



2023 PROGRAM EVALUATION NARRATIVE

June 13, 2023

NARRAGANSETT BAY
ESTUARY PROGRAM

MASSACHUSETTS • RHODE ISLAND • CONNECTICUT

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Introduction

The Narragansett Bay Estuary Program (NBEP, program, partnership) is a catalyst for scientific inquiry and collective action to restore and protect the water quality, wildlife, and quality of life in its 2,000 square mile [Study Area](#) of Narragansett Bay, Little Narragansett Bay, the Coastal Salt Ponds, and their watersheds, in Rhode Island, Massachusetts and Connecticut (see Figure 1 below). Founded in 1987, NBEP is one of 28 [National Estuary Programs](#) (NEP) created by §320 of the Clean Water Act (CWA). Hosted by [Roger Williams University](#) (RWU), with a [staff of four](#) and governed by a 30-member [Steering Committee](#), the program operates across boundaries to communicate science, lead collaborative planning, and fund pre-construction work that helps build a pipeline of future projects that sustain the natural environment and communities (See Figures 2 and 3). Guided by the 2017 publication, [State of Narragansett Bay and Its Watershed](#), our 2012 [Comprehensive Conservation and Management Plan](#) (CCMP), the newest science, and the shared will of our partners, NBEP strives to be bold and maximize impact by supporting leading-edge, community-driven work to help address the Study Area's toughest problems. See NBEP's [Fact Sheet](#) and [website](#) for more information on our place and work. This *2023 Program Evaluation* describes NBEP's efforts toward CWA goals and place-based priorities from [July 1, 2017 to September 30, 2022](#) (Evaluation Period or period). Over this period, NBEP is proud to have reshaped one of the nation's founding NEPs into a high-functioning, service-based organization that is helping to address the interrelated challenges of urbanization, climate change, and inequity facing the region.

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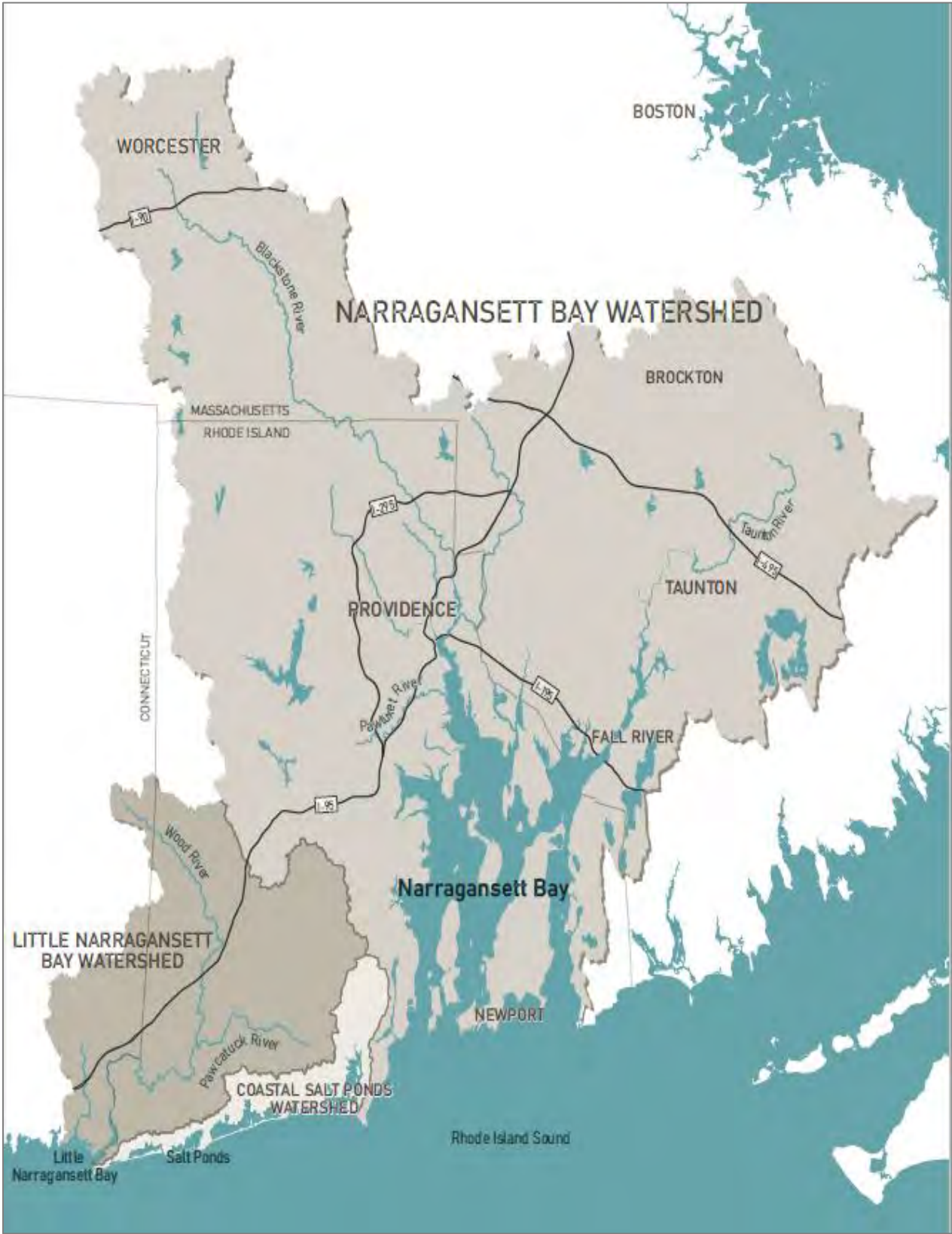


Figure 1: NBEP Study Area.

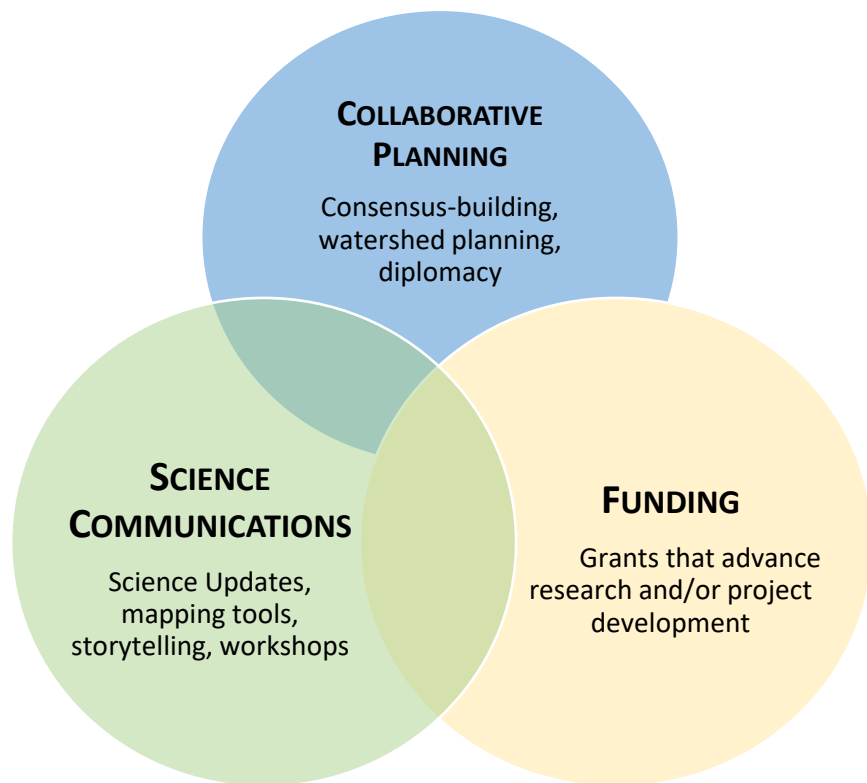


Figure 2: NBEP Core Services.

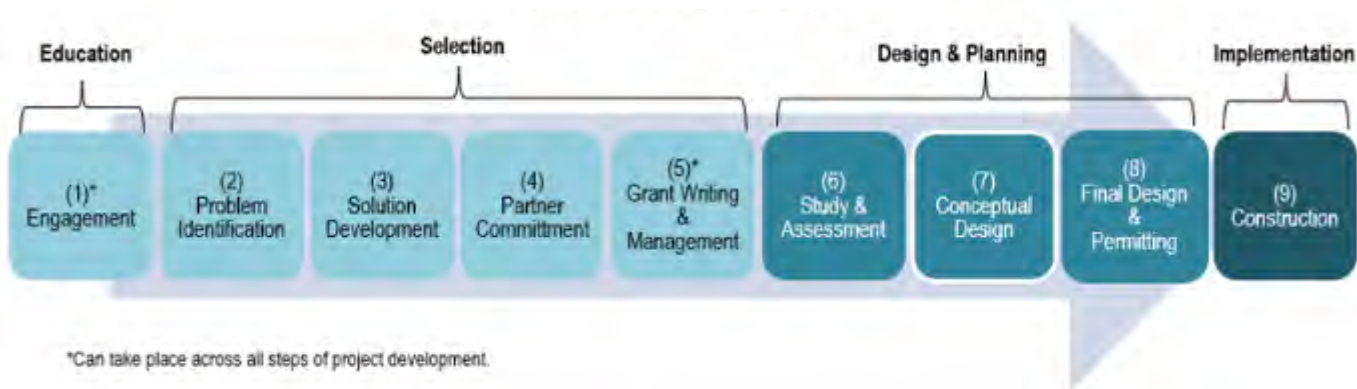


Figure 3: NBEP 9-Step Project Development Process.

Topic 1: Accomplishments

The Clean Water Act calls on NEPs to restore and maintain the ecological integrity of estuaries of national significance by addressing the quantity and quality of their waters, habitats, and living resources with the goal of making waters fishable and swimmable. Individual NEPs pursue these big picture goals by addressing the priorities of their Study Areas via implementation of a CCMP, [annual workplans](#), [bylaws](#), and sound program management. According to NEPORT reporting provided by EPA, NBEP leveraged \$2.9 million dollars and supported restoration of 4,435 acres of habitat during this Evaluation Period. NBEP appreciates the importance of these numbers for telling the collective NEP story; however, they only tell a small part of the NBEP story. NEPORT does not capture green infrastructure projects, nor does it include support for pre-construction project development, the latter being the core of program's current approach to advancing the CCMP. Most of reported habitat and leverage are partners' non-federal cost-share offered as match for the program's funding, in part, because NBEP does not conduct habitat construction itself (see [Topic 2, Section B](#) below). Thus, NBEP is pleased to offer a full picture of its accomplishments during this period in this narrative.

This section includes **53 accomplishments** (also called projects) that span NBEP's tri-state Study Area. This area is inclusive of the program's historical focus area of the Narragansett Bay watershed in Rhode Island, expansion into Massachusetts over the last decade, and recent efforts to bring more services to the major tributary rivers, Coastal Ponds in Rhode Island, and Little Narragansett Bay watershed that reaches into Connecticut. Included work was completed from October 1, 2017 to September 30, 2022, as well as some efforts that began during this period but remain ongoing (e.g., CCMP update, green infrastructure planning, and capacity-building grants). Included for each accomplishment is background, NBEP's role (e.g., completed the work, funded the work) deliverables, outcomes, lessons, investment (for funding projects), media coverage, and the CCMP objectives and Workplan tasks it helped meet. The 29 accomplishments that are connected to a specific location are depicted on the map provided as Figure 4; the remaining 24 not shown apply to the entire Study Area or the Narragansett Bay watershed.

Note that NBEP routinely funds projects that take several years to complete, causing some to span Evaluation Periods. More specifically, projects are included as accomplishments here if they were solicited during this period or required notable staff management in this period. Multi-year projects solicited prior to this period where staff merely received the final report are not included. One accomplishment during this period that set the stage for award of [Infrastructure Investment and Jobs Act](#) (BIL) funds in FY2022 was included. Keep in mind that NBEP's CCMP includes 24 objectives and 118 actions, all of which are broadly drawn, so one-to-one comparison between the CCMP and an NBEP accomplishment is challenging. For clarity and simplicity, CCMP references are kept at the objective level—the objective(s) that the project most helped to meet are listed. The CCMP objectives that projects helped meet are shown in Figure 5. Further, accomplishments are organized by the three categories suggested by EPA, Clean Waters, Healthy Ecosystems, and Strong Communities, as well as a 'General' category that includes work spanning all three EPA categories. By and large, all NBEP's work seeks to deliver benefits to the triple-bottom line of environment, economy, and community.

Funding for this work came from annual appropriations to NEPs under §320 of the Clean Water Act and the [Southeast New England Program](#) (SNEP). Note that due to a backlog of unspent funds at the outset of this Evaluation Period and a few carry-forward projects, §320 and SNEP funds from FY2015 and FY2016 were used to complete work during this period. Some FY2021 §320 funds were utilized to prepare for deploying BIL monies. Note that when referring to fiscal years this document is referring to the *EPA fiscal year*, that is, the fiscal year each annual award begins (e.g. an award made on 10/1/2019 is called FY2019).

All told, the accomplishments described herein resulted in convening over 500 stakeholders, publishing 33 scientific pieces and 4 watershed plans, advancing development of projects that can impact roughly 5,600

acres of natural resources, providing \$1,600,000 to external partners, and bringing in an estimated \$12,000,000 of non-federal leverage. These accomplishments illustrate the program’s transition over five years from its roots as a funder of research and restoration to a more collaborative, interdisciplinary, and nimble body that provides a range of niche services and financial support to projects that respond to local needs across the Study Area.

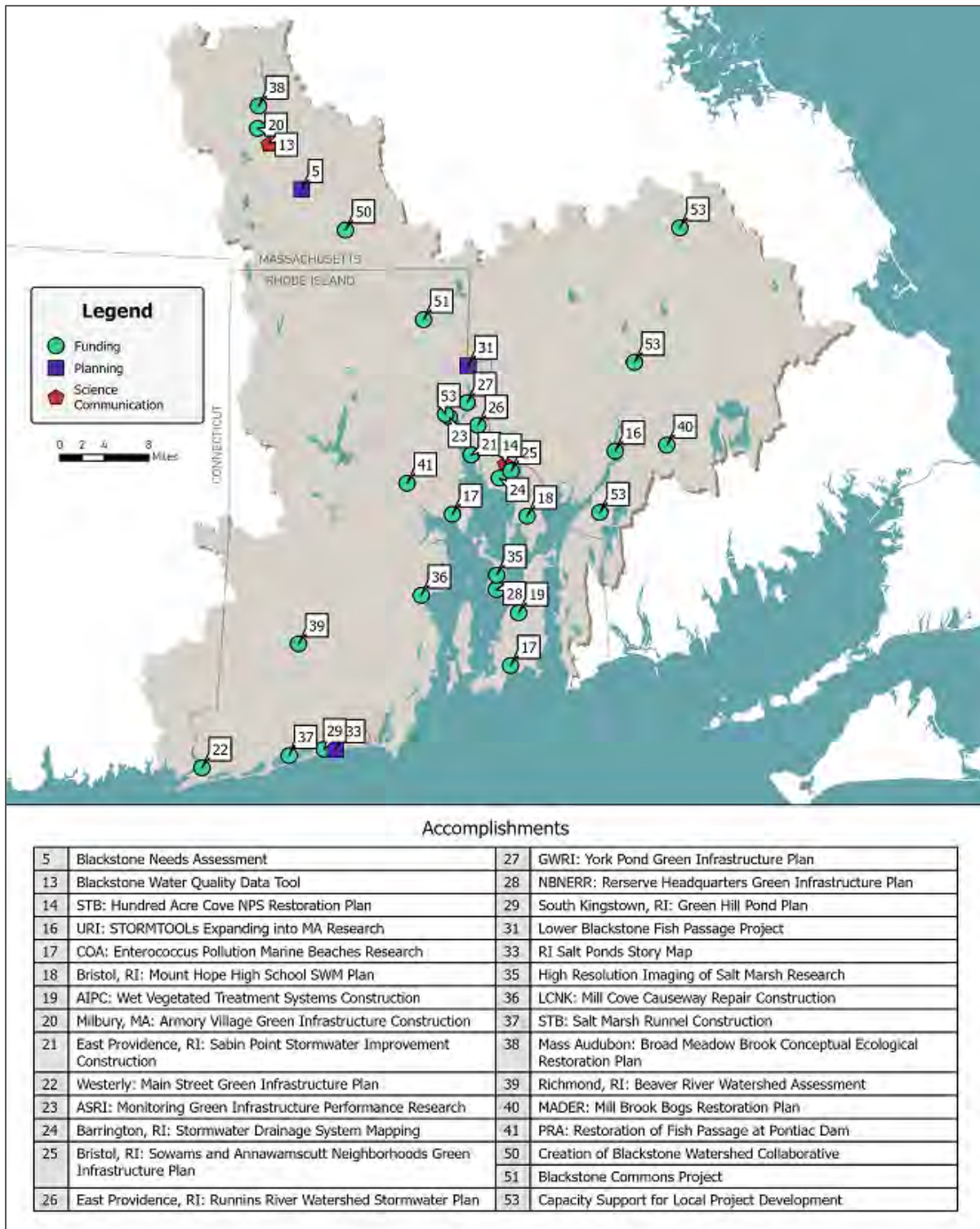
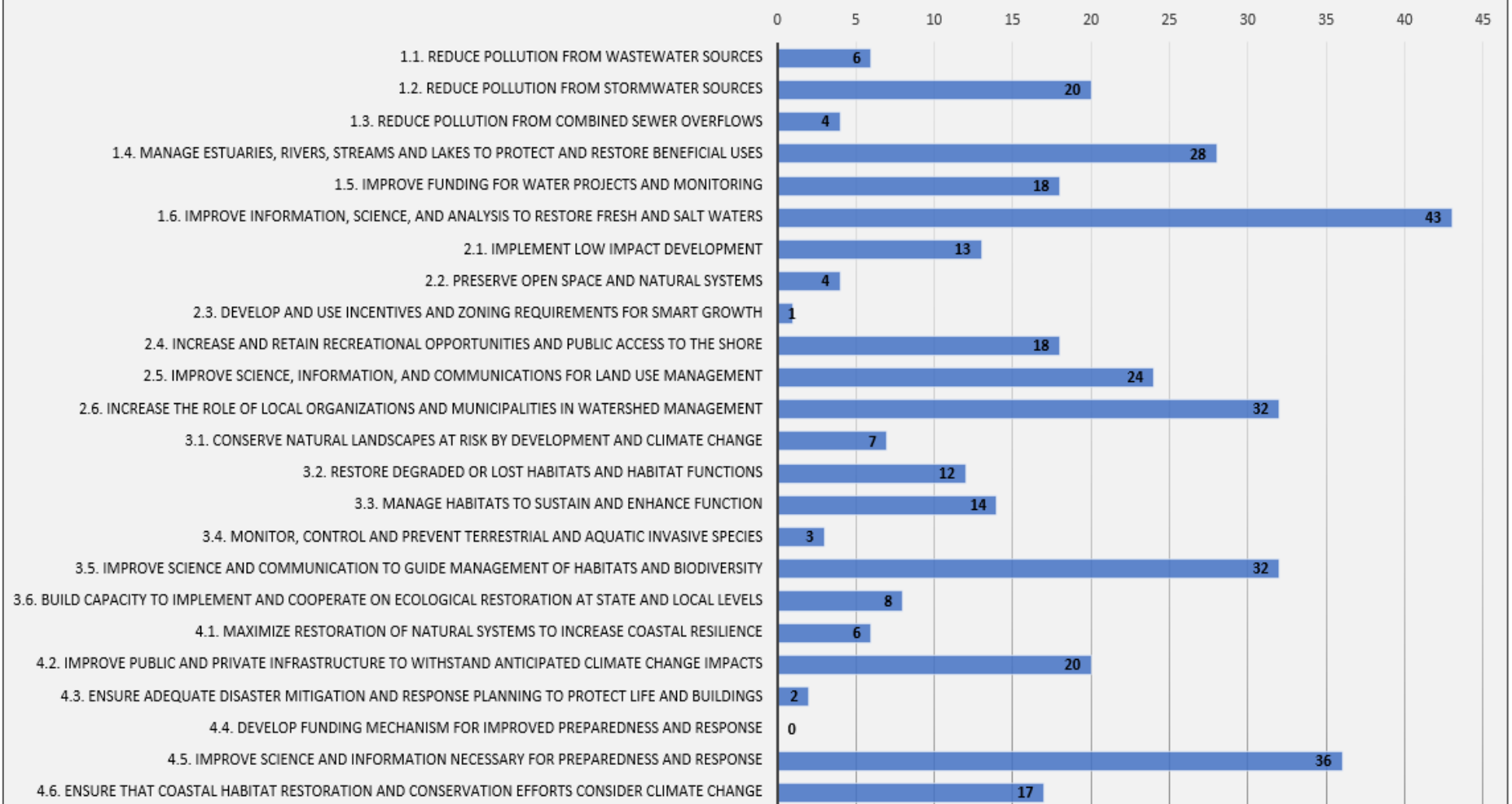


Figure 4: 29 accomplishments connected to a specific location. 24 more that apply more broadly are not depicted.

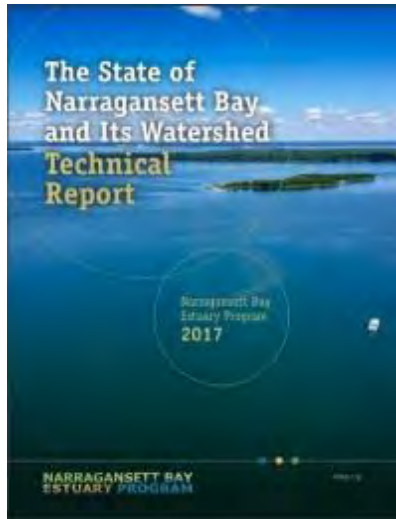
Figure 5: Accomplishments Per CCMP Objective



A. General

1. State of Narragansett Bay and Its Watershed Report

NBEP's current guiding scientific document for Narragansett Bay and its watershed, the *State of Narragansett Bay and Its Watershed* report, was published in October 2017 (2017 Report). The 2017 Report includes the status and trends for 24 indicators. This full Technical Report was accompanied by a 28-page [Summary Report](#), a 4-page [Overview Sheet](#), and [Errata Sheet](#). This work built on NBEP's [Current of Change](#), CCMP, and



[Watershed Counts](#) documents released between 2009 and 2017. Final comments, predominantly received from NBEP's Scientific Advisory Committee and the commercial fishing industry, were reviewed and used by NBEP to make final edits to these materials in late FY2017. Following publication, the program circulated a press release, held a [webinar](#), and hosted a series of public workshops, including [Providence, Rhode Island in October 2017](#), [Fall River, Massachusetts in October 2018](#), and [Worcester, Massachusetts in April 2019](#). Due to constraints on EPA's staff ability to speak at the 2017 workshop, the 2017 Report received significant national media attention, including in the [New York Times](#). The Program and partners also created a detailed map gallery of the 2017 Report results titled, [2017 State of the Bay and Its Watershed, Mapping Drivers of Change and Variation](#), which received an award at the ESRI User Conference in July 2018. Finally, NBEP published a [synthesis paper](#) on the 2017 Report's findings in May 2020. The key lesson learned was that without a baseline (where we have been, where

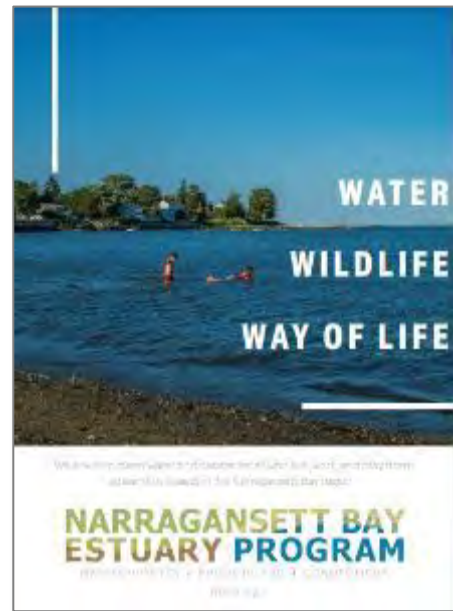
we are) it is a challenge to set and measure against goals (where we want to go). A nearly singular focus of the program from 2014 to 2018, this suite of materials has become an invaluable base of knowledge for the Narragansett Bay region that opens the door to future to goal-setting, greater accountability, and investment. Completing these materials met CCMP Objective 1.6, 2.5, 3.5, and 4.5 and multiple tasks in NBEP Workplans from FY2017 to FY2020.

2. Indicator Update Quality Assurance Project Plan

Since NBEP is charged with examining, synthesizing, and sharing environmental and social-environmental data for the Study Area, EPA requires NBEP to have a current Quality Assurance Project Plan (QAPP). A QAPP was approved in 2019 and revised in 2021. The revised plan, Quality Assurance Project Plan: State of the Narragansett Bay Estuary Program's Study Area Indicator Update Project, is inclusive of data collected by others used to update the 2017 Report and allows for the exploration of new indicators as appropriate. Indicator updates include any revisions, summaries, maps, or other documents that build on the 2017 Report with new and actionable information. Updated data will be analyzed using the same procedures utilized for the original 2017 Report. A lesson learned from this QAPP was how much of a barrier this type of paperwork can be to data development, and on the flipside, how much new science can be developed when you figure out how to streamline and be more flexible within the rules. This QAPP approach has offered significant efficiency for NBEP staff and partners as they seek to consider and share the most current science. Indicator Updates completed under this QAPP that relate to water quality, habitat, and social factors are described under Sections B and C below. This document supports CCMP Objectives 1.6, 2.5, 3.4, 3.5, and 4.5 and meets Task 2a/b in NBEP Workplans from FY2017 to FY2021.

3. NBEP Fact Sheet

For the first time in its 38-year history, NBEP published a [fact sheet](#) during this Evaluation Period that provided an overview of our place, role and services, accomplishments, and vision for the future. This 4-page document uses concise text, a regional map, and photos. With this public-facing piece, NBEP sought to tell its story (not that of the host or EPA) and exhibit a warmer service-oriented approach. The original version was created in FY2019 and revised in FY2021. This fact sheet has been a useful tool when connecting with new partners, and especially as a ‘leave-behind’ with elected officials. It also serves as the “case statement” suggested by EPA in our 2018 Program Evaluation. Developing this piece demonstrated the messaging power of color, pictures, and tone in addition to, or in lieu of, words. Completion of this work helped most meet CCMP Objectives 1.6, 2.5, 3.5, and 4.5, but supports the entire CCMP. It achieved Task 1f and Task 1h in the FY2018 and FY2019 NBEP Workplans, respectively. It has also been used for targeted outreach consistent with Task 5d and Task 4d in the FY2020 and FY2021 NBEP Workplans, respectively.



