

2014 ANNUAL REPORT

of the

MASSACHUSETTS BAYS NATIONAL ESTUARY PROGRAM





Photo: C. Hadfield via the International Space Station



COMMONWEALTH OF MASSACHUSETTS
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EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
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MASSACHUSETTS BAYS NATIONAL ESTUARY PROGRAM
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This information is available in alternate formats upon request.

The Massachusetts Bays National Estuary Program (MassBays) is one of 28 National Estuary Programs (NEPs) around the United States funded by the U.S. Environmental Protection Agency (EPA). In a planning area that encompasses two bays, more than 1200 miles of coastline, and 50 communities, MassBays works strategically and cooperatively to protect, restore, and enhance coastal ecosystems.

Our 2014 Annual Report surveys MassBays' work between January and December 2014 and highlights the significant progress we have made toward our vision for the Bays, under the guidance of our Management Committee:

We envision a network of healthy and resilient estuaries – sustainable ecosystems that support the life and communities



King Tide, Plum Island. Photo: S. Napoli

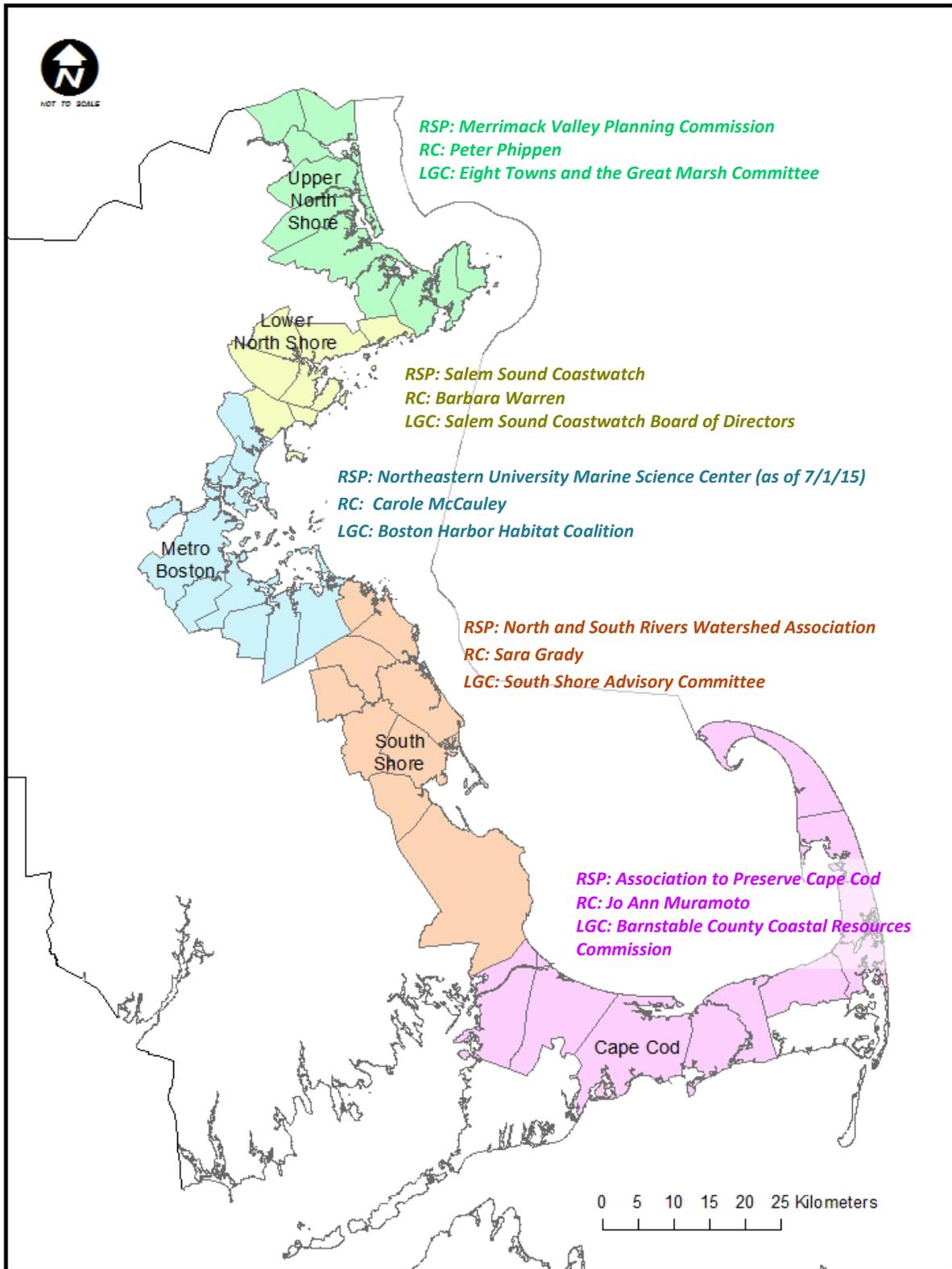


Elgrass restoration in Essex Bay. Photo: L. Berry Engler

2014 At a Glance

- ☞ MassBays' Regional Coordinators brought citizens, scientists, and government officials together for the good of the Bays through regional meetings and workshops.
Convening Stakeholders, page 3
- ☞ MassBays provided \$74,980 in cash awards, as well as technical assistance for research and planning programs that advance our strategic goals.
Providing Scientific Basis for Management, page 5
- ☞ MassBays Regional Coordinators provided critical interagency coordination and recruited hundreds of volunteers to conduct surveys, monitoring, stormwater management, and outreach and education, leading to restoration and enhancement of nearly 500 acres of estuarine habitat.
Program Impact, page 8
- ☞ MassBays produced a stormwater treatment and control handbook and workshop series focused on coastal resources, and launched two new map-based tools on our website.
Working with Decisionmakers, page 9
- ☞ Building on our baseline of \$558,000 in Federal funding from EPA, MassBays gained \$542,000 in matching cash and in-kind support, and leveraged almost \$6 million in additional resources.
Financial Data, page 11

The bulk of our on-the-ground work is carried out by Regional Service Providers (RSPs) based in five sub-regions. MassBays provides grant funds to each RSP to support a Regional Coordinator (RC), who convenes local advisors to their work via local governance committees (LGCs).



In 2014, MassBays renewed investments to support collaboration across multiple sectors to fulfill our mission:

The Massachusetts Bays National Estuary Program is dedicated to protecting, restoring, and enhancing the estuarine ecosystems of Massachusetts Bay and Cape Cod Bay. We facilitate partnerships to prompt local, state, and federal action and stewardship by *convening stakeholders* on the local and regional level, *providing scientific basis for management*, and *working with decisionmakers* to identify problems and solutions.

Work in these arenas is highlighted in the following sections.