4. 2017 Watershed Counts Report

[Watershed Counts](#) was a series of reports on condition of the lands and waters of the Narragansett Bay and its watershed that were developed by the [Coastal Institute](#) in partnership with NBEP from 2011 to 2017. These reports built on the status and trends summaries in the 2012 CCMP, explaining science and sharing partner profiles related to beaches, water quality and flow, invasive species, aquatic and terrestrial habitat, climate change, and economics. The [2017 Watershed Counts](#) developed in late FY2017 focused on impacts of climate change, including impacts of warming waters on oysters, rising seas on salt marshes, and

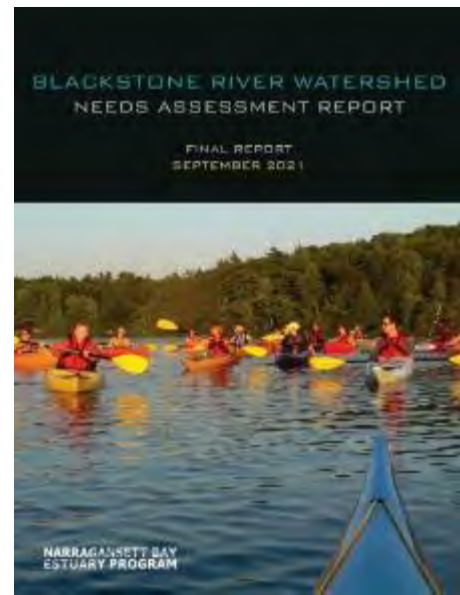
intensifying storms on coastal homes. New pictures were commissioned to create posters and post cards for outreach. A well-attended press event and press coverage by the *Providence Journal* and *RI Central* accompanied the release of the report. With publication of NBEP’s 2017 Report, Watershed Counts ceased publication in 2017.



This final report used simple storytelling and visuals to connect with decision-makers and the public about the realities of climate change that had already arrived in the region. A take home from this effort was that it is just fine to close down a project when you feel it has done its job and helped bridge to a new approach that better aligns with current needs (2017 Report and subsequent Science Updates). Completion of the 2017 Watershed Counts piece helped meet CCMP Objective 2.5, 3.5, and 4.5, and Task 3a in NBEP’s FY2017 Workplan.

5. Blackstone Needs Assessment

The Blackstone River and its watershed spans the Massachusetts—Rhode Island border and is vital to the region’s ecology, economy, and culture. It is the longest tributary to Narragansett Bay, running from north of Worcester, Massachusetts to Pawtucket, Rhode Island. It is also the bay’s second largest source of freshwater. The Blackstone River watershed hosts intact forests, cold-water fisheries, and growing recreational opportunities. The area has been home to indigenous people for millennia and is the birthplace of the US Industrial Revolution, earning the moniker “America’s hardest working river.” This hard work helped birth the nation’s economy but also brought dire consequences to the river. Watershed advocates have worked tirelessly since the 1970s to improve conditions by addressing legacy industrial pollution, connecting fish habitat, and better managing land use. Despite progress, there is much more to do to assure a healthier and more resilient watershed over the next 50 years, especially with climate change.



At NBEP’s workshop in Worcester in April 2019 noted in Section A.1 above, the consensus among participants was that a major barrier to making further headway on the river was prioritizing the sheer number of challenges before them given limited human capacity and funding to act. In response, NBEP convened a diverse group of interests over a series of [eight meetings](#) from December 2019 to September 2021 to explore local needs. The Program also piloted use of small capacity grants to help six local organizations participate in the meetings (\$4,000/organization for a total of **\$24,000**). In September 2021, NBEP wrote the collaboratively conceived [Blackstone River Watershed Needs Assessment Report](#), which describes high priority needs and 20 recommended actions to address them within the next five years. This effort was highlighted by the [Valley Breeze](#), [EPA HQ](#), [Spectrum TV News in Worcester](#), and other coverage from FY2020 and FY2021 noted [here](#). The first recommendation in the assessment, creation of the Blackstone Watershed Collaborative and hiring of a manager to oversee it, was accomplished quickly thereafter with NBEP funding. The Collaborative is discussed further under [Topic 1, Section D.50](#) below.

This project enabled the Blackstone 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. As designed from the beginning, pursuit of the recommendations in the assessment is now in the able hands of the local people. This offered a reminder for us, and anyone doing watershed work, that harnessing the passion and power of local people can deliver amazing progress. Further, this work also provides a new, replicable model for creating the pre-conditions necessary to advance paired ecosystem and community health in other large and complex watersheds in the Study Area and across southeast New England. This outcome is extra satisfying because the seed money for this effort was reallocated from a stormwater project that the Town of West Warwick was unable to complete in FY2015 (a funding shift that EPA SNEP staff were initially reluctant to do, but embraced when they met the local partners). NBEP is exceptionally proud that nearly all this work by staff and partners was completed remotely during the height of the COVID pandemic. NBEP’s completion of this project most helped meet CCMP Objectives 1.4, 1.5, 2.6, and 3.6, yet most objectives were supported in some way. It also met Task 5a, 5a, and 2d in NBEP Workplans for FY2019, FY2020, and FY2021, respectively.



Blackstone Needs Assessment from April 2021 with 37 participants. Photo credit: NBEP.

6. Program Evaluation 2018

NBEP completed its last Program Evaluation in October 2018. The Program Evaluation Team included Heather Radcliff, NBEP Interim Director with NEIWPC, Curtis Bohlen, Casco Bay Estuary Partnership, and Romell Nandi and Caitlyn Whittle from EPA. NBEP submitted its Program Evaluation Narrative to EPA in March 2018. The program then hosted a site visit in June 2018, where the Program Evaluation Team and NBEP committee members visited sites in Providence, Rhode Island, Warwick Rhode Island, Aquidneck Island, Rhode Island, University of Rhode Island campus in Kingston, Rhode Island, and Fall River, Massachusetts. EPA released their findings from the review in October 2018, noting that NBEP had passed the evaluation and remained eligible for \$320 funding. The letter stated that the program “has implemented corrective actions required in the [2013 Corrective Action Plan] CAP and fulfilled its responsibilities related to CAP-specific terms and conditions.” Further, EPA offered that NBEP had made progress addressing the four issue areas highlighted in the 2014 Program Evaluation and implementing the CCMP. Finally, the letter listed six ongoing challenges that NBEP is expected to address before its next Program Evaluation. [Topic 2, Section D.1](#) below describes how the program has responded to these challenges since 2018. The main lesson here was that being transparent and specific about problems—organizational or otherwise—is the best way to fix them. All told, both completing the CAP and showing improvements consistent with the 2014 Program Evaluation were important landmarks as the program overcame weaknesses that led to the CAP five years prior. Completion of this 2018 Program Evaluation and efforts to elevate program management helped meet Task 1 in NBEP Workplans from FY2017 to FY2021.

7. Vision 2032

NBEP is in the process of developing its next CCMP, which will be called [Vision 2032](#). This core organizational document has been a major work focus since FY2019. The program’s first [CCMP was released in 1992](#), with the update currently in place published in 2012. While important for NBEP and EPA, these past CCMPs, and their long lists of aspirational actions, in hindsight are viewed as not particularly useful to the broader conservation community. Vision 2032 will be a regional call to action for shared efforts over the next decade that can measurably improve the region’s capacity to act, the health and resilience of water quality and

wildlife, and the public’s access to nature (see Figure 6). It will feature a short-list of achievable actions for addressing priority problems in the Study Area from headwaters to sea over the next decade. In crafting the plan, a bottom-up community-driven process is being used that reflects best available science and diverse local voices. All actions will be reviewed through the lenses of climate resilience, sustainable resource use, and equity looking forward.



Figure 6: Vision 2032 Goals.

NBEP staff began work on the plan in 2020, holding [meetings](#) through April 2023 via a subcommittee and smaller planning groups. In August 2020 the program completed and obtained EPA Headquarters concurrence on a [Vision 2032 Blueprint](#), which maps out how the plan will be developed in line with EPA’s 2016 [CCMP Revision and Update Guidance](#). The program also obtained Office of Management and Budget approval of a Fast-Track Information Collection Request (ICR) in March 2021 that enabled NBEP to release a survey to obtain insights from people who have historically not been involved with NBEP, yet are most likely to be impacted by actions in the plan. Note that the program paused work on Vision 2032 for a year beginning in 2021 in response to the program losing two staff and COVID fatigue among stakeholders.

Re-starting in 2022 with new staff and energy, input to date was used to develop an [Action List](#), which includes 4 goals, 15 objectives, and 38 actions, as well as [Action Planning Worksheets](#) that will be used to develop the Action Plans that form the core of the document. 9-page Action Worksheets are complete for all 38 actions. Further, the program contracted \$18,550 in §320 funding to [Coastwise Partners](#) from FY2019 to FY2022 to assist with plan development, including interviewing committee members and other key partners to tease out any new [findings](#) on NBEP as an organization, or Vision 2032 specifically, before plan drafting starts this coming summer. Finally, a graphic designer and several authors were selected, who will create stories that serve as prologues for each chapter in the plan and be suitable for publishing in outlets like the *Atlantic* or the *New Yorker*. EPA-required checklists and other documentation will be included as Appendices. This innovative plan structure, which seeks to segment and organize the piece by target audiences, is described in Figure 7.

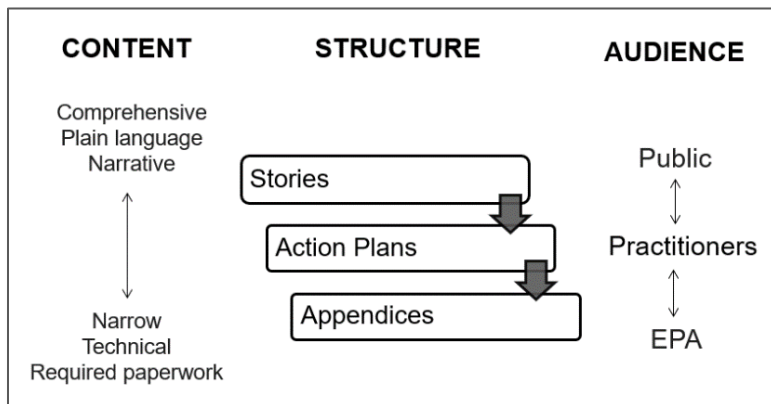


Figure 7: Vision 2032 Structure.

The program has sought, obtained, and responded to an unprecedented amount and diversity of input from scientists, resource managers, environmental advocates, and local communities. NBEP has hosted 17 meetings attended by 150 individuals supported by an active mailing list of 280 members; completed two community surveys that received 369 responses; offered 30 formal presentations and hundreds of one-on-one meetings; obtained coverage in the [Providence Journal](#); and contracted \$15,500 of \$320 funding to Tanager Creative to design and maintain a dedicated website (www.vision2032.org) that provides “one-stop-shopping” for obtaining planning materials, learning about meetings, and providing input. Targeted outreach to subject area experts on specific Action Plans and some interests where further engagement is needed, including commercial fishers and other natural resource-dependent businesses (e.g., commercial fishers, outdoor recreation outfitters), indigenous people and other underserved communities, and Connecticut partners is ongoing as the final piece is composed.

NBEP expects to complete writing and release Vision 2032 in 2024. An important lesson learned- more of a revelation - was that people are at the center of any successful restoration effort, from their engagement at the beginning, assessing how they are impacted by the problem and the solution, assuring their capacity to act, and fostering their willingness to steward the resource long term. Further, it was clear from a lot of outreach that despite an initial desire to do so, the plan cannot address everyone’s concerns. Throughout the process the program at times drifted into too much “planning to plan” in order to address every possible angle. The term “comprehensive narrowing” was adopted to consider all ideas, but to focus Vision 2032 on the actions NBEP and its partners have the expertise and agency to complete within ten years. Overall, the program feels confident it will have information that reflects the best science and local perspectives to develop a vision for 2032 that meets EPA requirements, guide NBEP’s services, and be useful for those seeking to lift water quality, wildlife, and quality of life in the region. Pursuit of Vision 2032 helped meet CCMP Objectives 1.6, 2.5, 3.5, 4.5, and 4.6, but ultimately will assist with achieving nearly all the objectives as refined in the future plan. It also supports Task 1h, 1j, 1j, and 2c in NBEP’s FY2018, FY2019, FY2020, and FY2021 Workplans, respectively.

B. Clean Waters

8. Narragansett Bay Chlorophyll and Hypoxia Response to Nutrient Loading Declines

Narragansett Bay is a warming temperate mid-latitude urban estuary that experiences seasonal periodic hypoxia. A defining moment for improving conditions in Narragansett Bay occurred in East Greenwich Bay in Rhode Island in 2003 when a perfect cascade of weather, nutrient loading, algal bloom, timing fish arrivals, *and* hypoxia killed an estimated 1 million fish, the largest kill in 50-100 years. The [Greenwich Bay Fish Kill](#) prompted the Rhode Island legislature to pass a law directing the Rhode Island Department of Environmental Management (RIDEM) to reduce nitrogen loading to Narragansett Bay by 50%. With subsequent new requirements in Massachusetts, a total of 17 wastewater treatment facilities (WWTF)—11 discharging directly to Narragansett Bay and 6 to tributaries—upgraded their nutrient treatment capabilities. By 2015, loadings to the Bay decreased 55% compared to 2000 levels.



Dead menhaden along shore. Photo [RIDEM](#).

While conditions in Narragansett Bay appeared to be improving based on monitoring and simple visual assessment, after setting baseline conditions in the 2017 Report, NBEP was interested in documenting more definitive evidence of recovery. NBEP provided a total of \$54,400 in funding to support reports released on [July 1, 2020](#), [July 7, 2020](#), and [September 10, 2021](#) by Dr. Dan Codiga, an expert in oceanographic data analysis, which resulted in the completion of the peer-reviewed article, as well as an NBEP webinar and Science Update:

- Codiga, DL, Stoffel, HE, Oviatt, CA, and Schmidt, CE (2022). [Managed Nitrogen Load Decrease Reduces Chlorophyll and Hypoxia in Warming Temperate Urban Estuary](#). *Frontiers in Marine Science*. Volume 9:930347.
- [Science Update: Changes to Chlorophyll and Hypoxia as a Result of Reduced Nitrogen Pollution](#).
- [Exploring Changes to Eutrophication and Finfish Communities with a focus on Mount Hope Bay](#).

This work found that Narragansett Bay responded to decreased nutrient loading from the 17 WWTF, and runoff to the system from riparian areas, between 2005 and 2019 in a manner consistent with “textbook” expectations for reduced chlorophyll and hypoxia—despite its complex coastline geometry, numerous river inputs, and widely-distributed treatment facilities (see Figure 8). Load reduction explains chlorophyll and hypoxia declines better than physical processes like river flow, stratification, tides, winds, sea level differences, and temperatures. Looking forward, it is believed that climate trends should be at least as important to future eutrophication as the nutrient load declines because, in addition to warming influences, long-term increases in river flow would increase load and stratification. This work was covered by [EcoRI News](#) in August 2022.

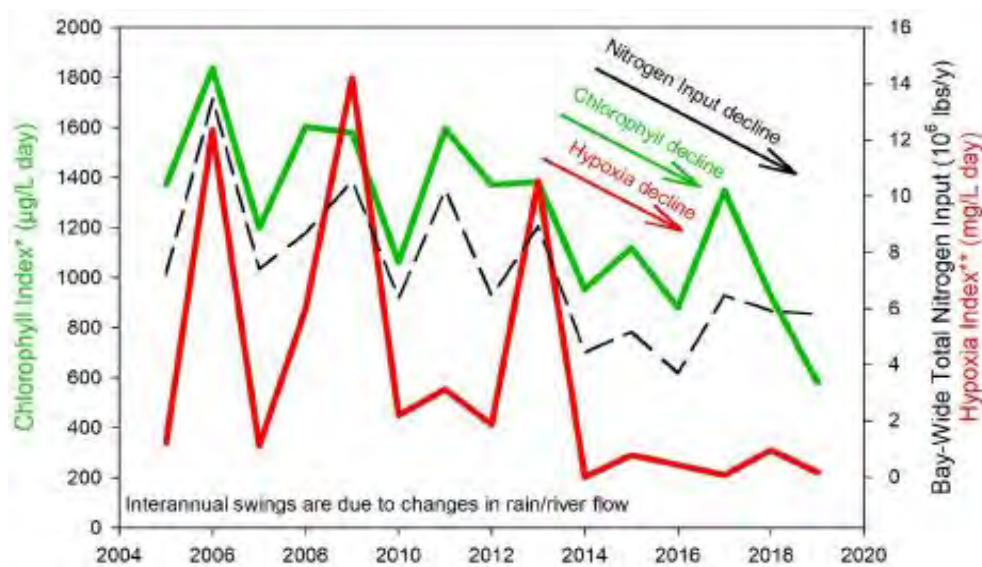


Figure 8: Nitrogen, chlorophyll, and hypoxia decline ([Schmidt, 2021](#)).

This work uses deep scientific analysis paired with simple messaging to demonstrate that the efforts to clean up Narragansett Bay that ramped up 20 years ago *have worked*. The opening of new quahogging areas for harvest described under [Topic 1, Section B.12](#) below also describes the estuary and its managers’ response to pollution reductions. A lesson from this project was not to let the complexity of a topic deter its exploration, especially if you offer sustained support of trusted specialists fueled by the challenge of untangling complex problems. This kind of work helps boost the credibility of the researchers and managers

overseeing the region's waters, justify public expenditure in pollution reductions, and establish that we collectively have the capability to relatively quickly and effectively respond to environmental challenges. Completion of this work helped confirm and publicize attainment of CCMP Action 1.1.2 specifically, meet Objectives 1.1., 1.3, 1.6, 3.5, and 4.5, and achieve NBEP Workplan Task 2e in FY2018, Task 2d in FY2019, Tasks 2a/f and 5d in FY2020, and Tasks 2a, 3b, and 4d in FY2021.

9. Narragansett Bay Anthropogenic Nitrogen Response to Reductions in Nutrient Loads

From 2008 to 2018, nitrogen loads to Narragansett Bay decreased by more than 50%. These reductions were largely the direct result of WWTF upgrades to tertiary treatment. NBEP staff worked with colleagues at EPA to assess how the distribution of sewage-associated nitrogen changed before, during, and after upgrades. The following paper was published in FY2018:

- Oczkowski, A, C.E. Schmidt et al (2018). [How the distribution of anthropogenic nitrogen has changed in Narragansett Bay \(RI, USA\) following major reductions in nutrient loads](#). *Estuaries and Coasts* 41: 2260-2276.

While seasonal and regional comparisons using pre- and post-upgrade dissolved inorganic nitrogen and Secchi depth from the early 1970s to 2016 resulted in only a few slight differences, use of nitrogen and carbon stable isotope data in particulate matter, macroalgae, and hard clams indicated that, even after nitrogen treatment upgrades, sewage-associated nitrogen still plays an important role in driving production and net production in the bay has decreased. In sum, five years after major treatment upgrades were completed, oligotrophication has begun and sewage (from smaller WWTF, septic, stormwater) still remains the dominant source of nitrogen to Narragansett Bay. As pollution reductions are achieved, this information is vital for assessing the amount, type, and source of nitrogen that supports a healthy and productive bay. Completion of this project helped meet CCMP Objectives 1.1., 1.2, 1.3, 1.6, 2.5, 3.2, 3.5, and 4.5 and Workplan Tasks 2a/d in FY2017 and Tasks 2c/f and 5c in FY2018.

10. Water Clarity Science Update

Healthy seagrasses that provide habitat for crustaceans and fish in estuaries rely upon clear waters. High nutrient levels can favor nuisance macroalgae, phytoplankton, and epiphytic growth that shades and inhibits grass growth. Sediment runoff from land is also a problem. Prior to the 1930s, the extent of seagrass in Narragansett Bay was vast— encompassing almost all sections of the bay that were less than 10 to 12 feet



deep, including the Providence River Estuary and Mount Hope Bay. Seagrasses then declined due to nutrient enrichment, physical disturbance, and a seagrass wasting disease outbreak in the 1930s, and now are found only in the Lower Bay. Measurements of water clarity—how far light can penetrate the water column—are useful for assessing water quality in estuaries. The [Water Clarity](#) chapter of the 2017 Report is based on Secchi depth and Photosynthetically Active Radiation (PAR) data from University of Rhode Island's Graduate School of Oceanography, the Narragansett Bay Commission, and the Narragansett Bay National Estuarine Research Reserve. As Secchi depth increases, so does water clarity. The 2017 Report noted that as of 2014 water clarity was best in the Lower Bay and declined into the urbanized Upper Bay, with clarity worse in the summer.

In FY2020, NBEP established the [Water Clarity Working Group](#) to reassess Narragansett Bay water clarity conditions in light of the

WWTF upgrades, consider different measurement tools, and explore if clarity data could be used in management decisions. The group met three times and in FY2021 NBEP published the Science Update titled, [Can we see our toes?: Water Clarity in Narragansett Bay](#). Due to its greater spatial and temporal coverage in the region and ease of use, Secchi depth was used over the generally more accurate than the more expensive and sophisticated photosynthetic active radiation (PAR). The same data sources used in the 2017 Report, along with data from RIDEM's Harmful Algal Bloom Program that added more sites, were analyzed in summers from 2010 from 2021, a period that spans before, during, and after WWTF upgrades. Data were compared against a 2010-2012 benchmark to show change.

The assessment revealed that water clarity increases with distance away from Providence, Rhode Island, aligning with the general north-south pollutant gradient that is well documented in the bay. Since 2012 clarity improved at all stations, including those in the Providence River Estuary where pollution and clarity are historically worse. This analysis adds to the growing body of evidence that water quality is improving in the northern reaches of the bay, likely due to WWTF upgrades and Phase 2 combined sewer overflow (CSO) abatement completed in 2012 and 2014, respectively. As noted in under [Topic 1, Section B.12](#) below, a part of the Providence estuary was newly opened to shellfish harvesting for the first time in 70 years. An important lesson from this work was to not let the perfect (e.g., PAR, peer-reviewed study) get in the way of the good enough (e.g., Secchi, update analysis) when looking for tools and trends in complex systems. This accomplishment helped meet CCMP Objective 1,4, 1.6, and 3.5 and NBEP Workplan Tasks 2a/b and 4d in FY2021.

11. [Atmospheric Nitrogen Deposition to Narragansett Bay Science Update](#)

Atmospheric nitrogen deposition data for Narragansett Bay is limited. The 2017 Report used 1995 data in the comparison of nutrient loading budgets from 2000-2004 and 2013-2015 that revealed a 55% decrease in wastewater nitrogen. Understanding how nitrogen species cycle through coastal ecosystems is vital to resource managers. Inspired by three pioneering papers on year-round event-based wet deposition, seasonal dry deposition, and air-sea fluxes of ammonia in Upper Narragansett Bay published by [Meredith Hastings' lab at Brown University](#) from 2020 to 2022, NBEP summarized these exceptionally complex studies into a Science Update completed in FY2020 titled, [What Goes Up Must Come Down: Atmospheric Deposition in the Narragansett Bay Region](#). Some key findings include:

- Urban areas experience more wet deposition (from rain) of nitrogen than rural areas.
- Ammonium wet deposition has increased by a factor of roughly 6 compared to 1990 levels.
- Dry deposition (from the air) could be 30% higher than wet-only observations, and shows upward fluxes of ammonia during the fall when runoff peaks.
- 49% of nitrogen in surface runoff is from atmospheric deposition.
- Nitrate deposition has decreased, yet deposition of the more bio-reactive ammonium has increased, since the 1990s.

Further assessment is needed to determine whether this new information can inform future nutrient budgets for Narragansett Bay, and the role that increasing ammonia is playing in bay phytoplankton blooms and urban air quality. This work has started to fill a big data gap acknowledged in the 2017 Report, and in time, it can lead to more accurate nutrient budgets and responsive policy action. Completion of these studies and our summary helped meet CCMP Objective 1.6 and NBEP FY2020 Workplan Tasks 2a and 5d.

12. Clean Water and Quahogs Story Map

Quahogs, or hard shell clams, are a popular shellfish that has a long history in the region. Around [20 million quahogs with a value of \\$5 million](#) are harvested annually from Narragansett Bay. Quahogs are filter feeders, making them sensitive to water pollution like harmful bacteria and biotoxins. Sources of pollution include discharges from WWTF, marinas, septic systems, and stormwater runoff. To protect public health from contaminated shellfish, state agencies monitor for fecal coliform bacteria and harmful algal blooms and then decide where shellfish like quahogs can and cannot be harvested for human consumption. Due to pollution from nearby cities, Massachusetts closed shellfishing in the waters of the Taunton River and the northern portion of Mount Hope Bay in 1926 and Rhode Island closed the Providence River in 1946. These areas remained closed through much of the twentieth century. By eliminating sources of pollution, more areas can be opened to shellfishing.

NBEP created a [Clean Water and Quahogs Story Map](#) in FY2021 to explain and celebrate the opening of 1,900 acres of the lower Providence River for the first time in 75 years (see Figure 9, red circle). Two infrastructure improvements completed by 2015 led to these new conditionally approved areas. First, three WWTFs directly upstream were upgraded. Second, the Narragansett Bay Commission finished Phase 2 of their work to replace the Providence, Pawtucket, and Central Falls CSO with an underground tunnel to capture, store, and enable treatment of more than 50% of storm related discharges that would have gone directly to the river. The newly opened area is now an ideal place to harvest shellfish, with shallow water and broad swaths of silty sand and mud. Having gone so long without being harvested, the quahogs in this new area are abundant and may act as a source of larval quahogs for the bay.

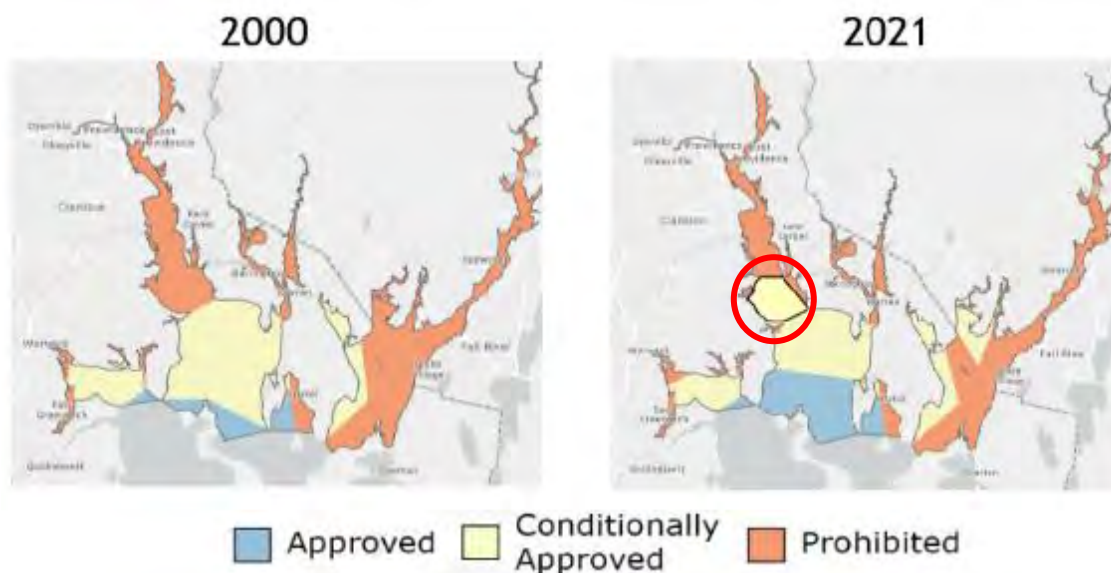


Figure 9: Change in Shellfishing Areas from 2000 to 2021.