Convening Stakeholders

Regional Conferences

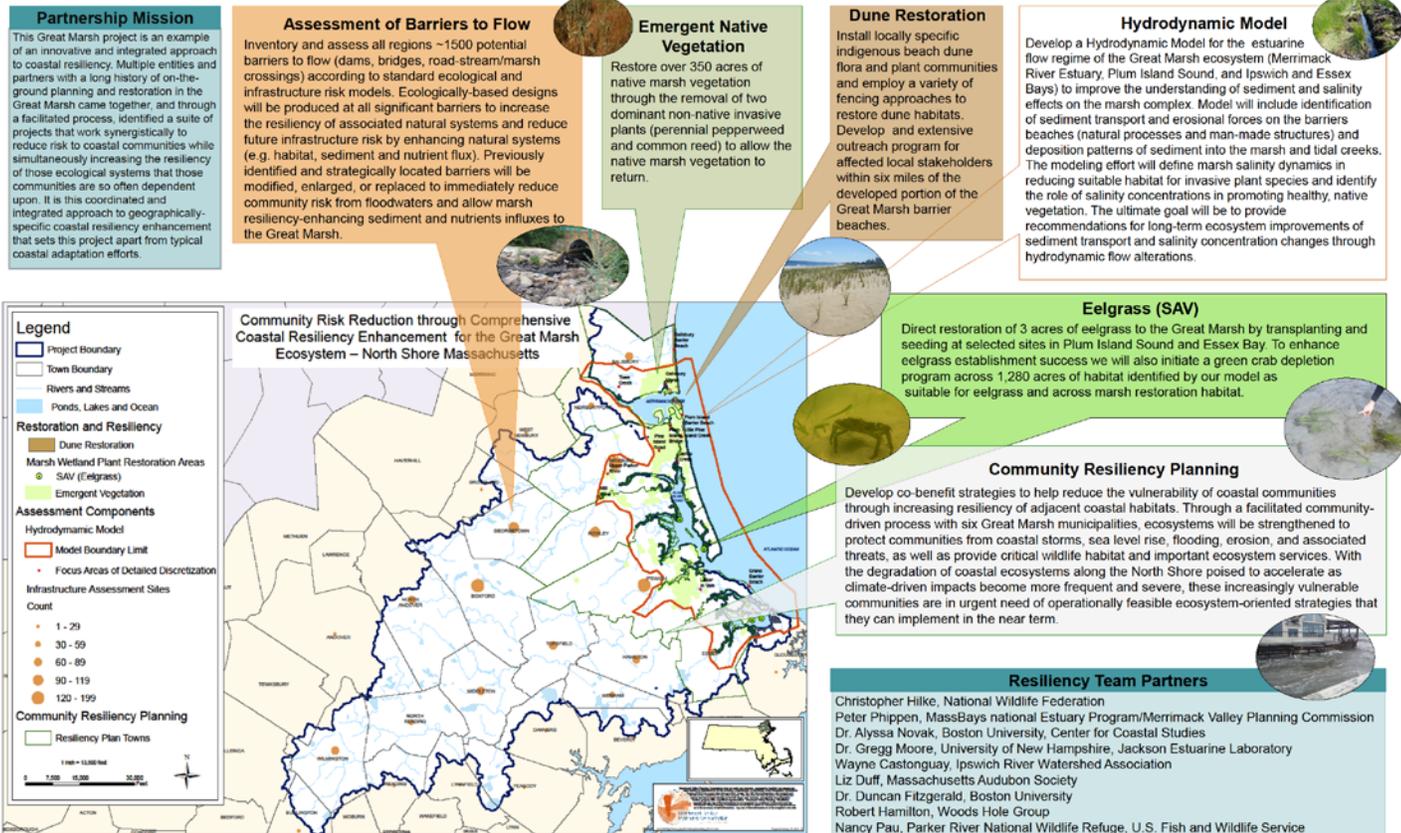
Each MassBays RC worked closely with partners to plan and implement conferences relevant to MassBays goals. The following describes workshops and information sessions that took place in 2014:

- *Sea Level Rise Adaptation Workshop* (Upper North Shore): MassBays' Upper North Shore RC brought stakeholders to the third annual Great Marsh Symposium, which focused on the pending impacts of sea level rise and community-based mitigation measures. Municipal officials, nonprofit staff, and citizen-volunteers heard from local and state experts on resilience of natural systems to climate change impacts, the need for community planning and green infrastructure options, marsh migration modeling, and local case studies. Presentations from the Symposium are available under the "Resources" tab at [Great Marsh Symposium 2014](#).
- *Eelgrass and Conservation Moorings Information Session* (Lower North Shore): In anticipation of installation of 70 "conservation moorings" in Manchester Harbor to reduce adverse impact on eelgrass beds, the Lower North Shore RC organized a public event at the Manchester Yacht Club. A State Division of Marine Fisheries expert, the mooring manufacturer, and the Manchester Harbormaster described the importance of eelgrass restoration and conservation, answered technical questions about the moorings, and explained the logistics of placing new moorings. The event resulted in news coverage of the issue, including an [article](#) in the *Gloucester Times*.
- *Regional Sea Level Rise Workshop* (South Shore): The South Shore RC worked closely with the Jones River Watershed Association to produce a six-part, regional sea level rise workshop to spark discussion and planning in the region. Participants shared details and plans for current and future adaptation efforts. Several presentations are archived at the Jones River Watershed Associations' [Climate Change in Your Backyard Series](#) web page.
- *Impacts of Sea Level Rise on Cape Cod's Aquifer*: Cape Cod's unconfined groundwater system could be significantly impacted by rising sea level, resulting in a higher water table and more pollution in local ponds, streams, and wetlands from septic and stormwater systems. Partnering with the U.S. Geological Survey (USGS), Cape Cod Commission, The Nature Conservancy, Barnstable County Coastal Resources Committee, and the Association to Preserve Cape Cod, the Cape Cod RC organized a workshop describing a study of the interaction between sea level rise and groundwater resources on the Cape. USGS scientists described their approach to private citizens, planners, conservation agents, coastal geologists, representatives of local and state agencies, and non-profit organizations. Watch the [event](#) at this [livestream.com](#) web page. Final results (due Fall 2015) will be used to develop adaptation measures for communities and ecosystems.