The bottom line is that the investment of time and money in pollution reduction projects over the last decade worked. While covered by the [Providence Journal](#) and [EcoRI News](#), few stopped to hail this landmark. The subsequent opening of 180 acres of East Greenwich Bay for shellfishing in September 2022 following a successful septic-to-sewer program and the rare sighting of a Minke whale in Upper Narragansett Bay, both signs of a healthier and more productive system, also passed quickly through the news cycle in fall 2022 (see [EcoRI News](#), [Providence Journal](#)). NBEP created this story map in response to past lessons learned by the conservation community: that we are collectively bad at celebrating success—we just move on to the next problem. The intent was to create a rather simple piece that can be understood by the general public and

encourage their support for future pollution reduction work. Finishing this work helped meet CCMP Objective 1.4, 1.6, 2.4, and 3.5 and achieve NBEP FY2021 Workplan Tasks 2a and 4d.

13. Blackstone Water Quality Data Tool

The [Blackstone River Coalition](#) has coordinated a long-term Volunteer Water Quality Monitoring Program at strategic locations on the river’s main stem and major tributaries since 2003, which includes a network of 75 sites. Members of the coalition, the [Blackstone Headwaters Coalition](#), the [Blackstone River Watershed Association](#), and the [Blackstone River Watershed Council](#), each sponsor a monitoring team that collects data on aesthetics, water/air temperature, dissolved oxygen, turbidity, conductivity, nitrate, orthophosphate, and bacteria. Select information is routinely summarized in a Blackstone Watershed Water Quality Report Card. This nearly 20-year data set is extremely valuable. However, concerns were voiced during development of the Blackstone River Watershed Needs Assessment (see Recommendation #7, Page 60 [here](#)) that funding for continued data collection was becoming a yearly scramble, staff time to analyze and create report cards was limited, only a portion of the data was being submitted to states for inclusion in state biennial 303d reports, and the data set was not public.

NBEP staff worked with the Blackstone River Coalition in FY2021 to create a new publicly-available web-based [Blackstone River Coalition Water Quality Data Tool](#) to help address these issues. The tool utilizes a simple interface that allows users to create maps, graphs, report cards, and download raw data. See a depiction of the water quality field in Figure 10. This work will allow the coalition and its partners to more readily put this long-term data set to work for education, fundraising, and advocacy. Subsequently in early FY2022, [Patch](#) reported that the coalition received a \$23,000 grant from Massachusetts Department of Environmental Protection. A key lesson learned was how offering affordable (in this case, at no cost) specialty expertise can boost the already vital work of watershed groups. Consultant costs to create this type of web app are out of reach of most small groups. This accomplishment helped meet CCMP Objective 1.1, 1.6, 2.5, and 2.6, and Tasks 2d and 4d in NBEP’s FY2021 Workplan.

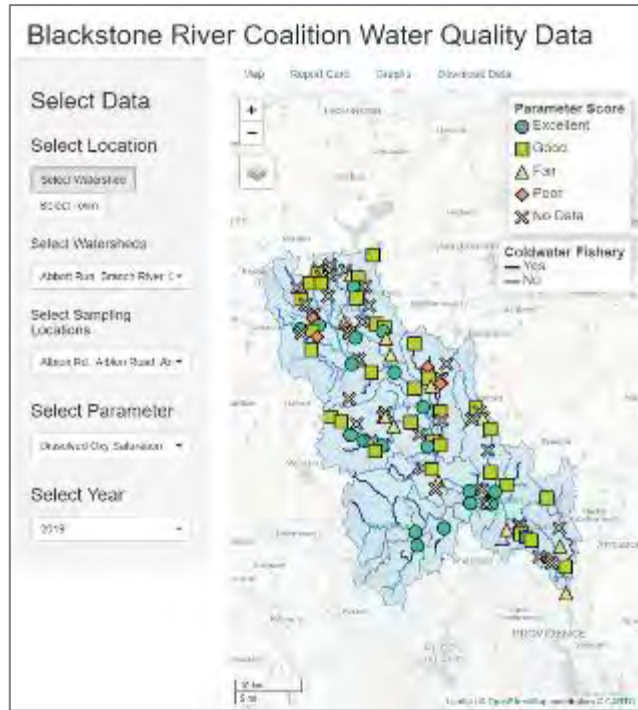


Figure 10: Blackstone River Coalition Water Quality Tool.

14. Save The Bay—Hundred Acre Cove Nonpoint Source Restoration Plan

Hundred Acre Cove, a part of the tidal Barrington River, is the third largest estuary in Rhode Island. The cove is shallow, broad, and includes small marsh islands that support breeding populations of birds and one of the only known breeding populations of the threatened diamondback terrapin in Rhode Island. Fishermen, boaters, and birders frequent the area. Save The Bay received EPA funding to identify and address nonpoint source pollution sources to the cove and its drainage area in Barrington and East Providence, Rhode Island, and Seekonk, Massachusetts. This effort was featured on [Save The Bay’s blog](#) in January 2019.

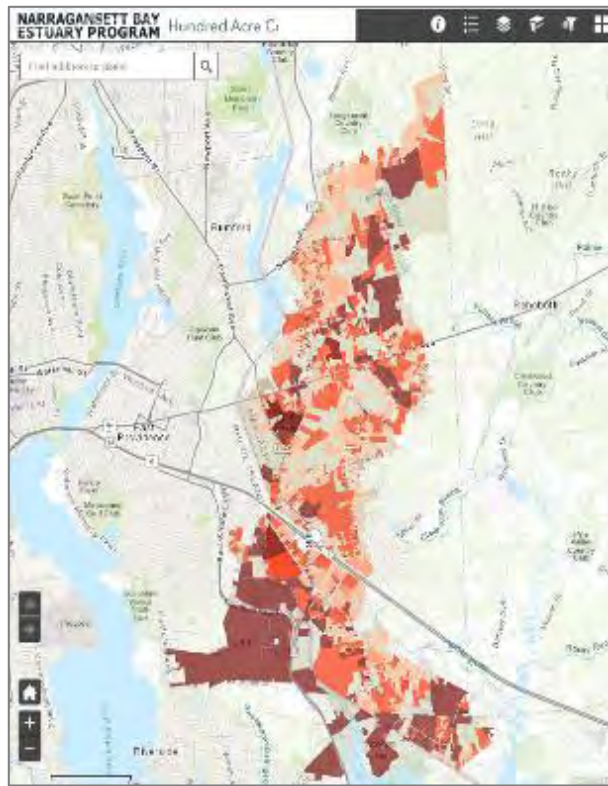


Figure 11: Hundred Acre Cove Septic Viewer.

NBEP analyzed municipal and state data to complete two GIS-based tools in FY2020: a [Septic Viewer](#) (see Figure 11) that shows system proximity to surface water and vulnerability to sea level rise and a [Stormwater Infrastructure Dashboard](#) that displays the location of stormwater infrastructure within the cove’s drainage. Both of these tools are intended to inform actions to better protect the cove, such as upgrading or relocating treatment systems, incentivizing septic pump outs, extension of sewer systems, and future land development decisions.

NBEP is especially pleased by these products in light of the lack of a clear role for the program at its outset. A lesson was to clarify expectations on open projects from departing staff at close-out. This tool is expected to help Save The Bay and the understaffed, and underserved, municipalities they are working with to identify future actions most protective of the cove. This accomplishment helped meet CCMP Objective 1.1, 1.2, 1.4, 1.6, and 2.6 and Task 5b in NBEP’s FY2020 Workplan.

15. NBEP Annual Event—Macro and Micro Plastics in the Narragansett Bay

NBEP has been a leader in regional science for decades. Over 100 scientific studies funded by the program, as well the 2017 Report and subsequent Science Updates, have helped create a strong baseline of knowledge. NBEP decided to launch an annual science event to bring together scientists, managers, environmental advocates, and the public to explore pressing issues facing the Study Area. The program hosted the inaugural event in 2022 at RWU, titled “[Macro to Microplastics in Narragansett Bay](#),” which served as a learning forum on current science around plastics from source to the bay. Over the course of a full day workshop, 70 attendees heard from a diverse mix of 15 speakers about pollution sources and sinks, monitoring approaches, impacts on wildlife and people, management techniques, and burgeoning efforts to address the problem. One of our speakers, Rebecca Altman, wrote this excellent plastics piece in [The Atlantic](#). Participants learned that humans have had a relationship with plastic since the Industrial Revolution. Plastics—from the microscopic to house-sized—are found all around us, upstream sources must be cut while also cleaning downstream, and much more work is needed to find, treat, and reduce plastics in our world.

In FY2022 NBEP developed a [summary](#) of the event, and posted all presentations to the event website. A lesson from this event was the importance of, as well as the collaborative and respectful tone set, by compensating speakers for their time. Further, RWU’s event hosting capability was fantastic, freeing up NBEP staff to focus on the content of the program. The event offered content that was well-suited for experts and the public to learn, enabled new relationships among plastics practitioners across the US, and led to NBEP hiring two interns to assist RWU faculty with plastics research. With planning for a rare species event at RWU in fall 2023, the program expects this to become a signature event. The event generated plastics pieces in

EcoRI News in [October 2022](#) and [January 2023](#). This project helped meet CCMP Objective 1.6 and 3.5 and Task 4a in NBEP’s FY2021 Workplan.



NBEP Plastic Event, Keynote Panel Discussion: Jed Thorp, Scott Coffin, and Rebecca Altman. Photo: NBEP.

16. University of Rhode Island—Extending STORMTOOLS into Massachusetts

[STORMTOOLS](#) is a web-based geospatial tool created by the [University of Rhode Island](#) (URI) for high resolution mapping of storm inundation risk, with and without sea level rise, for varying return period storms. The tool covered all of Rhode Island's coast and most of Narragansett Bay, with the exception of Mount Hope Bay and the adjacent Massachusetts shoreline. Predictions are provided that show water extent and depth at any given point for nuisance coastal floods (1, 3, 5, and 10-year recurrence intervals) and 25, 50, 100, and 500-year storm scenarios. Sea level rise of 1, 2, 3, 5, and 7 feet on their own as well as combined with each storm scenario are also modeled. STORMTOOLS is accessed online and simple to use, with no need to download software or complete extensive training. At its simplest, it provides flooding estimates for a location or problem of interest for coastal planners and homeowners. At a more sophisticated level, it can be used to craft plans and engineering designs to enhance coastal resilience.



Figure 12: STORMTOOLS Expansion.

NBEP contracted **\$26,964** in §320 funds to the University of Rhode Island (URI) in FY2020 to extend STORMTOOLS to capture all of Mount Hope Bay and the adjacent shoreline up to the City of Taunton by regenerating all data layers and online maps to reflect the newly modeled areas (See Figure 12). URI published their [final report](#) on this work and released the new version of STORMTOOLS in FY2020. A lesson from this work was the risk of having only one entity, in this case URI, with the capability to update an important, widely-used tool. URI staff are quite busy and they carry a high indirect rate (reduced to 25% for this work), which could potentially hold back future updates. As a tool used by the RI Coastal Resources Management Council (RI’s Coastal Zone Management agency) for permitting decisions, ensuring current data will be vital down the road. This project brought this state-of-the art and accessible tool to all salt waters in the bay

watershed. It also helped meet CCMP Objectives 2.5, 3.1., 4.2, 4.5, and 4.6 and Task 2e in NBEP's FY2019 Workplan.

17. Clean Ocean Access—Predicting Enterococcus Pollution at Marine Beaches

NBEP's 2017 Report identified historic and continuing health risks at marine beaches in the Narragansett Bay watershed. Yet, the report noted that its assessment was constrained by a limited scope for identification of temporal trends, comparison of health risks, and identification of the root causes of waters contaminated with bacteria across the large spatial extent of the bay. NBEP utilized a request for proposals (RFP) to subaward and manage \$16,000 of \$320 funds to [Clean Ocean Access](#) (COA) in FY2017 to complete an Assessment of the Research Needs for Marine Beaches. This report responded to the need identified in the 2017 Report to better understand the current status and trends of the region's beaches. The project focused on two beaches, Oakland Beach in Warwick, Rhode Island and Easton's Beach in Newport, Rhode Island, both of which have experienced high levels of fecal coliform pollution. The typical approach to water quality monitoring relies on culturing the fecal-indicator bacteria, *Enterococcus*. However, delays of greater than 24 hours to publish results can lead to poor protection of public health or unnecessary beach closures. This work used beach-specific models based in EPA's Virtual Beach software and COA data collected from 2015 to 2018 to seek to identify the environmental variables most predictive of *Enterococcus* pollution.

The [final report](#) completed in FY2018 showed that the variables found to be statistically significant predictors of pollution were different for each beach. At Oakland Beach, rain and tide along with the groundwater depth of the Warwick Neck were best. At Easton's Beach, weather variables like current, prior rain events, and temperature were most predictive. Unfortunately, these models did not predict 2018 data, potentially due to the lack of high *Enterococcus* exceedances that year. Moving forward, Warwick approved use of the model on a trial basis, Newport chose to pursue another year of data validation, and the Rhode Island Department of Health agreed to test the model for potential closure triggers in 2019. This work advanced the state of the science toward faster and more responsive action. A lesson here is that new approaches take time to develop and do not need to be perfect to be useful. This work helped meet CCMP Objectives 1.2-1.6, 2.4-2.6, 3.2, 3.6, and 4.1 and Task 2e in the NBEP FY2018 Workplan.

18. Town of Bristol, Rhode Island—Mount Hope High School Stormwater Management Plan

The [Town of Bristol, Rhode Island](#) has completed several water quality and flood control related projects within the Silver Creek watershed, which flows to Mount Hope Bay and Narragansett Bay. Both bays are impaired for nitrogen and bacteria. Silver Creek bisects the Mount Hope High School campus. Currently, untreated stormwater is discharged from the campus's roofs, parking areas, and athletic fields directly to the creek. NBEP used an RFP to subaward \$25,000 in SNEP funds to the town in FY2019 to create a Stormwater Management Master Plan for the Mount Hope High School's 46-acre campus. The approach was to consider Rhode Island state stormwater manuals and the results of a stakeholder engagement process to identify potential green infrastructure projects that would increase removal of pollution from stormwater runoff, provide flood storage, reduce downstream flooding, restore wildlife habitat, and improve climate resilience. The [final report and plan](#) completed in FY2020 provides 10% designs for nine best management practices ranked high priority that would treat stormwater from at least 50 acres. See Figure 13 for a depiction of the campus and the creek. Practices ranged from sand filters to improved wetlands and swales to stream/pond restoration. The town and school are now better prepared to pursue funding for further design and construction. For example, the town pursued the project noted under [Topic 1, Section B.25](#) based on this plan. This work helped meet CCMP Objectives 1.2, 1.4, 1.6, 2.1, 2.2, 2.6, 4.2, 4.6 and Task 4b in NBEP's FY2018 and FY2019 Workplans.



Figure 13: Mount Hope High School plan showing scale and scope of stormwater management opportunities. See the creek running from the upper right through the campus to the middle bottom of the plan. Photo Credit: Bristol, Rhode Island.

19. Aquidneck Island Planning Commission—Wet Vegetated Treatment System Construction

Aquidneck Island is the largest and most populous island in Narragansett Bay. Located at the southern end of Narragansett Bay, it is bounded by the bay’s East Passage on its western shore, the Sakonnet River to its east, Mount Hope Bay to the north, and Block Island Sound and the Atlantic Ocean to the south. The Island is divided into five watersheds where water flows into fresh water streams, public water supply reservoirs, and Narragansett Bay. The interconnected nature of water resource issues on Aquidneck Island calls for regionally coordinated efforts to improve water quality and protect coastal resources. The [Island Waters Partnership](#) completed the [Status of Island Waters](#) in 2018 to document current water quality conditions and identify solutions to reduce stormwater pollution to Aquidneck Island’s fresh and salt waters. NBEP used an RFP to subaward \$100,000 in SNEP funds to the [Aquidneck Island Planning Commission](#) (AIPC) in FY2019 to upgrade three existing stormwater detention basins to wet vegetated treatment systems (WVTS). These practices filter runoff draining into two vital drinking water reservoirs known as St Mary’s and Sisson Ponds. The long-neglected twentieth century-era detention basins provided minimal, if any, filtration and the upgrades now provide a greater level of treatment in accordance with today’s standards. Construction of the WVTS involved installing sediment fore bays and hydrodynamic separators, reconfiguring the three basins by placing gravel, organic soil, and wetland vegetation, and providing designated maintenance access. The resulting WVTS treats 70,000 cubic-feet of stormwater from 32 acres of impervious surface, reducing phosphorus, nitrogen, bacteria, and suspended solids by 53%, 55%, 85% and 86%, respectively. Further, the removal of accumulated sediments from existing basins and restoration of wetland vegetation provides a range of co-benefits like wildlife habitat, climate resilience, and aesthetic improvements. Work was

completed with submission of the [Island Waters: Wet Vegetated Treatment System Construction Final Report](#) in FY2021.



Island Farm wet vegetated system in Middletown, Rhode Island. Photo: AIPC.

Construction was hampered by many challenges, including unexpected high groundwater, the impact of three massive named storms and resulting on and off-site damage remediation needs, persistent drought, and COVID work restrictions. While many of these issues were acts of nature, AIPC’s challenges responding to them and reporting back to NBEP were a larger concern. A big lesson from this project was to include a strong capacity criterion in future RFPs, which evaluates each applicant’s capability to carry out the project based on their record of completing projects of similar scope, duration, and complexity. A more heavily-weighted “Capacity and Function” criterion was

included in the RFP for the green infrastructure planning projects described in Topic 1, Sections B and C. Ultimately, today all three WVTs are operational and covered by a Long-Term Operations and Maintenance Plan to sustain performance. This project helped meet CCMP Objectives 1.2, 1.4, 1.5, 1.6, 2.1, 2.6, 4.2, and 4.6, as well as Task 4b in NBEP’s FY2018 and FY2019 Workplans.

20. Town of Millbury, Massachusetts—Armory Village Green Infrastructure Construction

Armory Village is an urban landscape that is the commercial and civic heart of the [Town of Millbury, Massachusetts](#). The Armory Village Green Infrastructure Project seeks to address stormwater runoff, reduce heat islands, and revitalize this environmental justice area plagued by pockets of blight and disinvestment. The area is located immediately upslope and within 500 feet of the Blackstone River. Previous studies, including the [Watershed-Based Plan for the Blackstone River Watershed Within the Town of Millbury](#) and the Municipal Vulnerability Preparedness Program resilience plan, noted that the inadequate drainage system for existing and future stormwater flows was a key issue for Armory Village.

NBEP used an RFP to subaward **\$75,000** in SNEP funds to the [Town of Millbury, Massachusetts](#) in FY2019 to construct green infrastructure practices at Armory Village. Installations included a flow-through planter, bioretention systems and rain gardens, a Stormtech Subsurface Stormwater Management System, porous pavers, trees, and native plantings. This project teamed with separately funded



*Flow Through Planter in Millbury, Massachusetts.
Photo Credit: [Town of Millbury](#).*

streetscape work to reduce stormwater pollution (nutrients, sediment, and bacteria) discharge, increase groundwater recharge, reduce localized flooding, decrease heat island impacts, improve air quality, and add safety and beauty to this degraded downtown. This project will intercept and infiltrate 70% of the stormwater flow from 10 acres before it reaches the Blackstone River just downgrade. Work was completed with submission of their [final report](#) in FY2020. More on future phases of this project is available [on the town's website](#). The project lead, the town's Planning Director, was exceptional, addressing unexpected (COVID) and expected (cost overlays) to complete this complex downtown revitalization effort, delivering on promised environmental and community benefits. This project helped meet many CCMP Objectives like 1.2, 1.4, 1.6, 2.1, 2.2, 2.5, 2.6, and 4.2, as well as Task 4b in NBEP's FY2018 and FY2019 Workplans.

21. East Providence, Rhode Island—Sabin Point Park Stormwater Improvement Construction

[Sabin Point Park](#) in the [City of East Providence, Rhode Island](#) along the Providence River in the northern part of Narragansett Bay is rimmed with sandy beaches and a shoreline that offers potential for swimming. Unfortunately, stormwater runoff and an outfall pipe cause periodic high bacteria levels that prevent swimming at this area, once called the “Jewel of the Bay” by the Rhode Island Tourism Guide. The city has been taking persistent action to reduce bacterial pollution enough to bring the first swimmable beaches to

the Providence area in many decades. This article from [The Pawtucket Times](#) discussed the broader effort by the city.



*Retrofit installation on Willow Street in East Providence, Rhode Island.
Photo Credit: East Providence, Rhode Island.*

NBEP used an RFP to subaward **\$100,000** in SNEP funds to the city in FY2016 to construct and monitor the effectiveness of a stormwater retrofit consistent with the RIDEM-funded Sabin Park Watershed Comprehensive Stormwater Design Plan. A diversion from an existing basin, hydrodynamic separator, and Stormtech Isolator Row infiltration chambers were designed, permitted, and installed beneath Willow Street. This retrofit site is 63 acres, treating maybe 20 acres. This work is expected to reduce 97% of sediment, 88% of phosphorus, 96% of nitrogen, and 90% of bacteria. Save The Bay pursued outreach

from 2017 to 2021 in the surrounding communities about the benefits of the project and how it can help open up a new local recreational resource. Work completed with submission of their [final report](#) to NBEP in FY2021. The results of this project were excellent, showing how to pursue stormwater retrofits in a constrained-urban setting, helping create conditions for new recreational resource, and highlighting that investment in pollution reductions bring tangible benefits to communities. Further significant funding awards for this work has followed.

Stories on this project appeared in [Patch](#) in 2016 at award, in Save The Bay's blog (see [page 18 of this report](#)) in 2018, and most importantly in [Go Local Prov](#) in 2018 when the beach successfully reopened after nearly a century. While Save The Bay's expertise in stormwater and community engagement are strong, limited capacity resulted in a delay in the city closing out this project. Assuring project leads have sufficient staff to meet expectations should be a point of emphasis when NBEP selects projects moving forward. This accomplishment helped meet CCMP Objectives 1.2, 1.5, 2.6, 4.2, and 4.6, as well as Task 1d and 4a in

NBEP's FY2017 Workplan.

22. Town of Westerly, Rhode Island—Main Street Green Infrastructure Master Plan and Conceptual Designs

The Pawcatuck River and Little Narragansett Bay downstream are impaired for bacteria. As a gateway town to coastal Rhode Island, [Westerly, Rhode Island](#) is uniquely positioned to showcase how to use green infrastructure in a low-lying urban environment to best coexist with local waterways. Westerly has been deeply engaged in local planning to improve water quality and urban livability in the face of climate change. NBEP used an RFP to subaward **\$75,000** in SNEP funds to the [Southern Rhode Island Conservation District](#) in FY2021 to develop a green infrastructure master plan for the town's Main Street that includes three conceptual designs for practices consistent with their Municipal Resilience Plan/Comprehensive Plan. Priorities in these plans include use of nature-based solutions to reduce stormwater pollution to the river, decrease persistent inland flooding and increasing impacts of sea level rise, improve habitat, and replace pavement with public green space that connects this vital downtown corridor to the water. Town officials, downtown businesses, and landowners were engaged, the latter specifically to discuss retrofits on private property. Deliverables included site studies, conceptual stormwater master plan and renderings, and proposed green infrastructure concepts, from bioretention to tree filters to leaching basins, which could treat about 30 acres.



Westerly wrapped around the Pawcatuck River with Little Narragansett Bay in the distance. Photo: [Westerly, Rhode Island](#).

The [final report](#) and an excellent [Story Map](#) on the project were completed in FY2022. Project leaders noted in an article in [The Westerly Sun](#) in April 2023 that NBEP's support "allowed us to take the great work done through stormwater workshops and take it to the next step - how to manage stormwater along the entire corridor of Main Street." The town has now also received additional funding to pursue further engineering work from the Rhode Island Department of Transportation, Rhode Island Infrastructure Bank, and SNEP's Watershed Implementation Grant program. Four additional articles on are found on pages 11-20 of the [final project report](#). A lesson from this project, and really any that involves Fuss & O'Neill, is how valuable consultants that nurture long-term vision, and are willing to partner locally long-term to achieve it, can be to tackling the challenges facing municipalities. Another lesson is that investing in pre-project work opens the door to funding for deeper planning and construction. This accomplishment helped meet a long list of CCMP Objectives, including 1.2, 1.5, 1.6, 2.1, 2.2, 2.4, 2.5, 2.6, 3.1, 4.2, 4.5, 4.6, as well as Task 3b in NBEP's FY2020 and Task 3a in NBEP's FY2021 Workplan.

23. Audubon Society of Rhode Island—Monitoring Green Infrastructure Performance

Data on the realized effectiveness of installed green infrastructure practices is limited. Evaluating their performance is difficult due to the timing and short duration of storms, the sheer number of practices on the landscape, and the cost of traditional outfall monitoring. Nonetheless, it is recognized that green infrastructure practices do not always perform as intended, reducing their ability to improve water quality. In 2020 and 2021, the [Audubon Society of Rhode Island](#) (ASRI) and the [Providence Stormwater Innovation Center](#) piloted low-cost pressure sensors (water level) and loggers (rain amount) and remote field cameras to gather quantitative and qualitative performance data from at least three storm events on 24 practices at Roger Williams Park. This assessment protocol showed that only eleven practices were fully functioning, with the remaining 13 not fully functional due to inadequate maintenance or design or construction flaws.

NBEP used an RFP to subaward \$73,000 in SNEP funds to ASRI in FY2021 to test a low-cost performance assessment approach for green infrastructure practices in metro Providence, Rhode Island. This work is ongoing to implement the new assessment protocol on at least 20 practices outside of the park on sites managed by municipalities, nonprofits, and colleges in the Providence region. Findings will be shared via training sessions for design engineers and stormwater managers to inform practice design and operation changes, refine the assessment protocol, and otherwise inform broader stormwater manual changes and broader deployment of the protocol. The purpose of this work is to improve water quality by maximizing the performance of existing and future practices. By the close of 2022 excellent water level, rain, and video data were collected from 25 sites, mostly infiltration basins, from many large storms.

Preliminary data analysis is underway, but so far, the photo evidence in particular looks promising for informing changes. A lesson common to our work during this period is that simple, low-cost, and perhaps imperfect monitoring is fine if it is useful for tracking and responding to performance. Work will be complete by summer 2023. When finished, this project will help meet CCMP Objectives 1.2, 1.5, 1.6, 2.1, 2.6, 4.2, and 4.5, as well as Task 3b in NBEP's FY2020 and Task 3a in NBEP's FY2021 Workplan.



Infiltration basin treating runoff from parking lot at Providence College during heavy rain event. Inlet is working and berms are mostly containing flows. Overflow bypass appears to be functioning as intended. Photo: ASRI.

24. Town of Barrington, Rhode Island—Stormwater Drainage System Mapping

A disconnect hampering municipalities' ability to site green infrastructure has been a limited comprehensive knowledge of existing in-place drainage infrastructure. Absent such information, the tendency has been to mitigate stormwater piecemeal at the points where it is identified as problematic, which can lead to runoff being treated in low-lying areas where there is insufficient soil depth or other limiting factors making it difficult to treat the associated water volume. NBEP used an RFP to subaward \$33,700 in SNEP funds to the [Town of Barrington, Rhode Island](#) in FY2021 to develop a drainage system to identify opportunities to retrofit

existing stormwater infrastructure or install new green infrastructure. This ongoing project is creating a geodatabase to allow the town to better analyze potential opportunities to retrofit upgradient infrastructure or introduce new green infrastructure strategies in more suitable locations. Such a system-wide assessment will allow the town to maximize water quality treatment and best use of financial resources. Local GIS base layers have been updated, field work is underway to inventory the existing drainage system, and identification of outfall catchment areas is ongoing. This work is expected to be complete by September 2024. When finished, this project will help meet CCMP Objectives 1.2, 1.5, 1.6, 2.1, 2.6, 4.1, 4.2, and 4.5, as well as Task 3b in NBEP’s FY2020 and Task 3a in NBEP’s FY2021 Workplan.

25. Town of Bristol, Rhode Island— Sowams and Annawamscutt Neighborhoods Green Infrastructure Plan

The [Town of Bristol, Rhode Island](#) is working to address stormwater-related bacteria pollution to the impaired Kickamuit River and Mount Hope Bay. Investments by the town, the Rhode Island Coastal Resources Management Council, and the Eastern Rhode Island Conservation District in end of street retrofits on public land and rain gardens on private property have been used to stem this problem. NBEP used an RFP to subaward \$94,424 in SNEP funds to the town in FY2021 to develop 10% concept designs for up to three green infrastructure projects on town-owned properties in the Sowams and Annawamscutt neighborhoods to reduce stormwater runoff from at least 10 acres to the Kickamuit River watershed. The watershed includes both densely populated residential development and town-owned open space, including Leahy Pond Park, which is where this work will focus. Field investigation, public workshops, and 10% designs are all underway, and when complete, will position the town to pursue further funding for engineering design. This project is expected to be done by September 2024. When complete, this accomplishment will help meet CCMP Objectives 1.2, 1.4, 1.5, 1.6, 2.1, 2.6, 3.3, 4.2, and 4.5 and Task 3b in NBEP’s FY2020 and Task 3a in NBEP’s FY2021 Workplan.

26. City of East Providence, Rhode Island—Runnins River Watershed Stormwater Planning

The Runnins River flows nine miles in Rhode Island and Massachusetts into Hundred Acre Cove and then Narragansett Bay. This river is a quite degraded urban river whose watershed has extensive impervious



A paved swale directing untreated runoff to highly degraded section of the unnamed tributary to the Runnins River. Photo: East Providence, Rhode Island.

surfaces. Over the last decade, municipal and nonprofit partners have been acting to improve this waterway. NBEP used an RFP to subaward \$45,000 in SNEP funds to the [City of East Providence, Rhode Island](#) in FY2021 to develop a conceptual stormwater management plan for the 336-acre watershed and engineering, permitting, and bid documents for at least one site to reduce impacts to an unnamed tributary to the Runnins. The tributary has high bacterial counts, with downstream waters impaired for bacteria and closed to shellfishing. This ongoing project will build on the [Comprehensive Plan to Restore the Water Quality of Hundred Acre Cove](#) created via the work in [Topic 1, Section B.14](#) above, advancing plans to reduce

bacteria and nutrients in stormwater by redirecting runoff to linear infiltration practices in the right-of-way, re-engineering outdated controls like paved swales, and de-paving roads that end along the river. A partnership with Save The Bay offers technical assistance and outreach regarding rain gardens and rain barrels on private properties. When complete, these materials will assist further engineering and fundraising toward construction. Work is just beginning, with data collection underway on two roads identified as high priority. It is nice to see the program's past investment in a Stormwater Infrastructure Dashboard for the area is aiding development of responsive projects. This work will be complete by September 2024. When finished, this project will help meet CCMP Objectives 1.2, 1.4, 1.5, 1.6, 2.1, 2.6, 4.2, 4.5, and 4.6, as well as Task 3b in NBEP's FY2020 and Task 3a in NBEP's FY2021 Workplan.

27. Groundwork Rhode Island—York Pond Green Infrastructure Planning

The 400-acre York Pond watershed on the east side of Providence, Rhode Island, discharges directly to the Seekonk River and then Narragansett Bay. Over the years the pond has filled with sediment and chemical pollutants, and still captures largely untreated stormwater via pipes and runoff from the watershed. At first glance the area offers a strikingly natural expanse of water abutting dense development, however it is not safe to swim or fish in the Seekonk due to bacteria nor does it support aquatic life due to high nitrogen and low dissolved oxygen conditions. While work to address its industrial past and sewer overflows is progressing, there is no plan to address runoff from the watershed. NBEP used an RFP to subaward **\$92,029** in SNEP funds to the [Groundwork RI](#) in FY2021 to support site assessment, 10% concept and 75% engineering designs, and public engagement for at least three green infrastructure practices that will address untreated stormwater runoff and improve public enjoyment of nature in the area.

This ongoing project will focus on York Pond and the directly upgrade areas on the south end of Blackstone Boulevard, a wide expanse of asphalt road that greets visitors using the liner park along Boulevard to access Blackstone Park and the Seekonk River shoreline. Leading the project is a new partnership of nonprofits, city departments, and academic institutions convened by the new Seekonk River Alliance. The coalition intend to create permit-ready designs for three green infrastructure practices that intercept and infiltrate stormwater and offer other co-benefits like safe natural areas for the public. This accomplishment remains ongoing, with hiring of an engineering consultant, completion of site assessments and surveys, and drafting of 10% designs begun. A lesson from this project is not to discount what newly-formed hyper-local groups can do—the Seekonk River Alliance just formed and contacted NBEP in 2021, subsequently built a strong coalition, and has now received several grants to advance their vision. This work will be complete by September 2024. When done, this project will help meet CCMP Objectives 1.2, 1.4, 1.5, 1.6, 2.1, 2.4, 2.6, 4.2, 4.5, and 4.6, as well as Task 3b in NBEP's FY2020 and Task 3a in NBEP's FY2021 Workplan.



York Pond discharging to the Seekonk River. Photo Credit: Groundwork RI.

28. Narragansett Bay National Estuarine Research Reserve—Reserve Headquarters Green Infrastructure Planning

The [Narragansett Bay National Estuarine Research Reserve](#) (NBNERR) is located in the geographic center of Narragansett Bay with 4,453 acres of terrestrial and submerged land on Prudence, Patience, Hope and Dyer islands. NBNERR promotes informed management and sound stewardship of coastal resources through long-term monitoring, research, and hands-on education at the reserve and across the watershed. NBEP used an RFP to subaward **\$50,015** in SNEP funding to NBNERR in FY2021 to complete conceptual designs, engineering plans, construction cost estimates, and permitting for at least four green infrastructure practices to collect and treat runoff from rooftops and roads from their reserve headquarters on Prudence Island. The proposed work is especially important at the reserve headquarters on Prudence because the entire island is served by community and private wells, and groundwater supply and quality have long been issues of concern. Future construction will reduce stormwater runoff volumes and pollution, recharge groundwater, and provide education for island residents, visitors, and NBNERR program participants.



*NBNERR headquarters on Prudence Island, Portsmouth, Rhode Island.
Photo Credit: NBNERR.*

So far, NBNERR has partnered with a URI Landscape Architecture class who developed 13 conceptual designs for the landscape around the headquarters that would incorporate green infrastructure and they have solicited bids for engineering services from firms on the state's Master Price Agreement. NBNERR has demonstrated great competence in navigating state procurement policies to

advance this work, something NBEP will keep in mind when funding state agencies for design and construction work moving forward. This work will be complete by September 2024. When done, this effort will help meet CCMP Objectives 1.2, 1.4, 1.5, 1.6, 2.1, 2.6, 3.1, 3.2, 4.2, 4.4, and 4.5, as well as Task 3b in NBEP's FY2020 and Task 3a in NBEP's FY2021 Workplan.

29. Town of South Kingstown, Rhode Island—Green Hill Pond Green Infrastructure Planning

Green Hill Pond on Rhode Island's coast is a beautiful spot, home to over 100 species of finfish and shellfish, including species of concern such as alewife and blueback herring. However, the pond is quite degraded. It is impaired for bacteria with high nitrogen and low dissolved oxygen, has experienced large declines in submerged aquatic vegetation and oysters, is closed for shellfishing, and is the only coastal lagoon in the Coastal Ponds watershed holding a Category 5 (worst) rating from the state. Green Hill Pond's impaired condition is largely caused by stormwater runoff directly to the pond and from its 3,400-acre watershed. The pond is depicted under [Topic 1, Section C.33](#) below. Previous work funded by the town and SNEP resulted in final design and permitting for ten stormwater practices on publicly-owned lands, with construction expected soon. Because much of the pond's watershed is residential development, delivering lasting improvement work on private properties is vital. NBEP used an RFP to subaward **\$99,000** in SNEP funding to

the [Town of South Kingstown, Rhode Island](#) in FY2021 to complete engineering designs, permitting, and outreach to support green infrastructure development on up to four private sites in the watershed.

This ongoing project will enable design and permitting for up to four stormwater practices on private sites and provide design assistance for ten property owners on “yard-scale” retrofit tactics like rain barrels and small rain gardens. To date the town’s engineering consultant has completed a pollution attenuation study, has nearly finished design plans that will accompany permit applications, and outreach to homeowners’ associations and residents is ongoing. With completion of this work by September 2024, the town will be ready to seek funds for construction, expand outreach to more homeowners for yard-level practices, and deliver impactful reductions in pollution reaching the pond. A story in July 2021 in [EcoRI News](#) discussed how Rhode Island beach water quality has positively responded to less pollution. When finished, this project will help meet many CCMP Objectives, including 1.2, 1.4, 1.5, 1.6, 2.1, 2.4, 2.6, 3.2, 4.2, 4.5, and 4.6, as well as Task 3b in NBEP’s FY2020 and Task 3a in NBEP’s FY2021 Workplan.

C. Healthy Ecosystems

30. NBEP Habitat Working Groups

In the early 2000s, NBEP, Save The Bay, and the Rhode Island Coastal Resource Management Council (CRMC) led a Rhode Island Habitat Restoration Team. This team served as a multi-interest/disciplinary habitat restoration workgroup to increase collaboration, effectiveness, and government funding for restoration in Rhode Island. The formal convening of this team phased out in the 2010s as NBEP and partners focused on other work, yet it continued informally among several of the leading habitat restoration practitioners in the state. In 2020, members of NBEP’s Steering Committee with specific interest in habitat restoration asked the program to consider stepping back into habitat convening, with the same purposes as the original team. NBEP formed and managed the three habitat working groups below:

- [Salt Marsh—Restoration, Assessment, & Monitoring Program \(RAMP\) Working Group](#): Met seven times to activate [Rhode Island’s Wetland Restoration Strategy](#) and [Strategy for Developing a Salt Marsh Monitoring Program](#) and otherwise coordinate ongoing marsh monitoring, management, and restoration in light of significant new funding available.
- [Submerged Aquatic Vegetation \(SAV\) Working Group](#): Met twice to assist cross-state collaboration on the science, standardized monitoring, and management of SAV. Due to recent retirements, SAV expertise dedicated to this region is currently lacking, so cross-boundary partnerships are vital.
- [Fishermen’s Ecological Knowledge Working Group](#): Met twice formally, and many times informally, to gather diverse interests, including managers, researchers, and commercial fishermen, to evaluate an NBEP funded-report on the results of a pilot-scale fishermen interview project that ran from 2014 to 2019. The group also explored next steps to integrate fishermen’s observations into existing ecological monitoring frameworks for Narragansett Bay. Fisherman may reside in underserved communities, bringing new connections to these areas. See [Topic 1, Section C.24](#) below for more details on this effort.

This ongoing work is useful to help bring together busy experts from across state lines to replace some of the informal “after hours” conversations, which had kept the essence of the former Rhode Island Habitat Team alive, with more formal purpose-driven gatherings on hot topics. NBEP is especially pleased that these working groups and their key members played a role in RIDEM/NBNERR forming a new interdisciplinary work group, *Increasing Capacity in RI for Ecological and Community Resilience Projects*, whose goal is to integrate habitat restoration staff and goals across entities and ultimately justify and create the pre-conditions for the

long-desired Rhode Island Department of Ecological Restoration. This continuing accomplishment helped meet CCMP Objectives 1.4, 3.1, 3.2, 3.3, 3.5, 3.6, 4.5, and 4.6, as well as Task 2b in NBEP’s FY2020 and FY2021 Workplans.

31. Lower Blackstone Fish Passage Project

Fish have been unable to reach historic habitat in the lower Blackstone River in Rhode Island since the construction of the Slater Mill Dam in 1793. Today, four dams, Main Street, Old Slater Mill, Elizabeth Webbing, and Valley Falls, located in heavily-urbanized Pawtucket to Central Falls, Rhode Island, do not allow diadromous fish passage between Narragansett Bay and the newly restored Lonsdale Marsh above Valley Falls, which offers 80 percent of the habitat in this lower river (see Figure 13 below). Fish species impacted include American shad, river herring including alewife and blueback herring, Atlantic salmon, and American eel. Fish passage past the four dams would deliver a wide range of important benefits, including opening up 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. When complete, this project would constitute the largest fish passage project in the bay watershed, in one of the most underserved areas in all of New England.

Despite these benefits, river advocates and managers working in fits and starts over the last 20 years have been unable to achieve passage. The heavily-urbanized setting, high construction costs, engineering complexity, mixed public and private land ownership, Federal Energy Regulatory Commission permitting decisions, and simple bureaucracy has blocked progress to date. At the request of the RIDEM Director, NBEP convened 22 diverse interests in 2021 to re-boot fish passage conversations. The goal of NBEP’s [Lower Blackstone Fish Passage Project](#) was to identify a path forward that maximizes meeting the needs of ecosystems, hydropower, and heritage from the river through the bay to the North Atlantic system. NBEP compiled and evaluated past planning documents, interviewed stakeholders, hosted two formal convenings and, and offered extensive one-on-one diplomacy over an 18-month period.

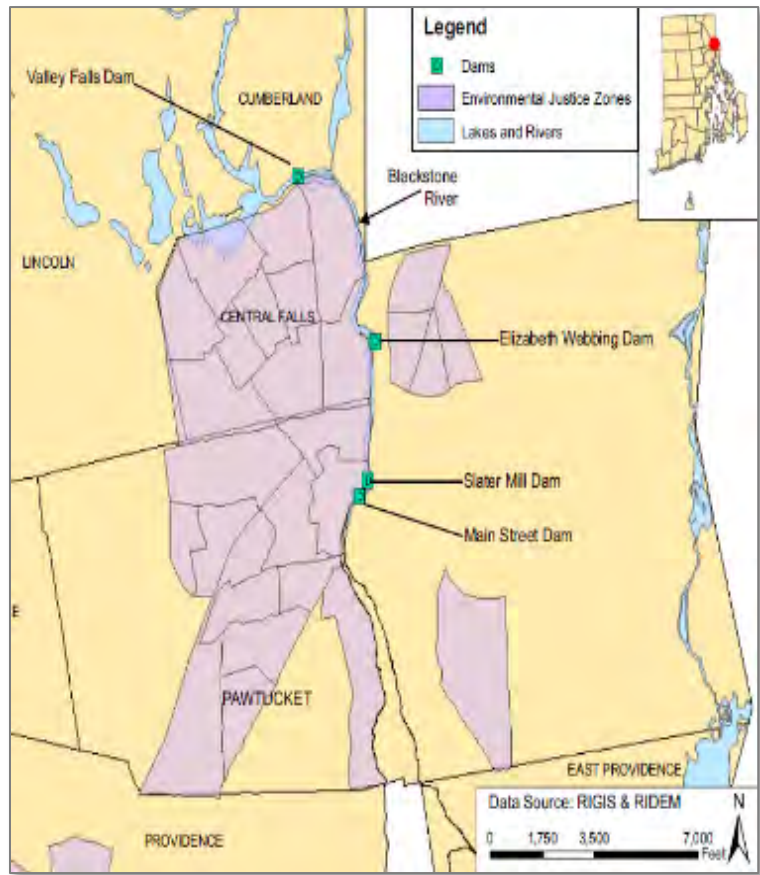


Figure 13: Geographic location of the four dams on the lower Blackstone River in Rhode Island. Photo Credit: Adapted from NRCS, 2008.

NBEP is thrilled to report that as of the close of FY2021, our convening and funding support finally advanced this landmark project for the Blackstone and the region as noted below:

- RIDEM committed to lead the project, via dedication of Director’s Office staff time and \$400,000 in State Bond funds to [The Nature Conservancy of Rhode Island](#) (TNC-RI) to cover 60% engineering designs and permit applications for fish passage at Main Street and Slater Mill dams. With Steering Committee approval of the FY2022 BIL Workplan in July 2022, NBEP committed to direct award \$300,000 to TNC-RI to pay for concept designs for the Elizabeth Webbing and Valley Falls dams. In total, this funding overcame a long-confounding issue for this project—“we can’t fund the project without a plan, we can’t plan the project without the funds.” *Note that after the close of this Evaluation Period, TNC-RI completed agreements with RIDEM and NBEP to receive funding and hired Fuss & O’Neill for engineering services. Site work began in April 2023.*
- Better relationships among interests are in place, especially the National Park Service and dam owners who felt left out of past efforts.
- With NBEP’s support, sufficient capacity is available for a local organization (the Blackstone Watershed Collaborative) to take over convening work and the Blackstone River Watershed Council to lead direct advocacy with tribes and the neighboring communities (see more on NBEP’s support for these organizations under Topic 1, [Section D.50](#), [Section D.51](#), [Section D.53](#)).
- There is strong support among Rhode Island’s congressional delegation for advancing this project near-term with the significant new funding available from NOAA and other agencies.
- Advanced Recommendation #14 in the Blackstone River Watershed Needs Assessment.

A clear lesson here is the absolutely vital role an independent and persistent convener can play in helping multi-issue/stakeholder projects move forward. NBEP, and now local Blackstone groups, are serving this role; without question, that is why this project is unstuck. Note that NBEP passed on the convener role intentionally at the end of FY2021 when the program began funding planning and advocacy for fish passage. This ongoing accomplishment helped NBEP meet CCMP Objectives 1.4, 2.4, 3.2, 3.3, 3.5, 3.6, 4.2., 4.5, and 4.6, and Task 2d in the NBEP FY2021 Workplan.



Touring geotechnical work at Main Street Dam. Photo: NBEP.

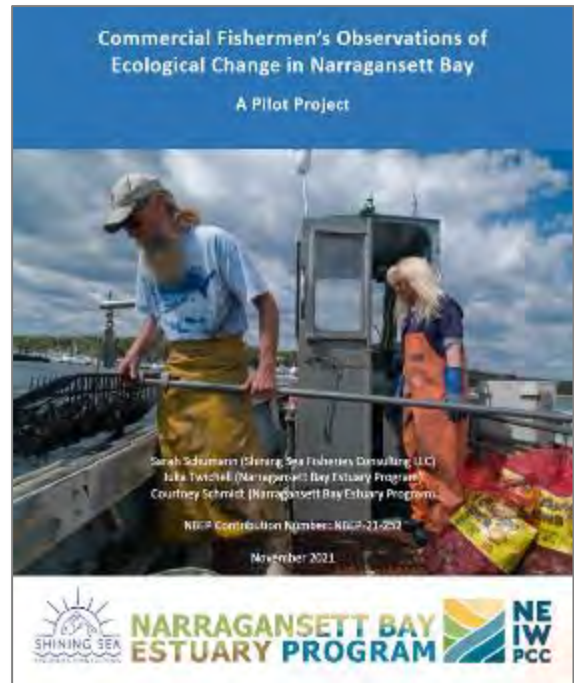
32. Fishermen’s Ecological Knowledge Project

The estuarine habitats that support living resources and resource-dependent economies in the Narragansett Bay region are in flux due to a variety of natural and anthropogenic factors. Although physical, chemical, and biological information is routinely collected by resource agencies, universities, and WWTF to quantify pollutant loadings to the bay, assess the bay’s ecological health, and inform management decisions, regulators, researchers, and resource users share a desire to create a more complete picture of these ecological changes and their impacts on the bay’s biota. Coming out of the Baird Sea Grant Symposium in 2017, which resulted in the important document, [Changes in Narragansett Bay](#), it was clear that further study and dialogue would be beneficial, and was especially important to commercial fishermen.

Around the world, social science has shown that commercial fishermen possess valuable ecological knowledge derived from their regular work on the water (fishermen’s environmental knowledge, or FEK). When properly collected and organized, FEK can fill spatial, temporal, species-level, and other gaps in the data collected by existing monitoring programs, and can contribute to better resource management. However, to do so, it must be gathered in ways that meet standards of scientific data collection and are valid given constraints on time, funding, and fishermen’s availability to participate.

NBEP provided GIS support and **\$10,000** in §320 funds to [Shining Sea Fisheries Consulting](#) in FY2020 to synthesize, document, and present the results of fishermen’s observations of ecological change in Narragansett Bay collected in 2014, 2016, and 2019. Shining Sea analyzed a set of 37 semi-structured interviews that elicited biotic and abiotic observations about the bay’s changing ecology from 26 commercial fishermen (lobstermen working the East Passage and shellfishermen working the upper portions of the bay). The resulting report, “[Commercial Fishermen’s Observations of Ecological Change in Narragansett Bay: A Pilot Project](#),” presents the analysis methods used, a synthesis of FEK data collected, and a comparison of FEK data with ecological data derived from existing monitoring programs. Some key patterns that emerged include:

- Quahog populations are at an all-time low with the exception of the Upper Bay, slipper snail (deckers) populations have soared, and lobsters are at historic low, with populations shrinking in a southward direction toward the mouth of the bay.
- Predictable types and distribution patterns in the seaweed/macroalgae community have given way to a more variable community structure characterized by an abundance of nuisance species and a near-absence of habitat-forming species like kelp and rockweed.
- Starfish, barnacles, and other fouling organisms are in decline.
- An immediate benefit of FEK is to fill gaps in existing scientific monitoring programs, especially outside targeted geographies such as coves and embayments, and taxa like once-common species that have become rare or taxa that have never been subject to permanent monitoring efforts, such as seaweed/macroalgae and native fouling invertebrates.
- Comparability of FEK with data from existing monitoring programs is limited due to differences in sampling methodology, magnitude/scale of observations, ability to distinguish among similar taxa, and level of abstraction (smoothing) in human observations. However, for species that have had regular monitoring, few discrepancies were found when data was compared to FEK.



NBEP was happy with the outcome of this novel work, especially the future data sharing and relationships it may stimulate. It successfully fine-tuned a new framework for organizing a wide range of FEK. Where most FEK studies conducted in the northeast US have focused on single species and have been interested in historic patterns of species distribution, this study showed the value of FEK for collecting information about an entire ecosystem during a time of rapid change. The project’s analytical framework has potential for widespread replicability in future FEK studies in Narragansett Bay and elsewhere. This project led NBEP to

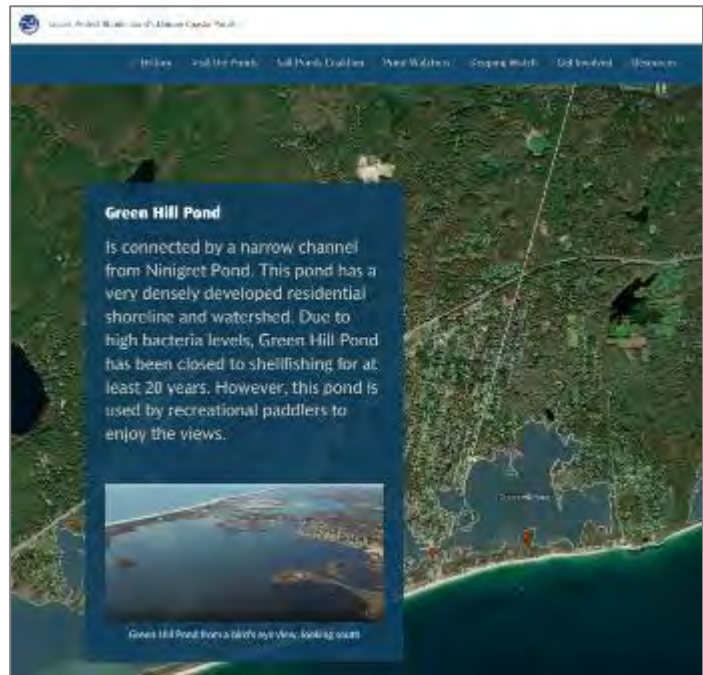
fund Boston University in 2023 to build on this work by further exploring types and patterns of seaweed/macroalgae in the bay. Especially important was the degree of trust across interests that flowed during this work. A culture of listening and respect is evident in the video of the final [workshop](#).

There were many lessons from this project. First, regulators and the regulated get along better when they can come together around a shared interest, in this case, exploring how to use FEK. Also, social science, when collected and applied properly, can have an important place in ecosystem management. Detecting the blatant, and especially the subtler, changes arising from climate change requires as many eyes on the water as possible. Barriers to including FEK are more social than scientific. This accomplishment helped meet CCMP Objectives 1.4, 1.6, 3.3, 3.4, 3.5, and 4.5, as well as Task 2e in the NBEP FY2020 Workplan and Task 3b in the NBEP FY2021 Workplan.

33. [Rhode Island Coastal Salt Ponds Story Map](#)

Some of Rhode Island’s most unique and important natural resources are the coastal ponds that line the state’s south shore. The Narragansett Tribe relied on these glacier-created saltwater lagoons for millennia, and the ponds remain a treasured natural resource today. Each pond has a unique identity and supports a range of wildlife, recreational opportunities, and two of Rhode Island’s two largest industries: tourism and fisheries. The land surrounding the ponds has a growing population, which has led to water pollution, hydrologic changes, and use restrictions. Further, these systems are extremely vulnerable to climate change as they sit at the frontline of sea level rise, higher temperatures, and more extreme storms.

In FY2020, NBEP partnered with the [Salt Ponds Coalition](#) to create a [Locals Protect Rhode Island’s Unique Coastal Ponds Story Map](#), which offered a tour of the location, habitat, and uses of the ten ponds that span 5600 acres. This tour was followed by an overview of the Salt Ponds Coalition’s work to watch over the ponds, with an emphasis on their long-term [water quality monitoring program](#). From 1985 to 2019, 150 Pond Watchers sampled 26 sites for temperature, rain, nutrients, bacteria, and dissolved oxygen. Pond Watchers program data resulted in rapid action to obtain a RIDEM advisory in summer of 2019 when the ponds experienced their worst bacterial contamination on record. As of the 2017 Report, 78% of the shellfishing areas in the ponds were open, thanks to the work of the Salt Pond Coalition, RIDEM, and other partners working to assure the reduction of pollution to the ponds and their watershed.