The Great Marsh Resiliency Partnership

In 2014, MassBays' Upper North Shore RC helped launch the Great Marsh Resiliency Partnership, bringing together nonprofit organizations; for-profit companies; local, state, and federal agencies; and research institutions to bring new Federal funds to the region. Their successful proposal to the National Fish and Wildlife Foundation (NFWF) was one of 54 grants awarded in response to 375 proposals for funding under the Hurricane Sandy Coastal Resiliency competitive grant program. For more information about the awards, see the [NFWF Grant Program](#) web page.

Community Risk Reduction Through Comprehensive Coastal Resiliency Enhancement for Great Marsh Upper North Shore, Massachusetts



Applying more than \$2.9 million in new Federal funds – matched by \$2.3 million in cash and in-kind contributions – the project includes six components in three categories:

Community Resiliency Planning

1. Coastal Community Adaptation Plans

Assessment and Modeling

2. Hydrologic barriers assessment & prioritization
3. Hydrodynamic sediment transport & salinity modeling

Ecological Restoration and Enhancement

4. Dune nourishment & revegetation
5. Salt marsh & sub-aquatic (eelgrass) vegetation restoration
6. Student Conservation Association assistance

Providing Scientific Basis for Management

Research and Planning Grants

The Research and Planning Grant program was launched in 2010 to support the important groundwork necessary to obtain subsequent funding for large restoration projects or in-depth research proposals. Since 2010, MassBays has awarded almost \$500,000 toward 26 projects that investigate topics ranging from specific local causes of coastal habitat degradation, to funding options for stormwater management, to testing new habitat restoration approaches. With a new Comprehensive Conservation and Management Plan in the works, MassBays' Management Committee authorized a program evaluation and revision.

MassBays' Staff Scientist convened an *ad hoc* subcommittee (including past grantees, fellow state and federal grant-makers, a New England NEP representative, and management committee members) to examine the impact of the program from 2011 to 2014, and look for ways that a new program could advance MassBays' goals. In 2015, MassBays will launch a new **Healthy Estuaries Grant program** incorporating their findings and expert contributions.

Meanwhile, in December MassBays wrapped up the 2014 Research and Planning Grant program with funding for the following four projects. The final reports are posted at the [MassBays Research and Planning Grants](#) web page.

Environmental Impacts of Docks and Piers on Salt Marsh Vegetation across Massachusetts Estuaries (Division of Marine Fisheries, \$15,500)

This 2014 grant built on preliminary findings of a 2013 MassBays-funded study of the shading effects of docks, with the goal of generating data for potential revisions to guidelines for dock and pier installations. From July to September 2014, MassBays-funded *Marine Fisheries* intern and staff to collect marsh vegetation samples under and adjacent to 211 docks in 15 Massachusetts coastal towns. Among all dock stations, shaded (under-dock) sites had lower median stem density (62.2% less) and biomass (41.5% less) compared to unshaded (adjacent) areas. These findings will inform future permit review of proposed docks and piers in Commonwealth marsh habitats.

Site Reconnaissance, Survey, and Development of Conceptual Design Options for Fish Passage Restoration, Upper Herring River Watershed, Wellfleet (Friends of Herring River, \$20,000)

MassBays continued its support of the Herring River Restoration Project, which will reverse degradation of more than 1,000 acres of estuarine habitat. With MassBays funding, a consultant conducted evaluation and redesign of undersized culverts in the Herring River and Patience Brook, pinch points in the only courses for river herring, American eel, and other fish to reach the main spawning ponds upstream.



Outlet of Old Kings Highway culvert, Wellfleet. With conceptual designs funded by MassBays, Friends of the Herring River can pursue funding to restore habitat connections and reduce erosion from the adjacent roadway. Photo: Stantec Consulting Services, Inc.

Monitoring Salt Marshes in a Changing Climate (Jones River Watershed Association, \$19,480)

This project compared salt marsh characteristics between the North and South Rivers and the Jones River, both in the South Shore region. Documenting long-term changes in salt marsh systems will allow scientists to track – and resource managers to respond to – impacts of sea level rise, salt marsh vegetation dieback, and invasive species. Researchers found that species composition in the 2014 Jones River sampling was more similar to that of the 2000 North and South Rivers sampling than of 2014. Additional study will test the validity of comparing observations among the sites and identify factors controlling changes in each system.