*Example information provided for each pond in the story map
Photo Credit: NBEP.*

While NBEP has funded some projects in the Coastal Ponds part of its Study Area in the past, this work represented a deepening of our commitment and partnerships in this region. NBEP subsequently funded projects in the ponds led by Save The Bay (See [Topic 1, Section C.37](#)), and continue to engage with the Salt Ponds Coalition via the [Rhode Island Rivers Council](#) and nascent connections with the Narragansett Tribe.

The [NEIWPC blog](#) published an article on the map in 2021. This accomplishment helped meet CCMP Objectives 1.1, 1.2, 1.3, 1.6, 2.4, 2.6, 3.3, and 3.5, and with Task 2g and 5b in NBEP’s FY2020 Workplan.

34. Benthic Habitat Recovery Survey and Story Map

Benthic fauna are the vacuum cleaners of Narragansett Bay. They eat small fish, crabs, sinking debris, and microscopic plankton. Their feeding releases nutrients and their burrows bring oxygen into the sea floor. Many other aquatic organisms, like fish, rely on them to thrive. They are truly the backbone of a healthy bay. Like other sea life, benthic animals struggle to survive in polluted water. The cascade of too many nutrients, algal production and poor water clarity, and low dissolved oxygen harm sea floor life. A long history of pollution has impacted the bay. However, recent WWTF and CSO upgrades, improved stormwater control, and addressing aging septic systems have reduced anthropogenic pollution. Narragansett Bay is recovering.



Simple storytelling graphic from benthic story map. Photo Credit: NBEP.

A decade after the most recent bay-wide survey of benthic habitat quality in 2008, NBEP used an RFP to provide **\$34,601** in §320 funds to URI in FY2018 to revisit the same sampling locations using the same sediment profile imaging technology and analysis tools. The latest survey is the third in a time series spanning 30 years of decreasing nutrient inputs. As in the previous analysis of 1988 and 2008 benthic habitat quality, URI compared the prevalence and spatial arrangement of benthic fauna between 2008 and 2018 surveys.

The [final report](#) released in FY2019 showed that bay-wide benthic habitat quality has improved. Diverse new species of tube-builders and burrowing animals that require better conditions have replaced hardier pioneers like *Ampelisca*. Trends in habitat quality were not uniform, showing less improvement in the bay’s uppermost Providence and Seekonk Rivers, Greenwich Bay system, and Allen Harbor, which are closest to pollution sources and are expected to be the final places where any improvement could occur. In FY2020 NBEP developed a story map titled [Recovery of the Sea Floor](#) that describes this complex work using plain language, pictures, and graphics. A lesson from this work is to celebrate and publicize successes like this, no matter if the wildlife lack charisma and are never seen by the public. The benthic community is the backbone of the bay’s ecosystem, and so lacking media coverage, NBEP felt it was important to tell this story. This accomplishment helped meet CCMP Objectives 1.4, 1.5, 1.6, 3.3, and 3.5, and Tasks 2a in NBEP’s FY2018 Workplan and Tasks 3b and 5c in the FY2019 Workplan.

35. URI—High Resolution Imaging of Salt Marsh Mapping Using Drones

As of 2012, 4,900 acres of salt marsh were mapped in NBEP’s Study area. Vital to all estuaries as nursery grounds, storm and flood protection, and filtering pollution, salt marshes are particularly important here in this region, with 256 miles of shoreline and associated marsh systems in Narragansett Bay alone that are already succumbing to sea level rise. Knowing the status and trends of marshes is essential to prioritizing adaptation strategies to protect them; however, field surveys are expensive and time-consuming, and they become outdated in the face of changing climate conditions. Advances in unmanned aircraft system (UAS) technology and new regulations allow for collecting near real-time imagery surveys in greater detail and reduced cost compared to manned aircraft and field options.

NBEP used an RFP to provide **\$35,000** in §320 funds to URI in FY2018 to evaluate the use of UAS to collect high resolution images to map and monitor salt marshes at NBNERR on Prudence Island, Rhode Island. The [final report](#) released in FY2019 documented the methods to map salt marshes at two sites on Prudence using UAS, provide suggestions for how to develop a new UAS program, and offer basic guidelines on conducting a UAS survey. While operating a UAS program and processing the resulting data is an intensive process, this work showed it can provide valuable data at relatively low cost, which means more chance to track changes in extent and type of salt marsh habitats over time. This approach can help directly address data gaps identified in the 2017 Report. More specifically, these data will support Tier 1 (consists of aerial imagery) of the three-tiered monitoring approach created by NBNERR and advocated by the Salt Marsh RAMP noted under [Topic 1, Section C.30](#) above. This accomplishment helped meet CCMP Objectives 1.4, 3.2., 3.3, 3.5, 4.1, 4.5, and 4.6, and Task 2a in NBEP’s FY2018 Workplan.



*View of Coggeshall Marsh taken with DJI Phantom Quad-Copter.
Photo Credit: URI.*

36. Land Conservancy of North Kingstown—Mill Cove Causeway Repair Construction

An unnamed healthy 3-acre salt marsh is connected via small creek to Mill Cove in Wickford, Rhode Island. A causeway was built 250 years ago to connect an island village in the marsh to the mainland. 20 years ago, the causeway collapsed into the creek blocking flow into and out of the marsh. The town created an emergency cut to allow saltwater into the marsh, leaving behind unstable partial cement walls, rubble, and sediment, which continues to erode into the channel, prevents proper marsh flushing, and disconnects popular parklands and trails used for hiking and birding on the westside from a residential area on the east side. The North Kingstown Land Trust completed engineering plans and permitting in 2019.



Location of creek and marsh off Mill Cove in Wickford, Rhode Island. Photo Credit: Land Conservancy of North Kingstown.

NBEP used an RFP to subaward **\$5,000** in SNEP funding to the [Land Conservancy of North Kingstown](#) in FY2019 to clear debris from the creek channel to open it up for easier and slower flushing, especially during storms and moon tides, stabilize the creek banks with geotextiles, riprap, and relocated stone, and prepare the site for future installation of a footbridge to restore the historical causeway path allowing safer public access across the marsh. This work was completed with submittal of a [final report](#) in May 2020. Separate funds were used to subsequently purchase and install a footbridge and signage. This article in [The Independent](#) describes the completed project in more detail. A lesson from this project was that a small investment, in this case \$5,000, helped resolve a long-standing problem and

created active new NBEP partners in this community. This accomplishment helped meet CCMP Objectives 1.4, 2.4, 2.6, 3.2, 3.3, 3.6, and 4.2, and Task 4b in NBEP's FY2018 and FY2019 Workplans.

37. Save The Bay—Salt Marsh Runnel Construction

Accelerating sea level rise over the last two decades and legacy agricultural impacts are hindering the ability of southeastern New England's salt marshes to keep pace with sea level rise, threatening their ecological health and viability and impacting critical habitat and essential ecosystem functions. Between 2012 and 2013, impounded water on the marsh surface, vegetation die-off, and degradation of marsh substrate were documented through salt marsh assessments throughout Narragansett Bay and Coastal Ponds watersheds. Without healthy plants on the marsh platform to trap sediment and increase marsh surface elevation through accumulation of below ground biomass, the surface of the marsh subsides and converts to shallow standing water. These shallow areas of water do not support fish and they create mosquito habitat. Assessment of aerial photos confirm a transition from vegetated marsh to open water in recent years. These impacts pose a profound threat to the health of coastal wetlands including the loss of native species, including the listed salt marsh sparrow, that rely on them for breeding habitat. Over the last decade, [Save The Bay](#) has completed 14 salt marsh adaptation projects that used shallow "runnels," shallow ditches, in the marsh platform to aid drainage of water and creation of higher elevation areas, allow early successful marsh vegetation to recolonize the platform, reduce mosquito habitat, and improve the marsh migration corridor so it can retain its function and ecosystem services with rising seas. A [Save The Bay blog post](#) talked about this technique.

NBEP used an RFP to subaward **\$25,000** in SNEP funding to Save The Bay in FY2019 to implement already permitted salt marsh adaptation projects on a marsh at Ninigret marsh in Charlestown, Rhode Island and two marshes on Winnapaug Pond in Westerly, Rhode Island. The project [final report](#) stated that Save The Bay collaborated with RIDEM and landowners over a 19-month period to excavate runnels using a low ground pressure excavator or by hand using interns and volunteers, place excavated material on the marsh to create

elevated microtopography, and monitor drainage and revegetation. Runnels were re-dug or extended inland as needed to assist drainage. In total, 800 feet of runnels were installed at Ninigret, and 3300 feet total at the Winnapaug Pond sites.

Across the sites, the project was successful and informative. Runnels continued draining impounded water, excavated peat and formerly impounded or bare areas began to revegetate, and on one site, *Phragmites* decreased and upland species of shrubs and trees were dying off due to saltwater intrusion. This work highlighted the importance of ongoing maintenance and the significant time such maintenance requires. An extended project period due to COVID allowed for extra visits to the site for maintenance and comparison to other projects. Save The Bay also began piloting a new Salt Marsh Stewardship Program, which would train small groups of volunteers to offer long-term maintenance of the runnels. This project helped meet CCMP Objectives 1,4, 2.6, 3.2, 3.3, 3.4, 3.5, 4.1, 4.5, and 4.6, as well as Task 4b in NBEP’s FY2018 and FY2019 Workplans.



Reduced standing water on marsh platform post-runnel excavation at Ninigret. Photo Credit: Save The Bay.

38. Mass Audubon--Broad Meadow Brook Conceptual Ecological Restoration Plan

Broad Meadow Brook Wildlife Sanctuary in Worcester, Massachusetts is the largest urban wildlife sanctuary in New England, with more than 400 acres cooperatively managed or owned by [Mass Audubon](#). The brook and sanctuary, nestled within an urban neighborhood, provides an oasis of wildlife habitat, trails, and education programs. The goal of Mass Audubon’s comprehensive Broad Meadow Brook Restoration Project is to achieve a self-sustaining, native riparian and wetland ecosystem within a 203 acre highly-altered and degraded wetland complex that offers a full suite of ecosystem services, greater climate resilience, and enhanced accessibility for the enjoyment of neighbors and visitors.



Educational hike at Broad Meadow Brook. Photo Credit: [Mass Audubon](#).

NBEP used an RFP to subaward **\$28,780** in SNEP funding to Mass Audubon in FY2019 to prepare a conceptual project roadmap for the Broad Meadow Brook property. A consultant completed base mapping, field reconnaissance of habitat conditions, feasibility assessment and suite of concept designs, a base conceptual roadmap and potential practices, and concept-level cost estimates. Two conceptual designs resulted: (1) restoration of sections of the brook with creation of new open water areas, elevated wooded

zones, and trail improvements, or (2) the work in option 1 plus additional trail improvements, observation platforms, and turtle nesting habitat. Both options included opportunities for channel daylighting and naturalization, floodplain reconnection, trail connectivity, and broader habitat enhancements to improve the ecosystem, with a recognition of the important role that beavers play in healthy freshwater stream habitats. Mass Audubon delivered a [final report](#) at the close of FY2021, after delays related to COVID and a rejected first draft of the contractor's roadmap document. This work has informed continued work on the property described in this article from [Worcester Magazine](#).

A lesson learned from this project, and others funded and reviewed by NBEP during this period, is to request clarity from applicants at proposal (and in periodic reports if funded) about the current stage of project development, how the current award will advance project development, and about projected next steps to get to construction. The intent is to ensure work systematically progresses from consultant studies to implementation. The conceptual project roadmap graphic provided as Figure 1 and discussion in Section 3 of the final report align with this thinking and NBEP's Project Development Process depicted in Figure 3. This helped meet a host of CCMP Objectives, including 1.2, 1.4, 1.6, 2.1, 2.2, 2.4, 2.6, 3.1, 3.2, 3.3, 3.5, 3.6, 4.1, 4.2, and 4.5, as well as Task 4b in NBEP's FY2018 and FY2019 Workplans.

39. [Town of Richmond, Rhode Island—Beaver River Watershed Assessment](#)

Beaver River is an essential water resource for the [Town of Richmond, Rhode Island](#) and the entire state. This small, second-order stream flows from James Pond in Exeter south to the Pawcatuck River and then Little Narragansett Bay. The watershed is 13,000 acres and the river flows 11 miles through forested areas, most of which is protected land. The watershed is mostly undeveloped, with the remaining land mostly used for agriculture (e.g., turf farms), a golf course, and some residential and commercial development. It supports a diverse range of aquatic and terrestrial species, including healthy populations of wild brook trout. In 2019, the Wood-Pawcatuck Watershed, including the Beaver River, was nationally designated as [Wild and Scenic](#), joining a stretch of the Taunton as the only rivers with that designation in NBEP's Study Area. Nonetheless, there are threats to this outstanding resource, with water quality, stream hydrology and temperature, and aquatic habitat suffering impacts from deteriorating inactive dams, inadequate culverts, and unmanaged stormwater runoff. Further, the changing climate brings larger, more intense, and more frequent storms, which puts additional stress on infrastructure, while rising temperatures jeopardize the cold-water fishery.

NBEP used an RFP to subaward **\$30,000** in SNEP funding to the Town of Richmond, Rhode Island in FY2019 to develop a watershed plan that identifies existing and potential future land uses, calls out potential restoration and land protection projects, develops criteria for prioritizing projects, provides recommendations for projects aligned with available funding opportunities, and enhances community stewardship through meaningful involvement of a formal advisory group and the public in planning. [The final plan](#) is a comprehensive and impressive piece that dives deep on this watershed, adding to the excellent existing planning resources for the region, such as the town's Comprehensive Community Plan, Wood-Pawcatuck Watershed Flood Resiliency Management Plan, and Wood-Pawcatuck Wild and Scenic Rivers Stewardship Plan. This article in the [Westerly Sun](#) speaks to the concerted outreach effort. There is strong, forward-thinking work underway in this corner of the Study Area, and NBEP is pleased to support it. This project helped meet many CCMP Objectives, including 1.2, 1.4, 1.5, 1.6, 2.1, 2.2, 2.5, 2.6, 3.1, 3.2, 3.3, 3.5, and 4.1, as well as Task 4b in NBEP's FY2018 and FY2019 Workplans.

40. Massachusetts Division of Environmental Restoration—Mill Brook Bogs Restoration Planning

Mill Brook Bogs is a 200-acre state-owned Wildlife Management Area in Freetown, Massachusetts. The site includes a large (127-acre) former commercial cranberry bog, perennial stream, and a 55-acre remnant of an Atlantic white cedar swamp, all of which are impacted by 100 years of cranberry farming impacts. Legacy agricultural impacts include sand fill over native soils and peat, interior and lateral ditching, and five dams. Planned restoration actions will target root causes of degradation and repair wetland hydrology using techniques successfully implemented on other retired cranberry farms in Massachusetts, including ditch plugging, dam removal, channel enhancement, extensive grading and microtopography creation, large wood placement, and planting and seeding of pollinator-friendly plants. These practices seek to increase water storage, improve water quality, improve biological diversity, and restore connectivity for aquatic organisms. The [Massachusetts Division of Ecological Restoration](#) (MADER) [Cranberry Bog Program](#) is leading a movement with partners to address an ongoing wave of bog retirements and create examples for other heavily degraded former agricultural lands.



Typical impaired surface of cranberry bog, and ditch fragmenting forested wetlands at Mill Brook Bogs site. Photos: MADER.

NBEP used an RFP to subaward **\$30,000** in SNEP funding to MADER in FY2019 to move this project from the preliminary design phase by supporting a draft 75% engineering design that includes geotechnical investigation to evaluate the feasibility of including pedestrian bridges and boardwalks across the site while maintaining optimal hydrological connectivity. The [final report](#), [geotechnical report](#), and [preliminary design](#) were completed in FY2020. Planned permitting applications were not completed due to COVID delay and staff changes. The draft design includes five pedestrian bridges that would enable excellent public access to the restored site. Per the [MADER cranberry bog project update site](#), fundraising for project permitting, final design, and bid documents was underway at project close. An observation on this project, and other cranberry bog restoration projects in the area, is that MADER and its dedicated Cranberry Bog Program are doing a superb job of coordinating with partners, completing thoughtful plans and studies, and installing projects that offer a balance between ecosystem restoration and public access. This project helped CCMP Objectives 1.4, 1.6, 2.4, 3.1, 3.2, 3.3, 3.5, 4.1, and 4.2, as well as Task 4b in NBEP's FY2018 and FY2019 Workplans.

41. Pawtuxet River Authority—Pontiac Dam Fish Passage Plan

The Pawtuxet River Watershed in Rhode Island is known for its abundant fish habitat. However, access to the habitat has been precluded by the many dams in the system. Following the removal of the Pawtuxet Dam in

2011, the Pontiac Dam, and an abandoned utility crossing just downstream, in Warwick, Rhode Island remains the first obstruction to fish passage of anadromous fish from tidal waters in the downstream Providence River to the Pawtuxet River. Fish passage at this dam would provide access to an additional 2.5 river miles and approximately 35 acres of habitat until the next obstruction at Natick Mills. While previous studies performed by the [Center For Ecosystem Restoration](#) looked at options for dam removal, one of the two current owners of the Pontiac Dam is seeking to maintain it adjacent to a new hotel and mill complex renovation underway. Since dam removal may not be part of future plans of at least one dam owner, there is interest in exploring options for passage while retaining the dam.



Downstream face of Pontiac Dam, Warwick, Rhode Island. Photo Credit: PRA.

NBEP used an RFP to subaward **\$22,500** in SNEP funding to the [Pawtuxet River Authority](#) (PRA) in FY2019 to develop conceptual engineering plans that identify alternatives for anadromous fish passage at the dam and utility crossing. The focus is on shad and river herring, with American eel also reported in the area. The [final report](#) for this work provided a site assessment and two potential design alternatives for fish passage—installation of a bypass nature-like fishway or construction of a technical Denil fishway. PRA selected the bypass fishway on river-right due to its nature-like configuration, higher efficacy in passing fish and other aquatic species, and greater flood reductions upstream of the dam during significant flood events. Completion of this conceptual work will enable PRA to pursue further funding to create final engineering design, permitting, and construction if dam removal is ultimately determined not to be a viable option. A lesson taken from this work is that having options for addressing dams helps pass fish past them and inspire new discussions about dam removal. This project helped CCMP Objectives 1.4, 1.6, 3.1, 3.2, 3.3, 3.5, 4.2, 4.5, and 4.6, along with Task 4b in NBEP’s FY2018 and FY2019 Workplans.

D. Strong Communities

42. Partner Expansion and Diversification

Unlike traditional Clean Water Act (CWA) regulatory programs, NEPs are called on to include communities in the process of identifying problems and solutions to restore and protect estuaries and their watersheds. NEPs are overseen by a Management Conference that includes representatives of federal, state, local government agencies, regional bodies, affected industries, educational institutions, and the general public in the Study Area. Per its [bylaws](#), NBEP’s Management Conference includes its Steering Committee, Executive Committee, and Science Advisory Committee. The aim is for local stakeholders to be deeply engaged in

decision-making, respond to community needs, and take greater ownership of the restoration and protection of their place. As of FY2017, NBEP did not maintain a formal partner list, beyond a spreadsheet of committee members, and conducted generally effective, yet ad hoc, outreach mostly to long-known organizations and people who were members of a committee or a recipient of program funding. Perhaps 50 people were included in this group of “usual suspects” that were the organization’s core partners going back many years.

Beginning with the hiring of a new Executive Director in FY2018, and expanding markedly during the COVID pandemic, the program worked hard to engage new communities through hundreds of one-on-one meetings. The intent was to listen to and learn from people outside our traditional circle, explore partnering opportunities, and establish NBEP as a service-oriented organization with its own value and brand. Further, while inclusive, outreach was strategic. NBEP ensured a specific reasoning for engaging someone, audience-targeted messaging, grounded conversations in the purpose of advancing NBEP’s CCMP and partners’ goals. Meeting for the sake of meeting did not take place. Rather than spending limited time writing a communication plan (that is, planning to communicate), we spent time communicating, though we did follow the approach in the communications framework found on page 27 [here](#).

NBEP is pleased with the increased number and diversity of genuine new partners realized during the Evaluation Period. The Steering Committee added new representation from municipalities, fishing, health, transportation, and community groups, mid-level professionals across interests, and the general public, while retaining a nearly balanced membership across Rhode Island and Massachusetts. Further, NBEP established a formal mailing list, which now includes municipalities, consultants, and small non-governmental organization (NGOs) across the entire Study Area. After RWU became the program’s host in FY2021, staff developed solid relationships with the Congressional delegations that represent the Study Area, especially with the Rhode Island Senators, who carry considerable sway on coastal issues and regularly sought insights and quotes (see NBEP quotes in press releases for Senator Whitehouse on [National Estuaries Week](#) and Senator Reed on [NBEP’s Green Infrastructure Planning](#) awards in FY2021 as recent examples). Further, by FY2021, NBEP maintained an active and growing MailChimp contact list of 520 partners, with an average message open rate of 50% (over 70% for issue-specific topics), and an unsubscribe rate of 0.2%.

Nonetheless, there is more to do, especially with underserved municipalities and groups supporting them, indigenous people, businesses that depend on natural resources, and interests in our Study Area in Connecticut. In FY2021 the program filled a new position, Watershed Outreach Manager, tasked with building relationships and projects with new interests, enhancing name recognition, and otherwise ensuring the program is connecting with the right people. The manager will craft a formal engagement plan in FY2023 to guide this work. There is no question that NBEP’s reach and reputation improved during this period.

An absolutely vital lesson NBEP learned from this concerted relationship-building work was that past need not be prologue. All it takes is one positive interaction today to put past perceptions and challenges to rest and shift focus to the promise of tomorrow. This accomplishment helped meet CCMP Objectives 1.6, 2.5, 2.6, 3.5, 3.6, and 4.5, as well as Task 2d in the NBEP’s FY2017 Workplan, Task 5c in the FY2018 and FY2019 plans, Task 5d in FY2020 plan, and Task 4d in the FY2021 plan.

43. Public Access to NBEP Work Processes and Products

Since 2001 NBEP has operated the www.nbep.org website. The site has provided general information about Narragansett Bay and the program, detailed current projects, and hosted some publications. In FY2019, NBEP undertook a complete website refresh to update the design, content, and tone, but most notably, ensure free and open public access to the program’s work. As virtually all NBEP’s efforts are federally funded,

it is imperative that information be publicly-available. A revamped description of services, [committee meeting notices and notes](#), [recent Workplans](#), governance documents, [funded projects](#), simple Story Maps and Science Updates, and technical resources were added to the site. The website is provided in English, Spanish, Portuguese and Hattian Creole. In what was an 18-month herculean effort by NBEP staff, the [Narragansett Bay Estuary Program GIS Data Hub](#) was developed, which provides all the maps, layers, and metadata that underly the 2017 Report, and is updated regularly. A comprehensive searchable [on-line library](#) was also posted that includes nearly 300 scientific pieces funded by NBEP and/or developed by partners. As noted under [Topic 1, Section A.7](#), a dedicated website for [Vision 2032](#) work was also created. This new on-line presence drastically upped the program’s transparency, aligning with our commitment to be a trustworthy, inclusive, and inviting organization. This work helped meet CCMP Objectives 1.6, 2.5, 2.6, 3.5, 3.6, and 4.5, as well as Task 1g in NBEP’s FY2019 Workplan and Task 5d in FY2020 plan.



44. Land Use Science Updates and Story Map

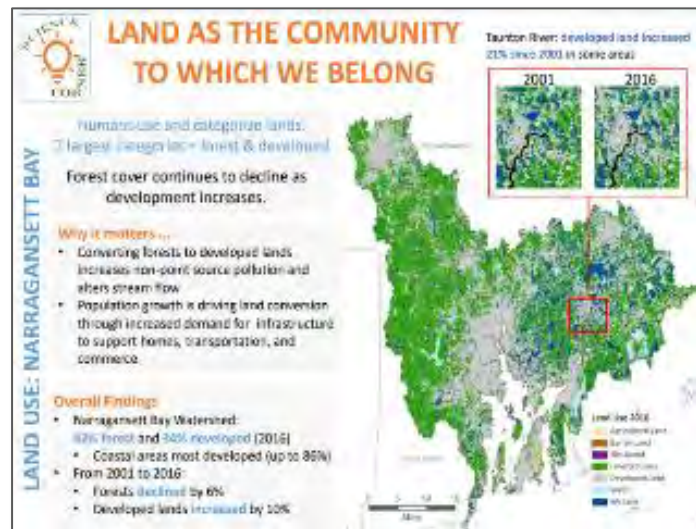
Rhode Island, Massachusetts, and Connecticut are in the top six states with the most population density in the US. There are 113 towns in the Study Area. The 2017 Report concludes that the Narragansett Bay watershed’s population increased 8 percent from 1990 to 2010, with recent growth concentrated in suburban and lesser-developed areas where people use more land per capita. From 2001 to 2011, areas of urban land use increased by 8.5 percent, and forest lands decreased by 4 percent. Also, impervious cover constituted 14 percent of the watershed, and 36 of 52 subaward locations had more than the detrimental threshold of 10 percent impervious cover. In FY2020, NBEP created a series of new resources to explore and explain the suburbanization facing the region. The five updates include:

- [A Landscape of Change Story Map](#), which uses simple visuals to tell the story of how the population and landscape of the Narragansett Bay watershed had changed from 1850 to 2000, its impacts on the land, and what we can do together to ensure communities thrive.



Depictions in Story Map shows population change in the region from 1850 to 2000.

- [Science Update: Land as the Community to Which We Belong—Land Use, Narragansett Bay Watershed](#) builds on the 2017 Report by presenting an analysis of land use change in the Narragansett Bay watershed, focusing on the change from forest lands to developed lands from 2001 to 2016. The findings showed that forests declined by 6 percent and developed land increased by 10 percent over this period.
- [Science Corner: Land as The Community to Which We Belong](#), offers a 2-page summary of the longer update above.
- [Science Update: Land as the Community to Which We Belong—Land Use, Little Narragansett Bay and the Coastal Salt Ponds](#) offers an analysis of land use change from forest to developed from 2001 to 2016 in the two estuarine watersheds in our Study Area that were not included in the FY2017 Report. This analysis showed declines in forest and an increase in developed land in both of these relatively rural watersheds—forests declined 1.4 percent and developed lands increased 3.5 percent in the Little Narragansett Bay Watershed; forests declined 5 percent and developed lands increased 6 percent in the Coastal Ponds. 4 of the 11 subwatersheds in Little Narragansett Bay and all 3 subwatersheds in the Coastal Ponds showed increases in developed lands.



- [Science Corner: Into the Woods: Solar Fields in the Forest](#) explored trade-offs and regulatory limitations presented by siting solar fields in forests. At the time of publication, neither Rhode Island nor Massachusetts’s municipalities could reject a solar field application simply because it was located in a forest; however, towns could take specific action to limit or impose restrictions on solar. The piece closes with some key questions to stimulate future work.

Land use change happens in pieces, and often goes unnoticed until a favorite place changes, or the cumulative impacts of altered land use on the natural environment or our communities becomes evident. Knowing what is happening, and possible trade-offs, is a first step. These resources are intended to cut through the complexity and share simple facts that inspire people to be aware of land use change, its consequences, and available next steps should they desire to act. This work helped meet CCMP Objectives 1.6, 2.2, 2.5, 2.6, 3.5, and 4.5, along with Task 2g in NBEP’s FY2018 Workplan and Task 5d in NBEP’s FY2020 Workplan.

45. Nuisance Flooding Science Update

Recent extreme storm activity across the US has brought home the consequences of a changing climate, particularly to those who live near the coast. The increasing number of “named” storms is the result of larger storms and the attention people are giving to them. Nuisance or “sunny-day” flooding occurs without a storm, caused by very high tides like spring tides (1-2 feet above average high tide) or king tides (greater than 2 feet above average high tide). Sea level rise causes high tides to reach further inland and flood more often, with seawalls and hardened shorelines often exacerbating this increased flooding risk. This nuisance

flooding damages infrastructure, makes roads and sidewalks impassable, overwhelms drainage systems, and damages properties and businesses. NBEP created an update on this issue titled [Science Corner: Water, Water Everywhere](#) in FY2020. With the assistance of Casco Bay Partnership, the program analyzed coastal flooding data from [NOAA's Tide and Currents data portal](#) and concluded that since the 1940s, nuisance flooding in Providence, Rhode Island has increased 6-fold, from 1.4 days to 8.4 days per year (see Figure 13). With sea level in our region expected to rise 9 to 11 feet by 2100, this problem will only get worse. Efforts to increase resilience of existing infrastructure and site and design new development with this flooding in mind is the best way to stem its impact on our communities. As with other new resources, the program is synthesizing complex data into publications to nudge planners and developers to take proactive action, and inform the general public about what is happening around them. This work helped meet CCMP Objectives 1.2, 2.5, 2.6, 3.5, 4.2, 4.3, and 4.5, along with Task 5d in NBEP's FY2020 Workplan.

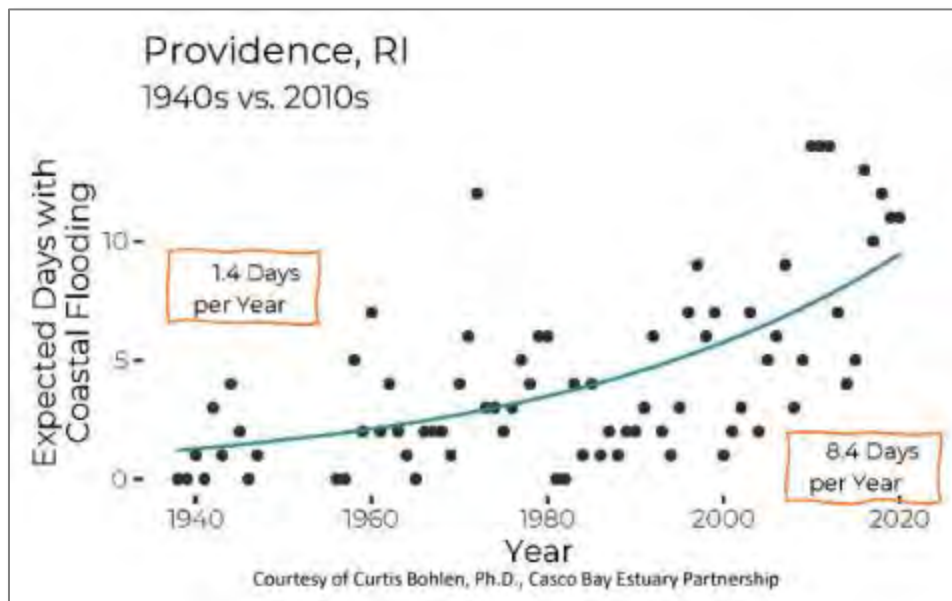


Figure 13: Increase in nuisance flooding in Providence since 1940s. Photo Credit: NBEP.

46. Social Science Indicators for the Narragansett Bay Region

NBEP's 2017 Report included 24 environmental indicators that describe stressors and associated environmental conditions. Three of these indicators illustrate in part how environmental conditions impact public health—recreational water use, beach use, and shellfishing. However, these indicators do not fully address how people behave, interact, and influence the natural environment. In other words, they don't include indicators of the well-being of individuals or communities, such as social, economic, psychological, legal, and political factors. Environmental systems are human systems, so it is imperative to better integrate these social science perspectives into management decisions to assure they protect ecosystems and sustain a high quality of life.

NBEP sought to wade into this gap by convening a [Social Science Working Group](#) over five meetings in FY2020 and FY2021. A small group of government and university social scientists explored potential ways to document (metrics vs storytelling), type of data to use (qualitative vs quantitative), data needs, and what indicators and framing are best to help inform environmental decisions. The program contracted \$9,250 in \$320 funding to a professional facilitator with E&C Enviroscape, LLC to lead the group. The ultimate goal is for NBEP to select a suite of social science indicators, establish baseline, and periodically evaluate status and trends in concert with natural science indicators already in place. The four preliminary indicators included in

Figure 14 rose to the top for further study.

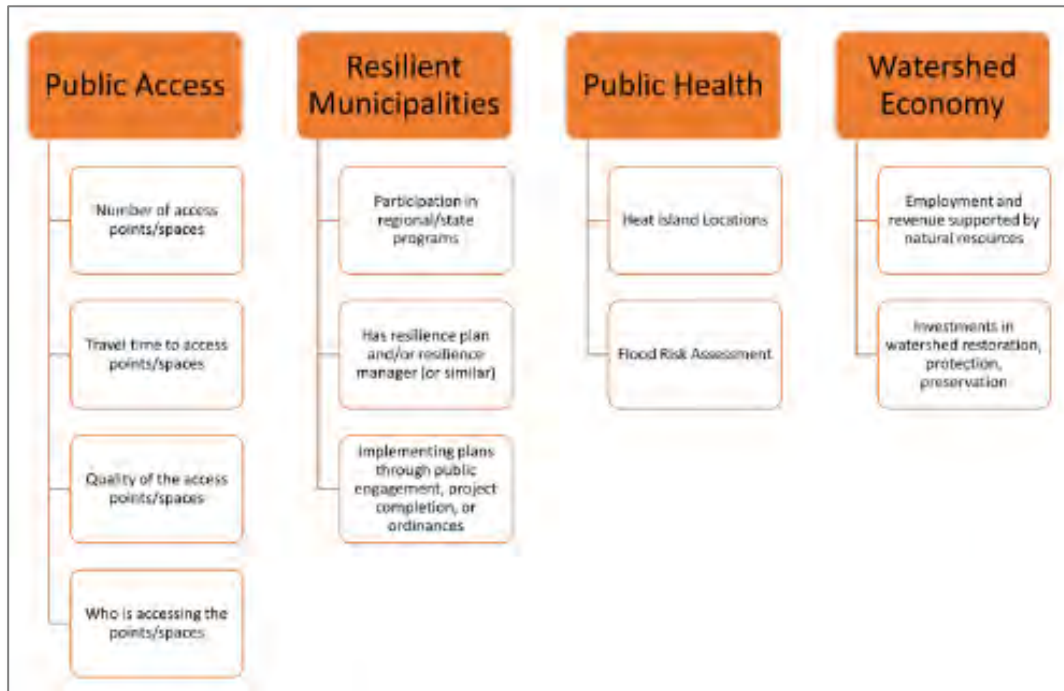


Figure 14: Potential indicators (orange boxes) and metrics (open boxes). Photo Credit: NBEP.

Due to the lack of current budget to mine existing data and/or create new data to build out these preliminary indicators, the group created documents to guide future work, including:

- [Science Update: Social Science Indicators for the Narragansett Bay Estuary Program](#), which offers an overview of group discussions, recommendations, and areas of future work.
- [Potential Social Science Indicator Matrix](#), which lays out aspects, status, goals, and leads to develop the four potential indicators.

Other NEPs are engaging on this issue, including the Piscataqua Region Estuary [Partnership's Social Indicators Project](#), and the Puget Sound Partnership's [Vital Signs](#), which currently includes cultural wellbeing, economic vitality, good governance, sense of place, and sound stewardship as quality of life measures. A central lesson from this work is: it is hard. Natural and social scientists often do not speak the same language. The cost to develop social science data are high and there are limited funding sources for this work. There are legal hurdles to collecting this data, like Information Collection Rule compliance (e.g., restricts surveying without approval) if federally-funded, the inherent subjectivity of social factors compared to the perceived objectivity of biophysical data, and finally, the challenge to set representative and equitable quality of life goals. A more solid foundation is now in place upon which to advance this complex topic. This work helped advance CCMP Objectives 1.6, 2.4, 2.5, 2.6, 3.5, and 4.5, with Task 5d in NBEP's FY2020 Workplan.

47. Environmental Justice Mapping Tool and Story Map

Environmental justice (or EJ) is the just and equitable distribution of environmental benefits and burdens for all communities, resulting in higher quality of life for all. It means that all of us receive protections from environmental and public health hazards, access to amenities like clean water, green space, and shade, and are afforded meaningful opportunities to participate in environmental decision-making. Advancing

environmental justice increases success for all communities, including people of all races, national origins, incomes, and life experiences. NBEP estimates that the majority of towns in its Study Area have a census block unit that includes a community impacted by environmental injustice. This is the result of the region’s shared history of discriminatory land use policy, urbanization, and industrial past and present. In FY2020, NBEP began exploring [environmental justice in our region](#), and created the first resources specific to the region that enabled identification of environmental justice areas and exploration of the distribution of benefits and burdens in these areas to support better understanding of what environmental justice means in our region.

- An [Environmental Justice Planning and Mapping Tool](#) for the Study Area, which used four factors to enable anyone to enter an address, view the demographics of the location, and then identify “EJ Priority Areas” where the impacts of environmental burdens may be intensified (see Figure 15).

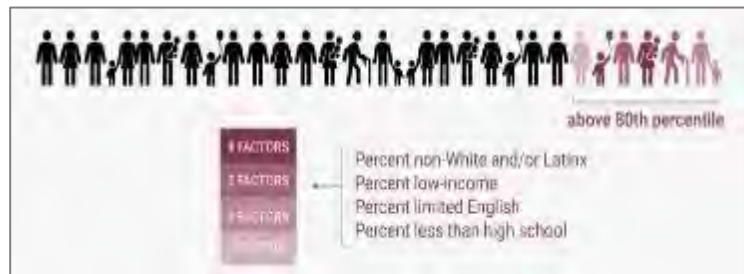


Figure 15: Four factors used to define EJ Priority Areas.

- A Story Map titled “[Environmental Justice in the Narragansett Bay Region](#)”, which explored how patterns in our landscapes, waters, and quality of life reveal the drastic difference in environmental benefits and burdens between EJ Priority Areas and outside of these areas (see Figure 16).

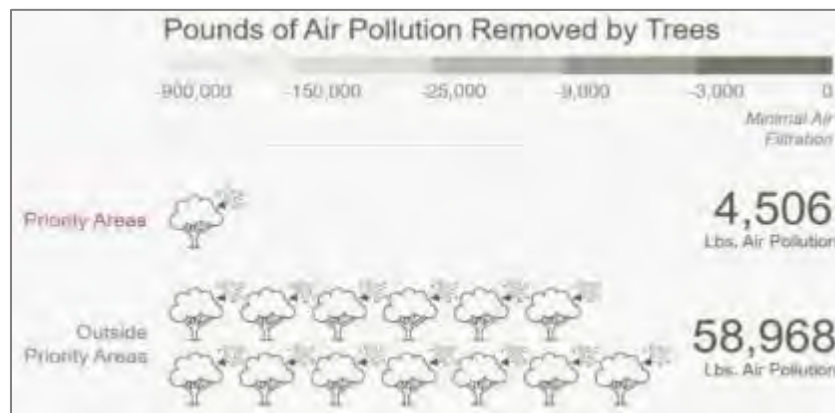


Figure 16: Example graphic from Story Map—pollution in EJ vs non-EJ areas.

With this work, NBEP became a catalyst and voice for careful study and action to address these issues for the regional conservation community and NEPs across the nation. The Environmental Justice Mapping Tool is being used by government and NGO funding programs to characterize a proposal’s connection to EJ Priority Areas. Both [Rhode Island](#) and [Massachusetts](#) have now created state-level tools that allow users to identify whether a property is located in an environmental justice area. In FY2022, as part of its EPA required Equity Plan, the program began crafting an expanded and dynamic equity tool that will allow users to access a simple interface, choose among demographic, environmental, and climate factors that matter to them, and then characterize a particular location. This tool will be entirely open source, with the source code posted on GitHub for use by others. [EcoRI News](#) published a story on the EJ Story Map in FY2021. A telling observation related to this work was that the words ‘equity’ and ‘diversity’ were never used in 2012 CCMP actions and the first time this terminology was used was in a NBEP Workplan was in FY2021. The program continues to

work diligently and humbly to catch up. These efforts helped advance CCMP Objectives 1.6, 2.5, 2.6, 3.5, and 4.5, and Task 5d in NBEP’s FY2020 Workplan and Tasks 1a and 4d in the FY2021 Workplan.

48. Coastal Public Access Inequities

Coastal areas are valued but are not always equitably accessible. Coastal and near-coastal residents and visitors receive a range of physical, psychological, health, economic, and social benefits. Time, cost, transportation, parking availability, and weather can pose barriers to shoreline access. People are also more likely to visit salt and fresh waters that are closer to their residence. Site quality such as trash and perceived water conditions impact visitor preferences. Areas with working waterfronts, shore armoring, and privatization of coastal access may physically or logistically restrict certain types of use. An individual’s resources, where they reside, and the quality of the natural amenities available may impact their access to the shoreline, so coastal access has potential environmental justice implications. The message from past study has been that underserved communities are disproportionately exposed to a range of disamenities related to pollution. Studies have considered disparities in access to amenities like green space, yet less is known about access to water amenities.

In FY2020 and FY2021 NBEP and colleagues at EPA completed pioneering geospatial analysis of coastal public access and community demographics in the Narragansett Bay region. Using anonymized cell phone data from summer 2019 that included 2.5 million visits, they examined different populations’ relative travel distances to all public coastal access and to public marine swimming beaches across Rhode Island, by race, ethnicity, and socioeconomics. Then, they assessed relative travel distances to high quality public coastal amenities (no history of water quality impairment). Several resources were created to present these important results, including:

- Story Map titled, [How Do We Use Our Coasts](#).
- Presentation at Fall 2021 Northeast Arc User Group titled, [Geographies of inequity: Landscape-scale inequities around coastal amenities in Rhode Island](#).
- RI Coastal Resources Management Council/RI Sea Grant Webinar titled, [Shoreline Access for All: Environmental Justice along the Coast](#).
- Journal article cited as, J.H. Twichell et al (2022). [Geographies of Dirty Water: Landscape-Scale Inequities in Coastal Access in Rhode Island](#). *Frontiers in Marine Sciences*: Volume 8 – 2021.

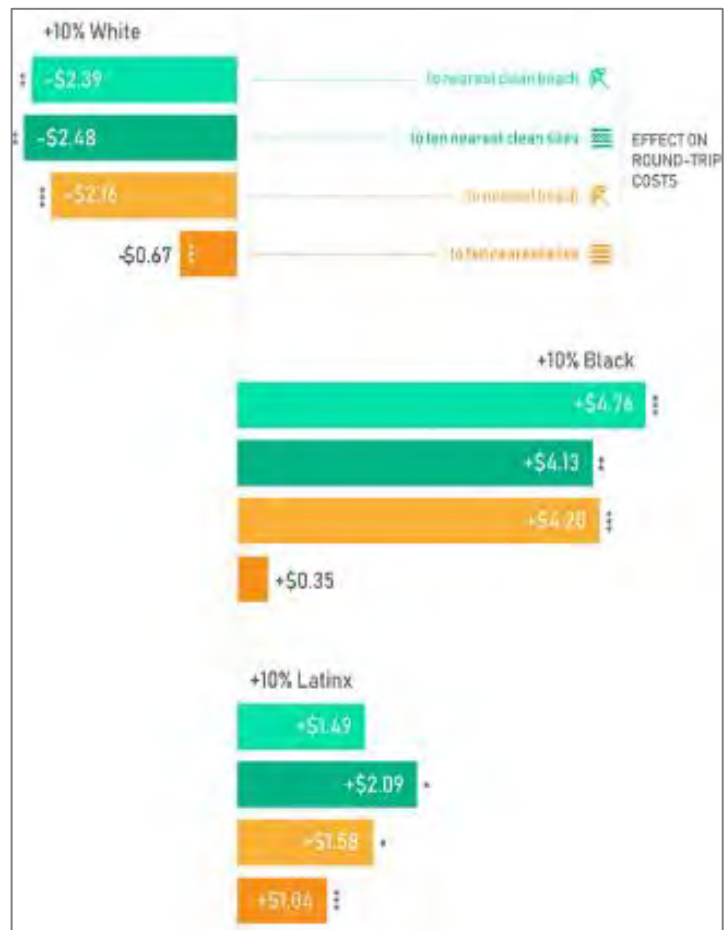


Figure 17: Change in round-trip travel cost by race and/or ethnicity to public access points and public beaches. Photo Credit: Twichell, 2022.

This work revealed landscape-scale inequities in travel distances and costs for visiting public coastal amenities associated with race and ethnicity. Black and Latinx populations had longer travel distances to public coastal sites with good water quality, to public swimming beaches, and to the highest quality public beaches. The disparity was larger with regards to access to high quality public coastal sites and public swimming beaches, which reflected the lack of high-quality public access in urban areas. This translates to added costs on each coastal recreation trip for census block groups with higher Black and Latinx populations (see Figure 17). The striking results of this work are intended to equip policymakers and managers with clear metrics to bolster policy efforts to address these disparities. This was seminal work, and the program was proud to play a role in it. This accomplishment helped meet CCMP Objectives 2.4, 2.5, and 3.3, as well as Task 2a and 5d in NBEP's FY2020 Workplan and Task 2a and 4B in the FY2021 Workplan.

49. NBEP Diversity, Equity, Inclusion, and Justice Assessment

NBEP has funded projects for decades in environmental justice communities, several described in this narrative, yet has not intentionally or systematically worked to maximize equitable provision of our services and funding across the region. In FY2020 NBEP contracted \$34,375 in §320 funding to [Impact by Design](#) to complete an [assessment](#) that looks at our own work through the lenses of diversity, equity, inclusion, and justice (DEIJ). Over an 18-month period Impact by Design and NBEP collaborated closely to create a DEIJ Assessment, which involved development of an [assessment plan](#), compilation of input from experts ([Resolve Conservation](#) under subcontract), [committee members](#), and environmental justice [community members](#) via OMB approval of a second fast-track ICR during this period, and deep discussions across regular meetings. The work concluded with a [closing workshop](#) with the Steering Committee. Coming out of the workshop, NBEP committed to taking specific actions to help address environmental injustice in our region:

- Go to events in underserved communities to build relationships.
- Assure recruitment for staff and interns targets applicants in underserved areas.
- Fairly compensate community members who bring their insights to our programs.
- Maintain open source mapping tools to highlight where environmental justice areas are located.
- Offer dependable funding to those with agency to develop projects in underserved areas.
- Require consideration of EJ impacts in our grant applications and review subcommittee scoring.

In 2023 the program plans to form a DEIJ Subcommittee made up of Steering Committee and community members to guide this work moving forward. A stark lesson from this accomplishment was that discussing DEIJ can make people uncomfortable. However, an equally important message was that being uncomfortable is OK as wisdom and action can arise from discomfort. Emotions were especially piqued as this work started just after the George Floyd murder and was pursued entirely during the COVID pandemic, where health inequities were exposed daily. NBEP is glad it persevered and completed this vital work and committed to take tangible action to elevate and amplify DEIJ in the region. This work helped meet CCMP Objectives 1.6, 2.5, 2.6, 3.5, and 4.5, and Task 5d in NBEP's FY2020 Workplan and Tasks 1a and 4d in the FY2021 Workplan.

50. Blackstone Watershed Collaborative Creation

The Blackstone River Watershed Needs Assessment discussed under [Topic 1, Section A.5](#), noted the creation of the [Blackstone Watershed Collaborative](#). Establishing a new body that would hire a full-time employee to coordinate, support, and add to the dedicated organizations working across state lines for the watershed was included as the #1 recommendation in the assessment. Local partners reached a point of short capacity

that was increasingly hindering cooperation and necessitating a reactive, triage-based approach focused on addressing permitting and emergent problems. The view was that existing staff were chronically over-booked, many leaders in the volunteer network were retiring, and new local “champions” were not materializing. A growing body of literature and real-world experience shows that a collaborative, networked approach is the best way to undertake and sustain restoration of large landscapes like the Blackstone. Two examples of regional networks in New England include [Resilient Taunton Watershed Network](#), hosted by [Southeast Regional Planning and Economic Development District](#), and the [Resilient Mystic Collaborative](#). A pivotal first step coming out the publication of the assessment was to secure funding to hire someone to create and operate the new collaborative.



NBEP used an RFP to subaward **\$95,000** in SNEP funding to Clark University in FY2020 to fund them to hire a Blackstone Watershed Manager. A manager was hired in the first month of FY2021 and the collaborative was launched soon after. NBEP has continued to support the organization by subawarding an additional **\$125,000** in SNEP and §320 funding, while they have now raised another \$160,000 from other sources. Through the end of FY2021, the Collaborative hosted 11 well-attended [meetings](#), hosted 5 workshops and tours, drafted 5 proposals for municipal partners, provided technical assistance to roughly 15 municipalities at Municipal Vulnerability Preparedness program planning sessions or otherwise, completed culvert assessment training and is now certified to train partners, helped lead the Blackstone Commons paddle (see Section D. 51 below), coordinated response to a [Woonsocket WWTF sewage spill](#) in summer 2022 (and subsequent Rhode Island lawsuit against the plant covered by [EcoRI News](#)), and pursued extensive outreach to municipalities and community organizations. Clark issued a [press release](#) on new effort in FY2020, and the group has since received a lot of positive [press](#).



Culvert assessment in Sutton, Massachusetts, which was apparently no fun. Photo Credit: Blackstone Watershed Collaborative.

All told, the Collaborative is gaining financial footing, is adding to the work of partners, and has already become a trusted place for information-sharing, technical assistance, fundraising, and advocacy. NBEP’s work to boost local organizations continues at scale under [Topic 1, Section D.53](#) and other entities are similarly

investing in capacity for bottom-up project development. This accomplishment helped meet virtually all CCMP Objectives, and Tasks 3b and 5g in NBEP’s FY2020 Workplan and Task 2d in the FY2021 Workplan.

51. Blackstone Commons Project

The Blackstone River has deep and rich history. It has nurtured the natural environment and people, dating to time immemorial when it nourished indigenous people, on to powering the Industrial Revolution, to today, where a healing river is opening up to supporting ecosystems, economies, and communities along its long path. Looking to tomorrow, the [Blackstone River Commons Project](#), led by the [Rhode Island School of Design](#) (RISD) in partnership with the [Blackstone River Watershed Council](#) (BRWC) and Blackstone Watershed Collaborative, aims to acknowledge and celebrate the multiple histories of the Blackstone River and reclaim the river as a commons that is part of our regional identity. The commons are something shared and protected by a community, to be kept open and protected for future generations. While the land that was historically held as a ‘commons’ by the indigenous communities of the region has been expropriated and privatized, the rivers are some of the last remaining resources still held in common by the people. Through this project, local partners are acknowledging complex histories, challenges, and achievements to move forward with solidarity and stewardship to chart a course for a vibrant, resilient and diverse future for the river.



A future river champion and her letter to the river. Photo Credit: BRWC.

NBEP used direct subawards of \$320 funds in FY2021 to provide **\$15,000** to RISD and **\$10,000** to BRWC, along with existing funding to the Blackstone Watershed Collaborative to help underwrite this unique collaboration among environmental scientists, designers, and community organizations. A group of five of these same partners completed [Expedition 2022](#), paddling the 60-mile length of the river over four days from Worcester, Massachusetts to Pawtucket, Rhode Island, where they linked up with nearly 100 new paddlers to continue onto a concluding celebration in Providence, Rhode Island (see this [video](#)). The final paddle day and/or event were attended by EPA Region 1 Administrator, David Cash, RIDEM Director, Terry



Gray, and Rhode Island Senator Jack Reed. Pop-up community education events and art installations were held along the way, including publication of posters, t-shirts, and a clever opportunity for people to write letters to the river. There was excellent media coverage of the commons project and related events, including articles in [RISD’s blog](#), [Worcester Chamber of Commerce’s Going Green](#), [Providence Journal](#), [EcoRI News](#), and [Patch](#). Further, as part of the broader commons work, BRWC hosted a shorter paddle for adults with intellectual and developmental disabilities on the river in Lincoln, Rhode Island, and two intertribal

community gatherings, one at the Boys and Girls Club in Woonsocket, Rhode Island (see this [video](#)) and another at Slater Mill in Pawtucket, Rhode Island. BRWC's efforts were covered by [EcoRI News](#), the [Woonsocket Call](#), and [Valley Breeze](#), respectively. BRWC was able to cover some participant support costs using the new NBEP program noted in [Topic 1, Section D.52](#) below.

NBEP has not historically conducted or supported community-level outreach. With the results of the DEIJ Assessment, hiring of a Watershed Outreach Manager in FY2021, and plans to release the next CCMP in FY2023, the program expects to continue to expand our efforts in this space. An essential lesson from this work was that NBEP does not need to create direct relationships with every single potential stakeholder or nation that can help advance our mission and CCMP; at least initially, supporting local partners working on-the-ground to enhance their own relationships is often more powerful and effective. In this case, the program was happy to learn that both the Nipmuc Nation and Narragansett Tribe have indicated that BRWC may speak for them on issues related to the river: quite an honor, indeed. This accomplishment helped meet CCMP Objectives 1.6, 2.4, 2.5, 2.6, 3.5, 3.6, and 4.5, along Task 5d in NBEP's FY2020 Workplan and Task 4d in the FY2021 Workplan.

52. Community Engagement Payments Program

Historically the conservation community does a good job of talking to themselves. Public comment sessions and other outreach events are held at locations, times, and using language that works for people employed as conservation practitioners. However, those working other jobs during the day, who hold non-professional life experience, or lack transportation or child care for public meetings can be left out. Even those employed in conservation whose expertise would be welcome often lack the ability to participate or travel without payment. A silver lining from the COVID pandemic was that virtual events became common, were effective at bringing in new voices, and now appear to be a permanent fixtures in environmental outreach. However, too often, those representing or residing in underserved communities are contacted seeking their insights with no offer to compensate them for their time.