Building a Resilient Eelgrass Population in the Waters of the Great Marsh ACEC (Town of Essex, \$20,000)

MassBays supported a large-scale eelgrass restoration program in Essex Bay using multiple donor sources and research into the population structure of the European green crab in the Bay—a species that has been observed to have a potentially significant impact on eelgrass beds in the area. The project brought together numerous partners and leveraged supplemental state funds to address concerns about green crab impacts on habitats, including shellfish beds. Researchers were able to successfully transplant eelgrass into multiple sites in Essex Bay, and recommended large-scale restoration at select sites while monitoring green crab impacts.

Monitoring estuarine habitats and species

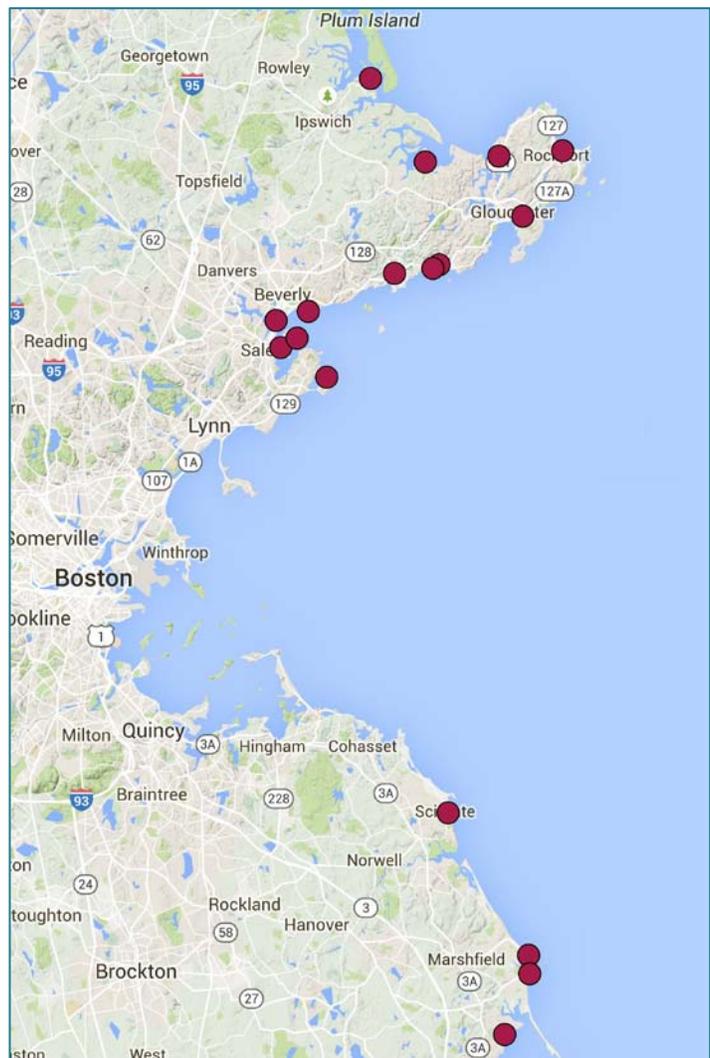
MassBays provides data to partners in Massachusetts state agencies and across the eastern United States. In 2014, Regional Coordinators recruited and trained volunteers to document:

- Water quality
- Herring migration
- Marine invasive species (map, right)
- Salt marsh invasive species
- Beach condition
- Horseshoe crab spawning
- Salt marsh restoration



Marine invasives monitoring volunteers at Beverly Pier (above). Photo by B. Warren

MassBays RCs contribute data each year to the state's Marine Invader Monitoring and Information Collaborative, a program developed and managed by the Office of Coastal Zone Management's [Aquatic Invasive Species Program](#). (Right) 2014 monitoring sites.



Restoration and Maintenance of Shellfish Bed Habitat



Investigating potential for enhancing mussel populations in the North and South Rivers, the North and South Rivers Watershed Association (NSRWA) initiated a pilot program, setting out tiny mussels in the river in protective bags attached to town-owned floats. The idea was to establish new colonies of blue mussels, as well as monitor growth and survival of the bivalves, particularly in light of predation by green crabs. MassBays' RC collected 200 spat (juveniles) in July 2014 and another 100 in August 2014. The mussels were measured on roughly a bi-weekly basis for cohort analysis and growth rate calculations. Growth rates ranged from ~0.8mm/day initially to ~0.4mm/day after a month of growth. Mortality rates declined with increasing size, from 1.8 individuals/day initially to 0.8 individuals per day after a month of growth. Since the ideal size for transplant to a benthic or aquaculture environment is ~25mm, this suggests that for settled spat to be used for population enhancement, there should be large quantities collected, and as early in the mussels' spawning season as possible. The other alternative (also tested by the NSRWA) is to collect settled mussels off temporary docks prior to their removal in the fall.