Last summer NBEP launched a new program offering Community Engagement Payments of up to \$650/day (the federal limit) to support participation in outreach events. Through the close of FY2021, NBEP or funded partners issued a total of **\$9,750** participation payments to 13 tribal members, authors, small NGOs, and scientists. It is telling that many people who were offered payments were surprised, pleasantly so, and have held up NBEP as an example when compensation is not offered to them by others. The program is excited to continue this effort into the future to assure the program is inclusive and respectful of people's time and expertise. This effort helps meet CCMP Objectives 1.6, 2.5, 2.6, 3.5, and 4.5 and Tasks 4a and 4b in the FY2021 Workplan.

53. Capacity Support for Local Project Development Program

For decades NBEP has funded a wide range of partner projects, from research to project construction. Based on the results of the program's far-reaching outreach to partners noted under [Topic 1, Section D.42](#), a lack of local capacity—in municipalities, community groups, and regional NGOs—was viewed as the single biggest barrier to new project development in our study area. Note that 'project development' in this context refers to advancing water quality, habitat/wildlife, and quality of life projects through the 4-phased, 9-step process depicted in Figure 3. Particularly those working in underserved areas lack the staff, time, and expertise to pursue the significant new money available from the federal government for water and climate infrastructure projects. NBEP concluded that the Study Area is not prepared to get its fair share of these new financial resources for long-needed projects.

Thus, in FY2021 NBEP built a new program into its FY2022 BIL Workplan to boost project development by

obligating direct subawards to five partners with the proven knowledge and agency to act in their community, but currently lack the capacity to fully develop projects. This direct subaward approach is responsive to the range of external factors noted in the graphic to the right, such as [survey results](#) on how best to support disadvantaged areas like those present in much of our study area, federal [Justice40 requirements](#), and the desire to get funding working as soon as possible. In FY2022 (after October 1, 2022) when BIL funds are available, direct subawards have gone to:

- The Old Colony Planning Council in Brockton, Massachusetts
- SRPEDD in Taunton, Massachusetts
- Groundwork Southcoast in Fall River, Massachusetts
- Save The Bay in Providence, Rhode Island
- Racial and Environmental Justice Committee in Providence, Rhode Island

NBEP is excited and optimistic about this new venture. The program expects to continue funding these organizations with BIL funds in future years if the approach delivers results. Smaller organizations' ability to manage the program's money, as well as all recipients' ability to advance projects through the development steps over the next few years, is something NBEP will watch closely and report on in the next Evaluation Period. This accomplishment helped meet CCMP Objectives 1,6, 2.5, 2.6, 3.5, 3.6, and 4.5, along with the forthcoming FY2022 BIL Workplan.



Figure 18: Reasons to use direct subawards for project development. Photo Credit: NBEP.

Topic 2: NEP Program Implementation

A. NEP Administration and Governance Structure

1. How does the NEP organizational structure provide a clear and transparent decision-making process for actions based on both stakeholders' priorities and good science, facilitate decision-making autonomy for the Management Conference from the host entity, and allow the NEP to be seen as a leader in watershed management? How is the NEP ensuring that its Management Conference includes input from diverse populations and interests?

Since its founding, NBEP has not had bylaws. Its past guiding principles were wholly inadequate to guide an organization with the complex governance structure and mandates managed by NEPs. In March 2022, NBEP's Steering Committee [formally approved](#) the document titled [Narragansett Bay Estuary Program Bylaws](#) (bylaws). While these 8-page bylaws in their entirety are responsive to this

question, provided below are five excerpts that offer emphasis.

- Article 1—Section 1 sets the tone for organizational decision-making at the start:
“NBEP shall use a shared governance structure made up of diverse stakeholders for open discussion, cooperation, consensus building, and collaborative decision-making to advance its mission.”
- Article II—Section 1 continues by describing the makeup of Standing Committees (or partnership) as:
“...representatives from each State in the Study Area, EPA and other interested Federal agencies, local governments, indigenous people, interstate or regional entities, nonprofit conservation organizations, private industry, educational institutions, community groups, the Host Institution, and the general public. The Standing Committees also should include a broad representation of interests that reflect the geographic, scientific, economic, political, and cultural scope of NBEP’s Study Area. The Standing Committees should represent the diversity of the Study Area in terms of socioeconomic status, race, age, and gender identity. The Host Institution shall have a representative on all Standing Committees.”
- Article II—Section 1 also emphasizes public process to ensure transparency and inclusion:
“meetings of Standing Committees shall be open to the public. Public notice and meeting minutes also shall be provided for Standing Committee meetings.”
- Article II—Section 2 calls out the Steering Committee as the lead governing body for the organization:
“The Steering Committee is a local stakeholder-driven partnership that assists the EPA, Host Institution, and NBEP Executive Director with setting the direction for NBEP. The Steering Committee is the primary governing body of the NBEP, serving as a forum for open discussion, consensus building, and collaborative decision-making. Members of the Steering Committee bring the perspective, experience, and commitment of their respective organizations **to advance the NBEP comprehensive conservation and management plan (CCMP) and mission.**” [Emphasis added: this was explicit that members are to act in the best interest of NBEP when serving on the committee.]
- Article VI specifically covers decision-making processes:
“ NBEP’s goal is to use consensus-based process for decision-making. A majority of the specific committee membership shall constitute a quorum. A quorum must be present (in-person or by electronic means in such a medium wherein all persons participating in the meeting can communicate with each other at the same time) to undertake a vote. Where a vote is required as determined by the Chair of the subject committee, each member shall have one vote, and a simple majority shall be required for approval or an action to otherwise advance.”

The content of these bylaws was strongly informed by EPA’s comments on the program’s autonomy in the 2018 Program Evaluation, current scholarship on collaborative governance, and the perspective of the program’s 30-member Steering Committee who vetted the document over a 6-month period. All Steering Committee members, including the Host, are asked to read and sign this [Expectations Document](#). A formal process is also in place for recruiting and approving new committee members to assure appointments are based on merit. Unfortunately, none of the long-standing Executive Committee members stepped forward to

take on the Chair role when it opened in FY2019. Fortunately, EPA Region 1 was willing to serve for two years until new committee members added during this period stepped up to take on the Chair and Vice Chair roles in FY2021. While the bylaws were important, looking out longer-term, NBEP joining a new host, RWU, in September 2021 after an excellent 6-month process led by a small team of committee members, was the most crucial governance change for the organization and staff during this period. RWU's alignment with NBEP's mission and culture, their role in the composition of the bylaws, the tone and NBEP-out-front branding in promotional materials, and just the manner by which the program does business, makes the roles of NBEP, the Steering Committee, and the host crystal clear. And lastly, as noted in the accomplishments under [Topic 1, Section D](#), the program is intentionally and persistently working to authentically connect with new and diverse interests across the Study Area. NBEP is thankful for the shift to RWU, new bylaws, and support of the Steering Committee and a growing list of partners as this aspect of the organization was upgraded.

2. How do the NEP's staffing structure and planning promote stability and continuity of succession within the organization?

Change can have substantial impact on small organizations. NBEP has experienced the negative side of this with abrupt leadership changes in 2013 and 2017 and an extended director search in FY2018; the program has also experienced the positive side with the switch to a new host in 2021. Making sure sound processes are in place to smooth transition is vital. Some of the steps taken or conceived during this Evaluation Period to maximize stability and continuity in the face of future change are listed below.

- *Staff Capacity.* NBEP currently has four full time staff (FTE), up from 3.5 FTE at the start of this period. Two staff departed in FY2020, and replaced in FY2021, one a higher-level manager position. Note that the program intends to further boost capacity by hiring a fifth staff person, an ecologist, in FY2023 to fill a gap in our expertise and help meet EPA requirements that accompany BIL funds.
- *Decision-Making.* NBEP operates in an open, collaborative, and horizontal manner, with major decisions (like annual work planning and budgeting) subject to group input, first by staff, then the Executive and Steering Committees.
- *Budgeting.* NBEP's previous host required that the program hold back roughly 12 months of funding for staff salary. EPA expressed concerns about retaining this amount of funding. Moving forward with RWU, the Steering Committee has requested that the program retain 6-9 months to cover staff salary in the event of future changes in funding. Keep in mind, NEPs get their entire next fiscal year \$320 funding allocation on (or before, usually) the first day of that fiscal year, so this advanced funding offers some built-in protection for reductions in funding down the road.
- *Governance.* The Executive Committee and Steering Committee each meet four times a year, quarterly reports are presented, and all materials are posted to the NBEP website. The Executive Director converses with the Steering Committee Chair on a regular basis. NBEP now has formal bylaws that cover key governance topics.
- *Office Culture.* Staff are empowered to manage their own projects on a day-to-day basis, with formal mentoring via monthly meetings, and informal brainstorming sessions among staff encouraged. Administrative and programmatic opportunities and challenges, including those experienced by the Executive Director as appropriate, are discussed in the office to explore solutions and share the realities of managing an NEP.
- *Intern Program.* The program's Internship Program, expanded in FY2021 to include students working on site with partners, is also helping NBEP long-term. A former intern did fantastic work from FY2019 to FY2021 leading our geospatial and design projects (Julia Twichell) and several others have applied for open NBEP positions. All are thriving in their careers and remain supporters of NBEP.
- *Information Management.* NBEP maintains a comprehensive *Data Management Protocol* that

describes how program data shall be maintained. Project files are organized on SharePoint, data on the GIS Data Hub, and other public-facing materials are maintained and shared on the website. The program expects to explore a social media presence to further push out materials in FY2022.

- *Distribution of Admin Tasks.* Administrative tasks, like managing grants, setting up meetings, submitting reporting, and ordering supplies, are dispersed across staff.

Nonetheless, staff turnover will always pose challenges with such a small staff. NBEP fared vastly better when two staff departed in FY2021 than it did with the abrupt departures of its last two leaders in 2013 and 2017. Despite the improvements, workload did become heavy in FY2020 with only two staff, and again amped up heading into FY2022 when long cultivated ideas blossomed, additional federal funding arrived, and new BIL-related submittal requirements arose. The Executive Director was doing too much writing, requiring time outside the office, which was not ideal for mentoring and organizational culture. The program would need to lean into the continuity steps noted above in the event of a leadership change. Further means to build up NBEP's sustainability are discussed under [Topic 2, Section A.4](#) below.

3. How does the NEP plan to continue operations during emergencies?

NBEP is well-equipped to operate during emergencies. The COVID pandemic, which ran during the majority of this period, showed the program's capability to quickly adapt and deliver high quality work products, maintain partner relationships, and keep staff safe. Hardware and software are now in place to accommodate virtual meetings. Otherwise, NBEP adheres to all RWU and Foundry Building (our office building) emergency policies. The actions listed in [Topic 2, Section A.2](#) above also apply to this question.

4. Highlight particularly beneficial characteristics as well as areas for improvement.

After completion of the excellent 2017 Report, NBEP has completed a programmatic and cultural shift over the last five years. It has become more community-responsive and service-oriented, is established with a new mission-aligned and highly-competent host, and is guided by a strong governance framework, which has collectively enabled the program to complete impactful work, some of which is described in [Topic 1](#) of this narrative. This is a sea-change from the organization that received the 2013 Corrective Action Plan and received the 2018 Program Evaluation noted under [Topic 1, Section A.6](#). The main area for improvement in program administration is for the Executive Director (with the help of the Executive Committee) to achieve a better balance among staff capacity, workplan obligations, and unexpected circumstances (e.g., new reporting requirements, new project opportunities, staff or partner departures). NBEP expects to add a new staff person, expand cross-training, and pursue a less aggressive plan of work in FY2023 to create space for reduced workloads and better accommodate future change.

B. Grant Obligations and Finance

1. Has the NEP consistently met all their EPA §320 grant obligations?

The program has consistently met the terms, conditions, and obligations in its EPA Cooperative Agreements since FY2019. The abrupt departure of the last Executive Director in early FY2017 and lengthy search for a new director during FY2018 slowed program outputs and directly led to delays in grant draw downs, some dating to FY2015. The program's FY2015-FY2018 grants were all successfully closed out by our former host during this period. NBEP has three awards open as of this writing. FY2019 is held by NEIWPC, has been spent down, and will be closing imminently. RWU holds an open §320 and SNEP award that contains FY2020 funds that were deobligated and shifted to the university as part of the host change, as well as new §320 and SNEP awards for FY2021 and FY2022. RWU also holds an open award that contains BIL funds from FY2022 and FY2023. All workplan tasks were completed from FY2017 to FY2021, with the exception of two tasks

from the FY2017 Workplan that were removed via a grant amendment and one delayed by the Steering Committee (preparation of a Finance Plan) until new EPA NEP Funding Guidance clarified allowed fundraising. NBEP financial planning is further discussed in [Topic 2, Section B.6](#) below.

2. Has there been any challenges encountered with cost sharing or implementing its NEP award?

NBEP has not had any difficulty meeting cost-sharing requirements for its EPA awards. A challenge we do encounter is cajoling our partners to provide match paperwork for future projects in a timely manner each spring. A further challenge is that partners do not always have specifics for projects planned for the upcoming year. A related longer-term issue is not knowing whether the match promised on paper is ever realized through completion of projects. More generally, NBEP is exploring the best means to track both project development funded by the program and those offered as match to confirm the work resulted in the construction of projects that delivered positive environmental outcomes.

3. What were the sources of the required non-federal cost share of the NEP award?

Figure 19: NBEP Non-Federal Match FY2017-FY2021

EPA FY	Source	Use	Amount
FY2017	Narragansett Bay Commission	Bay monitoring program staff time	\$150,000
	Rhode Island Habitat Restoration Trust Fund	Habitat projects	\$101,573
	RIDEM	State Bond projects and staff time	\$268,917
	URI Coastal Institute	Watershed Counts staff time	\$79,510
	Subtotal		\$600,000
FY2018	Mass Dept of Environmental Protection	Contract with URI to support Bay monitoring	\$113,397
	Narragansett Bay Commission	Bay monitoring program staff time	\$150,000
	Rhode Island Habitat Restoration Trust Fund	Habitat projects	\$132,705
	RIDEM	State Bond projects and staff time	\$703,898
	Subtotal		\$1,100,000
FY2019	Narragansett Bay Commission	Bay monitoring program staff time	\$100,000
	Rhode Island Habitat Restoration Trust Fund	Habitat projects	\$175,000
	RIDEM	State Bond projects and staff time	\$325,000
	Subtotal		\$600,000
FY2021*	RIDEM*	State Bond projects and staff time	\$1,389,234
	The Nature Conservancy of Rhode Island	Gilbert Stuart, Peace Dale, Echo Lake, and Quicksand Tunipas Breachway fish passage; Upper Narrow River oyster reef; fish passage monitoring; and staff time	\$228,500
	Woonasquatucket River Watershed Council	Steering Committee participation staff time	\$718
	Rhode Island Habitat Restoration Trust Fund	Habitat projects	\$150,950
	Mass Dept of Environmental Protection	Watershed Planning Program staff salary	\$17,749
	Subtotal		\$1,787,151
Total			\$4,087,151

*NBEP changed hosts in FY2021, necessitating some funding shifts that impacted the FY2021 total award. See [Topic 2, Section C.1](#) below for more details. In short, certified match provided by RIDEM in FY2020 in the amount of \$496,865 was applied in FY2021 as its term of use was through September 30, 2023.

Figure 20 describes total funds leveraged by NBEP during this reporting period (includes the non-federal match provided in Figure 19 above).

EPA Year	Source	Use	Leverage Type (1)	Amount
FY2017	Narragansett Bay Commission	Bay monitoring program staff time	\$320 Match	\$150,000
	Rhode Island Habitat Restoration Trust Fund	Habitat projects	\$320 Match	\$101,573
	RIDEM	State Bond projects and staff time	\$320 Match	\$268,317
	URI Coastal Institute	Watershed Counts staff time	\$320 Match	\$79,510
	SNEP Recipient Match	FY2017 NBEP Water Quality Projects	Response to request for NEPORT data	\$259,002
URI	ArcGIS license	Response to request for NEPORT data	\$5,000	
FY2018	Mass Dept of Environmental Protection	Contract with URI to support Bay monitoring	\$320 Match	\$113,397
	Narragansett Bay Commission	Bay monitoring program staff time	\$320 Match	\$150,000
	Rhode Island Habitat Restoration Trust Fund	Habitat projects	\$320 Match	\$132,705
	RIDEM	State Bond projects and staff time	\$320 Match	\$703,898
	CRMC	Quonochontaug Pond salt marsh restoration project	Response to request for NEPORT data	\$2,342,965
	Narragansett Bay Commission	Blackstone River monitoring staff time	Response to request for NEPORT data	\$192,231
	Blackstone River Coalition	Blackstone River monitoring staff time, materials, and outreach	Response to request for NEPORT data	\$60,000
Fuss & O'Neill	Supplies for Taunton Workshop	Response to request for NEPORT data	\$2,450	
FY2019	Narragansett Bay Commission	Bay monitoring program staff time	\$320 Match	\$100,000
	Rhode Island Habitat Restoration Trust Fund	Habitat projects	\$320 Match	\$175,000
	RIDEM	State Bond projects and staff time	\$320 Match	\$325,000
	RIDEM	Free office space for NBEP	Response to request for NEPORT data	\$40,000
	ESRI	Conservation Grant for ArcGIS tools	Response to request for NEPORT data	\$25,252
FY2020(2)	The Nature Conservancy of Rhode Island	Bellville fish passage and Rose Lanes coastal bluff restoration projects; staff time	Response to request for NEPORT data	\$135,391
	Narragansett Bay Commission	Bay monitoring program staff time	Response to request for NEPORT data	\$100,000
	Rhode Island Habitat Restoration Trust Fund	Habitat projects	Response to request for NEPORT data	\$110,000
	RIDEM*	State Bond projects and staff time	Response to request for NEPORT data	\$163,135
	NRCS	Oyster Reef Restoration Initiative	Response to request for NEPORT data	\$413,131
	The Nature Conservancy of Rhode Island	Echo Lake Fish Ladder, Coastal Pond Breachway, Potter Hill Dam restoration projects; Potowomut River and Quicksand Pond land acquisitions; shellfish and benthic monitoring	Response to request for NEPORT data	\$2,344,500
	RIDEM	Free office space for NBEP	Response to request for NEPORT data	\$40,000
ESRI	Conservation Grant for ArcGIS tools	Response to request for NEPORT data	\$25,680	
FY2021	RIDEM	State Bond projects and staff time	\$320 Match	\$1,389,234
	The Nature Conservancy of Rhode Island	Gilbert Stuart, Peace Dale, Echo Lake, and Quicksand Pond Tunipac Breachway fish passage; Upper Narrow River oyster reef projects; fish passage monitoring; and staff time	\$320 Match	\$228,500
	Woonasquatucket River Watershed Council	Steering Committee participation staff time	\$320 Match	\$718
	Rhode Island Habitat Restoration Trust Fund	Habitat projects	\$320 Match	\$150,950
	Mass Dept of Environmental Protection	Watershed Planning Program staff salary	\$320 Match	\$17,749
	The Nature Conservancy of Rhode Island	Little Compton and Palidades Mill fish ladders; Potter Pond and Beaver River easements.	Response to request for NEPORT data	\$909,500
	MADER	Sunken Brook Culvert replacement.	Response to request for NEPORT data	\$242,000
	RIDEM	Free office space for NBEP	Response to request for NEPORT data	\$40,000
	ESRI	Conservation Grant for ArcGIS tools	Response to request for NEPORT data	\$25,680
			Total \$320 Match:	\$4,087,151
			Compiled for NEPORT:	\$8,076,577
			TOTAL:	\$12,163,728

(1) NBEP requests project data twice a year, each spring for Annual Workplan match and then in the fall for NEPORT reporting. If the same project information was provided in response to both requests, the information as included as 320 match only in this table.

(2) FY2020 match was certified, but no FY2021 monies were spent by NEI/WPCC before the program shifted to R/WU. Thus the match was not applied, but is available for leverage if not redundant. When all FY2020 and FY2021 funds were formally awarded to R/WU (a total of \$1,787,151), new match was sought for this award, with the exception of \$496,865 (of \$660,000 provided by RIDEM for FY2020) that was carried forward for this combined award because it was still applicable (it was good through 9/30/23).

4. Have grant dollars been drawn down promptly in accordance with the terms and conditions of the grant for implementation of the EPA-approved workplan?

There were delays in drawing down FY2015 through FY2019 funds due to many factors, including the already noted leadership turnover at NBEP, need to reallocate funds from a West Warwick, Rhode Island construction project that was not completed, and a billing mix-up at RWU. Grant extensions were issued twice for FY2015, and once for FY2016 and FY2018. Also, for the first two quarters after joining them, RWU submitted invoices via email rather than the EPA ASAP payment systems. All past grants have now been closed or are closely imminently (FY2019), and FY2021-FY2022 §320 and SNEP awards to RWU are now being properly invoiced and drawn down promptly to support workplan tasks.

5. Are there strategies in place for obtaining additional funding beyond the EPA §320 funds to implement CCMP actions (i.e., financial strategy)?

NBEP received SNEP funding during this period, including \$400,000 in FY2018, \$250,000 in FY2020, and \$250,000 in FY2021. NBEP also received \$20,000 from Save The Bay to provide technical support for the Hundred Acre Cove Project in FY2018. No other public or private funding was obtained. Also, \$2,500 in program income was received from URI just after the close of this period as a sponsor for the plastics event discussed in [Topic 1, Section B.15](#).

6. Highlight particularly successful efforts and approaches as well as challenges or difficulties in obtaining funding.

NBEP was successful at managing existing §320 and SNEP funds, and planning to onboard and award new BIL funds in FY2022. The program was cultivating new sources of funding in FY2019, something the new Executive Director had promised in his interview for the position, but ran into two rigid barriers. First and foremost, NBEP's previous host did not permit non-federal fundraising of any kind. This was the subject of many discussions among NEIWPC, EPA, and NBEP in FY2020, which in part contributed to NBEP shifting to a new host. Second, EPA Region 1's perspective was that §320 money could not be used by NEPs for grant writing. Being written into a partner's grant to offer specific services was permitted, like what occurred with Save The Bay in FY2018. Beyond this project-specific money from Save The Bay, NBEP's only revenue was from EPA channeled through §320, so there were no funds available to support fundraising.

The opportunity to bring in additional funds started to open up in October 2020 with EPA's release of the new guidance titled, "FY2021-FY2024 Clean Water Act §320 National Estuary Program Funding Guidance," which clarified the conditions (see pages 18-21 of funding guidance) under which NEPs could use 320 funds for grant writing and other fundraising with appropriate approvals. After officially joining RWU in September 2021, NBEP was then free to obtain new funding.

With the announcement of BIL funding thereafter in November 2021, and word that the program would be receiving \$909,800 per year for 5 years (with the first two years arriving all at once in summer 2022), the Executive Director put a hold on any grant writing or fundraising. The thinking was that staff were already at capacity managing the new BIL money, and NBEP would be competing for funding with the very organizations we aimed to bolster with BIL funding. The program's approach is to create a finance plan *after* publication of Vision 2032 that defines funding needs and sources to diversify NBEP's funding and support implementation of the new CCMP.

C. Budget Summary

1. Financials

Figure 21: NBEP Budgets FY2017-FY2021

Expense Category	FY2017	FY2018	FY2019	FY2020-FY2021	Total
Personnel and Fringe	\$404,419	\$584,480	\$439,824	\$836,956	\$2,265,679
Travel	\$7,300	\$13,250	\$10,800	\$12,000	\$43,350
Supplies	\$4,592	\$7,089	\$500	\$6,200	\$18,381
Contracts	\$47,000	\$5,000	\$0	\$130,000	\$182,000
Subawards	\$0	\$316,500	\$35,000	\$649,995	\$1,001,495
Other Administrative	\$38,781	\$21,749	\$22,351	\$32,886	\$115,767
Total Direct	\$502,092	\$948,068	\$508,475	\$1,668,037	\$3,626,672
Total Indirect	\$97,906	\$151,932	\$91,525	\$119,114	\$460,477
TOTAL	\$600,000	\$1,100,00	\$600,000	\$1,787,151	\$4,087,149

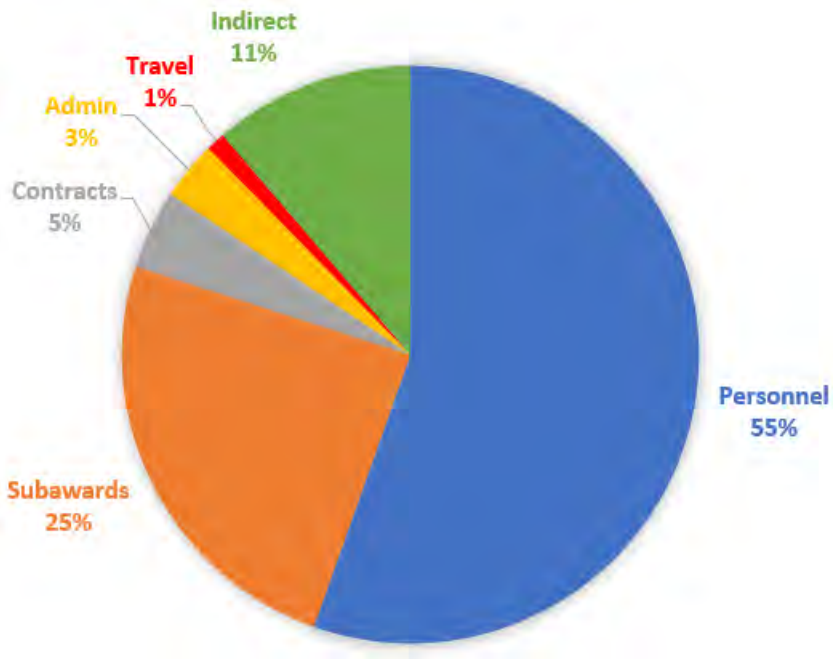


Figure 22: NBEP percent budgeted expenses by major category for FY2017 through FY2021.

2. Narrative

- The budget summary in Figures 21 and 22 above includes budgeted expenditures for FY2017 through FY2021. Actual expenditures were received from the previous host for the FY2017 to FY2020 period after this section was complete. Thus, *budgeted financials* are provided here by the categories used by our former host.
- In September 2021, EPA deobligated the equivalent of unspent FY2020 §320 and SNEP funds (\$837,151) previously awarded to NEIWPC, and awarded these funds to RWU along with the FY2021 §320 (\$700,000) and SNEP (\$250,000) awards. A total of \$1,787,151 was

awarded to RWU in FY2021.

- To align with accounting used by our former host, “Other Administrative” includes phone, printing, internet, supplies, meals, rental space, equipment rental, event hosting, meet registration, professional development, advertising and computer support. RWU Finance breaks down expenditures into 14 categories, which simplifies tracking. See page 5 of this [presentation](#) for an example report from March 2023 that uses the expanded categories.
- These funds were utilized to undertake NBEP’s Workplans from FY2017 to FY2021, including, but not limited to, the 53 accomplishments included in Topic 1. Not in this summary are FY2015 funds expended this period to help complete seven accomplishments and FY2016 funds used this period to complete one accomplishment
- Use of match is provided under [Topic 2, Section B.3](#).