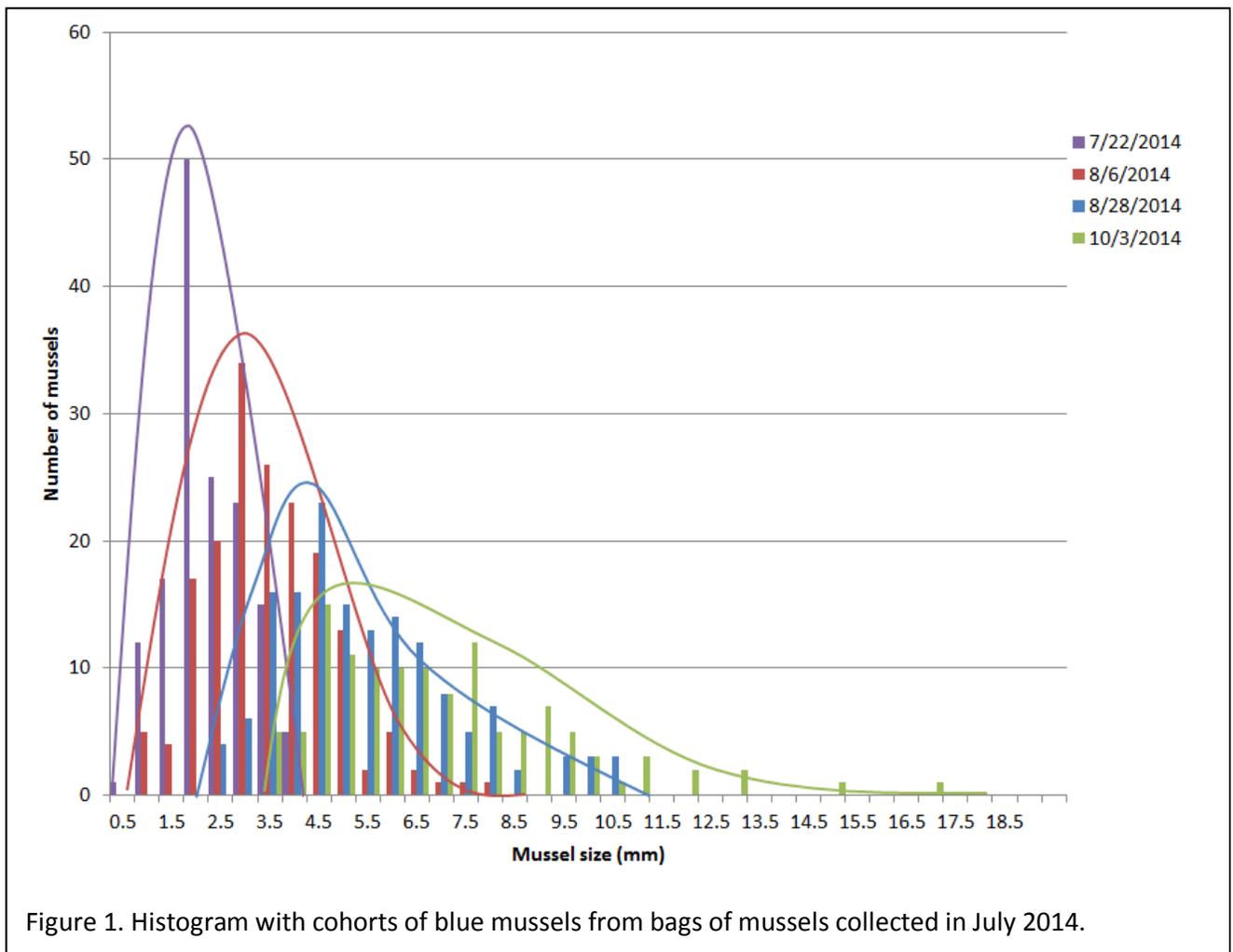
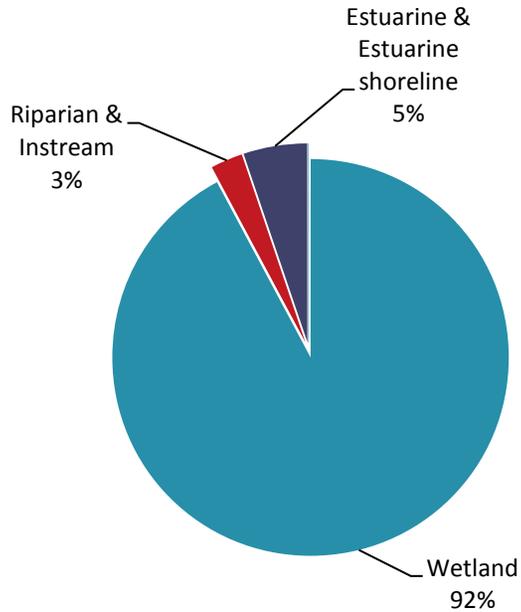