D. Opportunities for Improvement and NEP Priorities

1. How has the NEP addressed challenges identified in the previous Program Evaluation?

NBEP’s 2018 Program Evaluation identified six challenges. The challenges and how they have been addressed during this period are offered below.

i. Establish an identity in the region and communicate this role to target audiences.

The program has taken specific steps to engage more deeply with stakeholders and seek their involvement in our work, but also, to establish NBEP’s niche and value in the region., NBEP has leaned into the call in the 2018 Program Evaluation for the program to fill “gaps not addressed by other entities in the region,” by redefining its vision, mission, and especially its services, to be truly additive to efforts to restore and protect the Study Area. Accomplishments pursued to help the organization connect more directly with partners during this period included development of our fact sheet/case statement (see [Topic 1, Section A.3](#)), deep outreach for Vision 2032 (see [Topic 1, Section A.7](#)), rigorous partner expansion and diversification efforts (See [Topic 1, Section D.42](#)), and assuring greater public access to the program’s work (see [Topic 1, Section D.43](#)). Further, Story Maps (See [Topic 1, Section B.12](#), [Section C.33](#), [Section C.34](#), [Section D.44](#), [Section D.47](#), and [Section D.48](#)), Science Updates (Topic 1, [Section B.8](#), [Section B.10](#), [Section B.11](#), [Section D.44](#), [Section D.45](#), and [Section D.46](#)), and Science Event ([Topic 1, Section B.15](#)) also targeted key and new audiences with NBEP-developed and branded products. The new Habitat Working Groups (see [Topic 1, Section C.30](#)), Section Hundred Acre Cove Project ([Topic 1, Section B.14](#)), and all of our Blackstone River place-based projects ([Topic 1, Section A.5](#), [Section B.13](#), [Section C.31](#), [Section D.50](#), and [Section D.51](#)) also helped us reach new people with our services and brand.

The action most responsive to this challenge was NBEP shifting to RWU as its host in September 2021, and soon thereafter approving bylaws in March 2022 that established responsibilities across the partnership, including the host. This new partnership and its benefits were covered by the [Boston Globe, Providence Journal](#), and this [RWU press release](#). RWU, and specifically the Office of Global and Community Engagement, to which the program reports, has been excellent. The office is mission and philosophically aligned and they respect NBEP’s status and autonomy as an NEP. The program is now out front in branding. NBEP is confident it has addressed the issues at the heart of this challenge for today and the future.

ii. Expanded, yet targeted, stakeholder representation and partners to implement CCMP goals.

The strategic expansion of NBEP’s partner outreach noted in [Topic 2, Section D.42](#) above and other accomplishments listed in that section respond to this challenge.

iii. Communicating program successes.

NBEP's first fact sheet includes a summation of program successes over the years, the program's quarterly program reports and other parts of NBEP's website (see [Our Work](#) and [Projects We Fund](#), as examples), a new newsletter set to launch in spring 2023, and this Program Evaluation narrative itself, all speak to NBEP's and the larger partnership's successes in the region.

iv. Develop and implement an effective finance plan.

As noted in Topic 2, [Sections B.1](#) and [Section B.6](#), NBEP will create a finance plan after release of Vision 2032 in 2024 that explores how to diversify NBEP's funding and fund the new CCMP over the next decade.

v. Document primary leveraging more accurately.

The introductory section of Topic 1 notes that NEPORT reporting does not reflect NBEP's impact in the Study Area. While the \$1.7 million leverage is an improvement from past periods, the program knows it leverages vastly more money. As acknowledged in the 2018 Program Evaluation, NBEP's niche—reflecting the urban character of the area and identifying gaps—has been on pre-construction work and green infrastructure construction. NBEP funding and non-federal match did support habitat construction projects this period and they are represented in NEPORT (see Topic 1, [Section C.36](#) and [Section C.37](#); and match projects assessed via Topic 2, [Section B.3](#)). Another major confounding factor has been receiving sufficient information from partners on their non-NBEP-funded projects to complete the required fields in NEPORT. The hope is that more broadly and deeply engaging partners in our work—by providing them no-cost technical services, including them in our planning processes, and funding their work—they will see value in the reporting and be more inclined to respond to our requests. NBEP understands the value of NEPORT reporting for justifying the NEPs and their work, and will continue to explore means to capture more projects in our region.

vi. Work with other NEPs and related place-based programs on an issue-specific basis.

To the great benefit of the program, NBEP collaborates with NEPs and place-based programs regularly across the nation. For projects with other NEPs, NBEP has partnered with the Casco Bay Estuary Partnership on [Topic 1, Section D.45](#), Mass Bays Estuary Program and the Long Island Sound Study on seagrass propagation, Buzzards Bay National Estuary Program on SNEP-related activities, Peconic Estuary Partnership and Coastal & Heartland National Estuary Partnership regarding host change, Indian River Lagoon National Estuary Program on collaborative governance workshops, Tampa Bay Estuary Program (TBEP) on environmental justice mapping, and the Lower Columbia Estuary Partnership on their FY2020 Program Evaluation as the ex-officio. The program engaged with all NEPs via the Association of National Estuary Program (ANEP), especially once the Executive Director began serving as ANEP Secretary in 2022. Through a contract with Coastwise Partners, NBEP worked closely with former TBEP and Chesapeake Bay Program directors on Vision 2032. The program consulted with countless place-based programs, large and small, in New England (e.g., [Blackstone Watershed Collaborative](#), [Taunton River Watershed Association](#), [Salt Ponds Coalition](#), [Wood-Pawcatuck Watershed Association](#), [Mystic River Watershed Association](#), [Charles River Watershed Association](#)) and via the Executive Director's connections with organizations and leaders in the Chesapeake Bay watershed (e.g., [Chesapeake Bay Foundation](#), [James River Association](#), [Sustainable Chesapeake](#)) and across the US west (e.g., [Oregon Agricultural Trust](#), [Heart of the Rockies Initiative](#), [Stewardship Alliance of Northeast Elko](#)). This is just a sampling of the tech transfer taking place with place-based colleagues across the country.

2. What kind of obstacles, if any, has the NEP faced with CCMP implementation (political, institutional, etc.) and what has the NEP done to overcome those obstacles? How can EPA (Regions/HQ) support the NEP's efforts to address these obstacles?

It is important to acknowledge at the outset of this discussion that developing a CCMP is an enormous task. NBEP’s Study area covers three states, 113 towns, many operating under home rule or similar, with administrative and cultural issues that arise with spanning so many boundaries. Commentary here is offered with respect for past efforts and the clear benefit of time and hindsight.

The most prominent obstacle to implementing NBEP’s 2012 CCMP is a lack of ownership of the document by the partnership. While developed by a group of dedicated program partners, our appraisal is that it was completed to “check a box” for EPA and NBEP, and was never truly embraced as a guiding document for the region. In terms of content, the document is quite general, lacking specifics (e.g., SMART goals) that would enable any real measure of assessment of progress toward accomplishment of the prescribed actions. As related several times in this narrative, tracking the outcomes of projects funded by NBEP, offered by partners as non-federal match, or other work consistent with the CCMP is a challenge and clear shortcoming the program would like to address next period. Looking from the bigger picture, putting the significant monitoring data already collected into context and to work to track progress against goals, inform management, and support adaptation remains a challenge. Further, the CCMP, and the region itself, lacks enforceable goals or related policy for Narragansett Bay beyond the vital, but hyper-local, pollutant-, waterbody-, and/or discharger-specific water quality standards/permit limits. A Total Maximum Daily Load (TMDL) is not in place for Narragansett Bay or Little Narragansett Bay. NBEP’s CCMP does include a specific action (1.4.4) to create cross-boundary goals for nutrients under Objective 1.4 that says, “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,” but no such action has been taken. For example, there is nothing to drive collective action that approximates the [Chesapeake Bay TMDL](#) and implementation plans, the [state-level water clarity, SAV, Chlorophyll](#), or other “outcome-oriented” measures created for sections of Chesapeake Bay and other estuaries around the country. While it is acknowledged that the Chesapeake Bay gets five times more federal funding per square mile of watershed than Narragansett Bay, NBEP maintains that this region is no less important and no less in need of protection. Finally, a significant barrier is a lack of state capacity in Rhode Island, and municipal capacity across the region, to act consistent with the CCMP beyond that which is required by law. This is not a criticism of organizations or individuals—it’s just a reality that is common refrain. In total, these obstacles reduce the utility of the CCMP and other plans and constrain the region from getting its proportional fair share of federal funding compared to other important landscapes, like Lake Champlain, Chesapeake Bay, and Puget Sound.

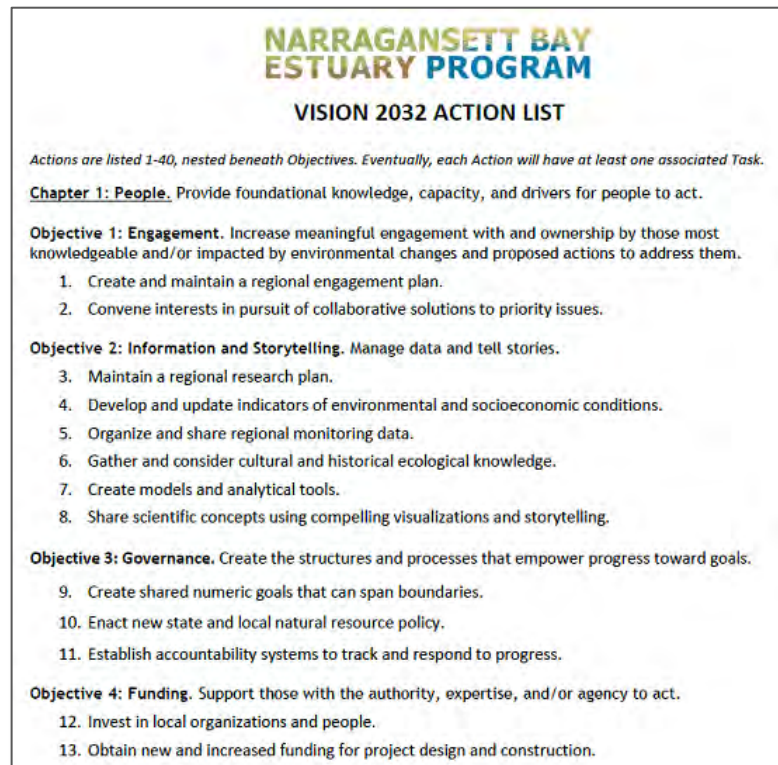


Figure 23: Proposed Vision 2032 actions to boost knowledge, capacity, and drivers for people to act.

NBEP has acted specifically to address these obstacles. The manner of development and content of Vision 2032 (see [Topic 1, Section A.7](#)), including ensuring it directly responds to partners' needs to foster greater ownership, includes enough specifics to implement and track, and has an entire section dedicated to lifting people's capacity to act. This 'People' chapter calls for creation of shared numeric goals that span boundaries, approval of new state and local natural resource policy to support them, and establishment of an accountability system to track and respond to progress (see [Chesapeake Progress](#) for an example). Further, the program's community-focused work under [Topic 1, Section D.42](#), [Section D.43](#), [Section D.49](#), [Section D.51](#), [Section D.52](#), and especially [Section D.53](#), are intended to increase and sustain regional capacity to implement projects and enact policy that supports progress toward shared goals. While it is clear from this narrative that the CCMP helps guide NBEP's work, an honest assessment is that it largely does not play the same role for partners who follow their own plans. Thus, the main goal is to assure that Vision 2032 is useful for the program and its partners.

There are several steps EPA can take to help overcome these obstacles. First and foremost, the agency should take care to assure that its policy supports the CWA's call that NEPs be placed-based by balancing appropriate federal oversight with respect for local approaches. A related suggestion is that EPA Headquarters Coordinators visit their NEPs in person at least twice a year to listen and learn, as well as bring their expertise in federal programs and process. Also, helpful would be EPA hiring staff, or pre-approving and paying for experts, with specific expertise to assist NEPs with required CCMP-related documents that, at least at the outset, would benefit from standardization, such as the communication, finance, monitoring, and equity plans. Finally, development of a CCMP development-associated ICR, which would enable NEPs to conduct surveys, would make collecting feedback to inform CCMPs considerably easier.

3. How can EPA (Regions/HQ), states, and/or other Federal agencies support the NEP's efforts to more effectively address climate and equity priorities?

Any undertaking by NBEP must be reviewed through the lenses of climate and equity. The history, demographics, and geography of the region put the Study Area at the epicenter of climate justice. There is really no teasing out these factors from the program's decision-making—doing so is likely a mistake; figuring out how to integrate them and hold them equal is best, and that is what we are doing. The suggestions under [Topic 2, Section D.2](#) respond to this question.

4. What difficulties or priorities does the NEP anticipate during the next five years?

Commentary throughout this narrative responds to this question. Overall, addressing the 'people' side of the conservation equation is the program's biggest difficulty and priority if we are to advance the mission, implement the CCMP, and improve the health and resilience of the natural and human environment in the region. As discussed in [Topic 1, Section D.2](#), addressing the lack of drivers and short capacity (inside and outside NBEP) for pursuing conservation at scale—at the scale of the Study Area and our biggest challenges (like climate change, inequity)—is paramount. The program's position is that, at least for the next decade with BIL and related funding, the money needed to achieve once in a generation progress in the region is available. However, we currently lack the goals, tracking, and enabling policies to obtain and deploy it on the ground. Work is underway over the last few years by Massachusetts Executive Office of Environmental Affairs, RIDEM, Rhode Island Infrastructure Bank, and Save The Bay, as well as NBEP, and others to create these pre-conditions for bringing more money and projects that deliver results to the area.

Topic 3: NEP Ecosystem and Community Status

A. Community and Stakeholders Engagement

1. How does the NEP ensure that the public has access to the decision-making process and engagement opportunities?

Topic 1, [Section D.42](#) (Partner Expansion and Diversification), [Section D.43](#) (Public Access to NBEP Work Processes and Products), and [Section D.52](#) (Community Engagement Payments Program), as well as [Topic 2, Section A.1](#) (NBEP decision-making) are responsive to this question.

2. How has the NEP engaged the variety of community members and stakeholders in the NEP study area, including in underrepresented segments?

[Topic 1, Section A.7](#) (Vision 2032), [Section D.42](#) (Partner Expansion and Diversification), [Section D.49](#) (NBEP DEIJ Assessment), [Section D.50](#) (Blackstone Watershed Collaborative Creation) [Section D.51](#) (Blackstone Commons Project), and [Section D.52](#) (Community Engagement Payments Program) are each responsive to this question.

3. What is the level of engagement from the stakeholders and the public?

Topic 1, [Section D.42](#) (Partner Expansion and Diversification), [Section D.43](#) (Public Access to NBEP Work Processes and Products), responds to this question.

4. Where and how could the level of engagement be improved?

Consistent with [Topic 1, Section A.7](#) and [Topic 1, D.42](#), priority interests where NBEP seeks a deeper level of engagement are underserved municipalities and groups supporting them, indigenous people, businesses that depend on natural resources, and interests in the small part of our Study Area in Connecticut. The new Watershed Outreach Manager has led this outreach in earnest in FY2021, with plans to release a more formal Engagement Plan in FY2023 in concert with release of Vision 2032.

B. Education and Outreach

1. Is the NEP effectively promoting and creating widespread recognition of the Program?

During this period NBEP has widely promoted its work, so that its niche and services are broadly known, and it is viewed as a valuable cog in efforts to advance restoration in the Narragansett Bay region. This is evident through the press coverage noted throughout this narrative, RWU's desire to partner with the program, and the accomplishments included in this narrative, especially those described in [Topic 1, Section D.42](#) and [Section D.43](#). NBEP is strategic about self-promotion as the organization believes it is most useful and effective as a service-oriented, humble body that amplifies and elevates NBEP and its partners work work to improve the health, resilience, and enjoyment of natural resources in the region.

2. What are some of the impacts of outreach and educational activities?

Descriptions of the accomplishments under Topic 1 and program management under Topic 2 are responsive to this question. Taken as a whole, NBEP's outreach activities are enabling more organizations and people to access and understand scientific data and tools, provide early feedback on activities that may impact their interests, avail themselves of NBEP's and other's services, particularly funding, and collectively deliver results that exceed what individuals can achieve.

3. What are some ways these activities could be improved?

NBEP has not historically pursued education and outreach beyond the scientifically-informed. Topic 1 describes the program's efforts during this period to use Story Maps, Science Corner 2-pagers, and website updates to provide timely, more general content for the broader "interested public," that is, members of the public who follow or are impacted by environmental decision-making. However, while a step forward, it is unlikely that folks beyond NBEP's traditional audience are seeing them. Thus, NBEP expects to strategically expand and better target its educational programs in the next Evaluation Period. First, it is important that the program take more deliberate steps to ensure the chosen communications channel (e.g., website, social media, workshop) is actually reaching the target audience. This is especially important for new interests with whom the program would like to build better connections. Further, NBEP must continue to improve its storytelling. Targeted stories of hope and despair, success and crisis, and today and tomorrow can be more effectively used to help drive action consistent with the CCMP. Also expanding NBEP's ability to use polling and focus groups—whether through individual fast-track ICRs or a new NEP-wide approval—will help the organization understand if its messages are being heard, understood, and bringing about the outcomes desired. There also may be some educational topics that are not adequately covered today where NBEP could become a leader, such as the region's rare species or the trade-offs between environmental improvements and affordable housing. In FY2021, the program hired a seasoned NEP professional to serve as its first Watershed Outreach Manager to lead its evolution in this area, via pilot efforts this year that will inform a development of a formal Engagement Plan in FY2023.

C. Monitoring and Assessment

1. How do the NEP's monitoring plan and indicators produce data to support a comprehensive and integrated analysis of environmental conditions?

A significant amount of monitoring takes place in the region. The focus of this answer is Rhode Island and Massachusetts, where NBEP has historically focused. Water quality data comes from WWTF dischargers, the [Narragansett Bay Fixed Site Monitory Stations Network](#), surface water monitoring program operated by [RIDEM Division of Water Resources](#) and the [Massachusetts Department of Environmental Protection](#), USGS, and [URI Watershed Watch](#), to name a few. Fisheries surveys are completed by [RIDEM's Division of Marine Fisheries](#) and the [Massachusetts Division of Marine Fisheries](#). Much of this data is required to meet requirements of EPA, NOAA, and the Atlantic States Marine Fisheries Commission. Collection of water quality, habitat, and social data takes place outside the regulatory sphere for individual projects led by government, NGOs, and academic institutions. Data is compiled by [RIGIS](#) and the Rhode Island Environment Monitoring Collaborative (RIMEC) operated by the URI Coastal Institute in Rhode Island, [MassGIS](#) and [BioMap](#) in Massachusetts, and a host of federal agencies. RIMEC was specifically established to develop and coordinate an environmental monitoring strategy for the state, but has served mostly as a forum for sharing recent monitoring work. NBEP is not aware of a similar coordinating body in Massachusetts. In sum, environmental monitoring is not as coordinated as it could be across states, towns, and projects, with data "stove-piped" within state programs. Limited sustained funding for staff to complete beyond required monitoring is viewed as a reason data is not better compiled and integrated in the region.

As discussed under [Topic 2, Section D.2](#), while the region has waterbody and discharger-specific standards/limits, it lacks enforceable goals or TMDLs for the Study Area, Narragansett Bay, or other areas at scale. NBEP's 2017 Report and GIS Data Hub provides status and trends data for 24 indicators, but also does not include goals for each indicator or a monitoring strategy for tracking and reporting change. Multi-jurisdictional water quality or habitat goals, like those in place for the Chesapeake Bay and Long Island Sound, have not been established here.

With the preceding discussion as back-drop, NBEP has chosen not to create a monitoring plan to date. There has simply not been a call among the Steering Committee, especially state partners that lead CWA monitoring, for NBEP to step in and create such a document. That said, [Topic 2, Section D.2](#) and Figure 22 above notes that via Vision 2032 NBEP is proposing that the partnership be a catalyst for creating the pre-conditions for more holistic and strategic monitoring by compiling and sharing regional data (Objective 2—Action 5), creating numeric goals that span boundaries (Objective 3—Action 9), establishing systems to track and respond to progress (Objective 3—Action 11), and seeking funding for the staff to manage such programs (Objective 4—Action 12). As a start, partnering with the Coastal Institute to re-invigorate the RIEMC, and establishing similar forums across state lines, is something the program began in FY2022. Looking forward into FY2023, NBEP plans for the Staff Scientist, and its new Ecologist hire, to do two things: (1) better track the outcomes of work funded by the program or offered as match, and (2) assume a greater role in coordinating and prioritizing monitoring work across the region.

The actions proposed for Vision 2032 and otherwise noted above are intended to organize data, build drivers, and create buy-in for more strategic monitoring, as well as determine whether a regional monitoring plan is additive, and if so, what is the best role for NBEP in creating such a plan in the coming years.

2. How does the NEP use monitoring results to re-direct management actions and programs implemented under the CCMP?

NBEP does not undertake construction projects or management actions itself. The program responds to current science, local needs, and opportunities to guide its services, including what is funded. The accomplishments noted in this narrative are responsive to these factors. Federal, state, and local agencies respond to new data and laws to adjust discharge limits, swimming and fishing use, and harvests.

3. How is research used to identify missing data that warrant additional monitoring or sampling?

NBEP has funded research for decades. Results are available in the Resource Library and GIS data Hub noted in [Topic 1, Section D.43](#). Any research conducted or funded by the program is likely to inform some future action from further study to planning to construction to management action. The goal is purpose-driven research that can assist future decisions. The 2017 Report included a section in each of the 24 indicator chapters that summarized data gaps, and a compilation of these Narragansett Bay data needs has informed our work thereafter. NBEP has recently engaged with the Science Advisory Committee to create an updated list of data gaps that will now be inclusive of the entire Study Area and social science data. NBEP will compile into a regional Research Plan in FY2023, with plans for an annual update and prioritization to assure most pressing needs are met. Additional roles for NBEP around monitoring and sampling may arise from the work described under [Topic 3, Section C.1](#) above.

D. Clean Water Act Programs Relationship

1. How does the NEP support the goals of the CWA?

Figure 25: NBEP Support of CWA Goals

CWA Goal	General Approach	Accomplishments That Address Goal
Strengthening Water Quality Standards	NBEP does not complete work that directly strengthens water quality standards (WQS) published by partner states. However, NBEP does generate new science and stimulate discussions that may inform WQS changes.	Topic 1, Section B.8 , Section B.9 , Section B.10 , Section B.11 , Section B.12 , Section B.13 , and Section B.17 .
Improving Water Quality Monitoring	NBEP does not conduct water quality monitoring. The program creates work products that compile, analyze, and share water quality data, as well as invests in projects that are subject to monitoring. Most of the organization’s work could help improve monitoring in some way.	Topic 1, Section A.1 , Section A.4 , Section A.5 , Section A.7 , Section B.10 , Section B.11 , Section B.13 , Section B.15 , Section B.17 , Section B.32 , and Section B.33 .
Developing Total Maximum Daily Loads	NBEP does not assist in the development of TMDLs created by partner states/EPA. Vision 2032, Blackstone River, and Hundred Acre Cove planning tools and funded research could assist content of TMDLs. The program focuses on supporting project development that helps implement TMDLs.	Topic 1, Section A.1 , Section A.5 , Section A.7 , Section A.14 , and Section A.17 .
Controlling Nonpoint Source Pollution on a Watershed Basis	Much of the program’s external funding (subawards) supports project development to reduce nonpoint source pollution and protect impacted habitats.	Virtually all Topic 1 accomplishments can connect to nonpoint source pollution and watershed management.
Strengthening National Pollutant Discharge Elimination Systems Permits	NBEP does not take action that addresses NPDES permits issued by the states and EPA. Providing capacity support for local groups to develop projects compliant with permits and otherwise advocate for their resources may help advance this goal.	Topic 1, Section D.50 and Section D.53 .
Supporting Sustainable Wastewater Infrastructure	NBEP does not provide wastewater technical services or fund wastewater infrastructure. The program’s planning processes and tools can help identify locations and build support for funding WWTP or septic upgrades.	Topic 1, Section A.7 , Section A.12 , Section C.33 , and Section D.47 .

E. EPA Priorities

1. How does the NEP incorporate EPA priorities into their workplans consistent with locally generated concerns?

Figure 25: NBEP Support for EPA and Local Priorities

EPA Priorities	Example Local Concerns	Workplan Addresses Priority				
		FY17	FY18	FY19	FY20	FY21
Reduction in nutrient pollution and HABs	Nutrient pollution has been a top priority in the region for the last decade. Mandated work to reduce WWTF and CSO nutrient discharges have improved conditions in Upper Narragansett Bay. Study and projects on nutrient runoff to other bays, coves, and ponds are ongoing. Much of NBEP’s work addresses nutrient pollution and its consequences in some way. Local HAB/nutrient issues relate to the closure of recreational swimming and shellfishing due to sewage discharges to streams or toxic blooms in ponds.	X	X	X	X	X
Water reuse and conservation	Water conservation and reuse policies exist in all three states, but it is not a major focus, despite recent drought. However, assuring local water supply planning includes all beneficial uses—drinking water and wildlife—is an emerging focus of communities in the headwaters of the Blackstone and Taunton Rivers where projections show scarcity.				X	X
Marine litter reduction	Trash and abandoned commercial fishing gear in waterways are increasingly hot topics. Trash is a top concern in polls conducted by NBEP in its urbanized Study Area. Bills to ban plastic nip bottles are in the Rhode Island General Assembly. The program hosted a plastics event in FY2021 to explore this issue in more depth, and staff were part of a SNEP grant review panel that funded the Commercial Fisheries Research Foundation in FY2020 to study ghost gear .				X	X
Green infrastructure	Due its heavily urban character, green infrastructure is installed throughout the Study Area. Also called nature-based solutions, they are funded by the Municipal Vulnerability Preparedness Program in Massachusetts, Municipal Resilience Program and State Bond funds in Rhode Island, and state §319 and SNEP in both states. NBEP’s planning for Vision 2032 and the Blackstone emphasize these practices, while for green infrastructure, the program funded 1 construction and 2 plans in FY2019, and 11 plans in FY2021.		X	X	X	X
Environmental justice	Some of New England’s most underserved communities are located in NBEP’s Study Area. Topic 1, Section D.47 and Section D.48 describes inequities and consequences in our region, and Topic 1, Section 49 calls out the steps NBEP is taking to address them. This work is a high priority for EPA, NBEP, and local partners.			X	X	X
Climate change	Southern New England is exceptionally vulnerable to rising seas and associated flooding of coastal structures, habitats, and socioeconomic opportunities. Rising temperatures are impacting species distribution in estuarine ecosystems. Nuisance flooding extending to uplands due to extreme weather is more common. All of NBEP’s work is directly connected to studying and responding to climate change.	X	X	X	X	X