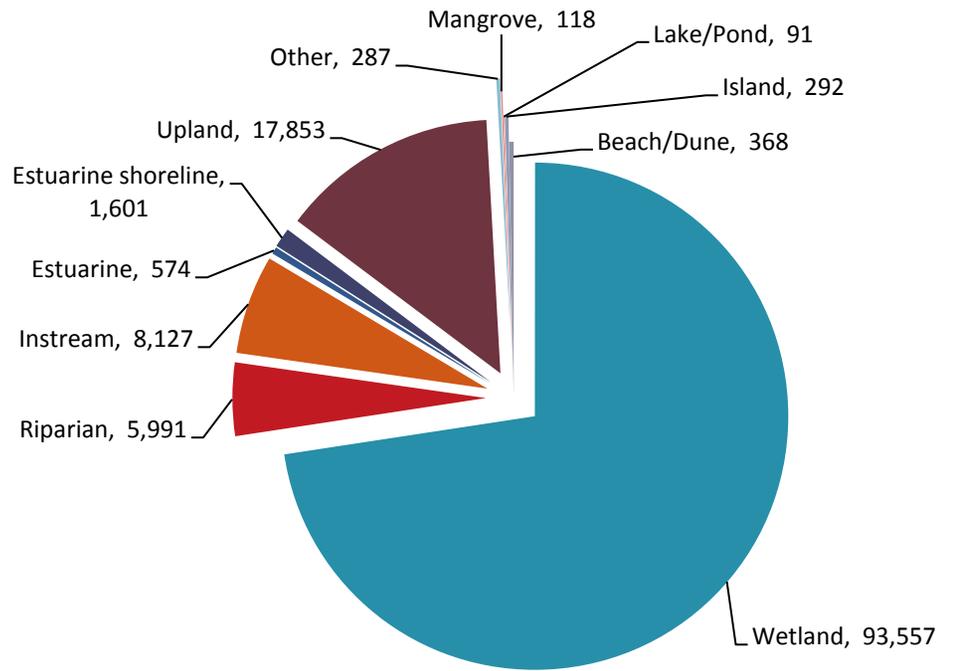
Figure 1. Histogram with cohorts of blue mussels from bags of mussels collected in July 2014.

Program Impact

EPA, as a condition of funding to the NEPs, requires annual reporting on acres of habitat restored with NEP support. The pie chart on the left reports acres restored with MassBays contributions; the right-hand pie chart compiles acres restored across all 28 NEPs, from Puerto Rico's San Juan Bay to Puget Sound in Washington.



**Habitat restored (MassBays, percent type)
499 acres total**



**Habitat restored (all NEPs, acres)
128,859 acres total**

Working with Decisionmakers to Identify Problems and Solutions

In 2014, MassBays staff worked with local, regional, and federal partners to respond directly to needs identified by the Local Governance Committees. Some examples are described here.

Green Infrastructure for Stormwater Treatment and Control Handbook

With technical assistance through an EPA contract, MassBays worked closely with Tetrattech engineers to document the benefits of green infrastructure for stormwater treatment and control. The Handbook provides guidance to coastal municipalities for assessing need and implementing green infrastructure approaches, incorporating potential climate change impacts on those installations.

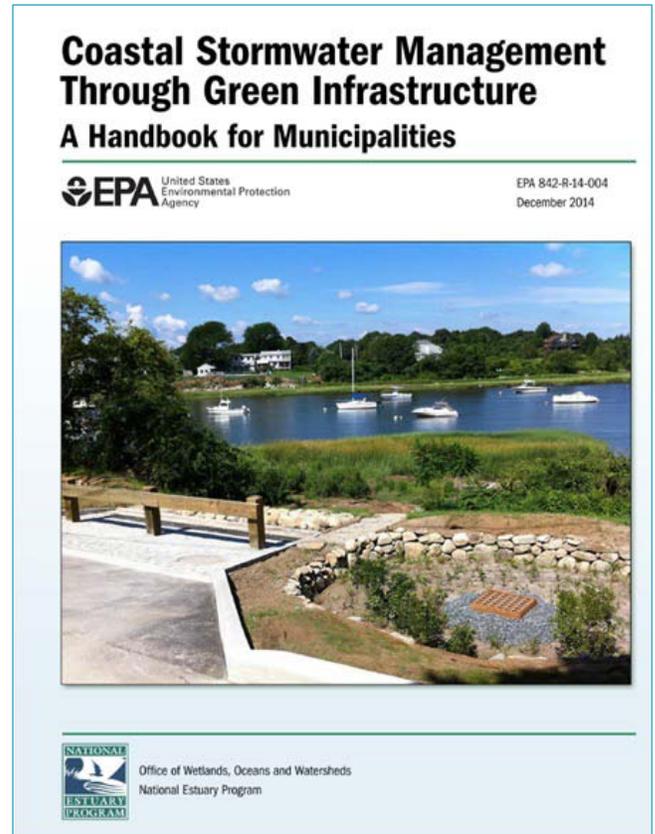
MassBays first hosted a “train-the-trainer” event, which provided critical input from the target audience on the draft Handbook and the agenda and presentations for four regional workshops. The workshops drew attendees from 79 communities, with more than 147 people representing departments of public works, planning boards, conservation commissions, nonprofits, and consulting companies. The final [Handbook](#) is now available along with a MassBays [fact sheet](#) that describes the document.

A successful installation on Kingston Bay is featured on the cover of the Green Infrastructure Handbook (right). Cover photo courtesy of M. Thomas.

Community responses to climate change

In 2014, the Office of Coastal Zone Management offered more than \$1 million as part of the Coastal Community Resilience Grant Program to support responses to climate change impacts, both current and future. MassBays RCs helped municipal partners develop proposals for funding, provided in-kind match, and aided in project implementation.

For example, MassBays’ Cape Cod RC worked with partners to manage a project to develop a beach nourishment plan to mitigate coastal erosion. This project involves a new kind of analysis of sand volumes and transport (sediment budget) from Wellfleet to Provincetown. Partners included the town of Provincetown, Cape Cod Commission, Center for Coastal Studies, and Cape Cod Cooperative Extension. The results, along with public input solicited by the project team, were applied to develop a beach management plan for Provincetown Harbor that identifies potential areas for dune restoration, beach stabilization, and other natural approaches to mitigating coastal erosion and flooding problems.



Online management tools

MassBays provided two new tools for decision-makers, making information about the area’s 47 embayments more readily available. An *Inventory* of more than 500 planning and research documents produced around the region since 1996 are searchable by target embayment and five topic areas: water quality, estuarine habitat protection, invasive species, climate change, and continuity of estuarine habitat. See the MassBays [Publication page](#) for complete details.

A new online [Estuary Delineation and Assessment Viewer](#) provides an interactive map for each of the 47 embayments in the region to help visualize and compare the location of stressors (such as road crossings and wastewater discharges) with resources (such as bird nesting sites or shellfish beds).

Habitat Restoration

The Mill Pond Dam, the second of four dams on the Third Herring Brook in Hanover and Norwell, was removed and a new stream channel established in October 2014. MassBays' South Shore RSP, the North and South Rivers Watershed Association (NSRWA), worked with the Division of Ecological Restoration, the Massachusetts Environmental Trust, U.S. Department of Agriculture's Natural Resources Conservation Service, the Sheehan Family Foundation, and the South Shore YMCA to bring this 10-year effort to fruition. A time-lapse video of the removal, footage from a post-removal fly-over, and greetings from a crayfish are available on NSRWA's [Third Herring Brook](#) web page.



Stormwater treatment at the Milton Public Library, site of a MassBays green infrastructure workshop. Photo: L. Berry Engler

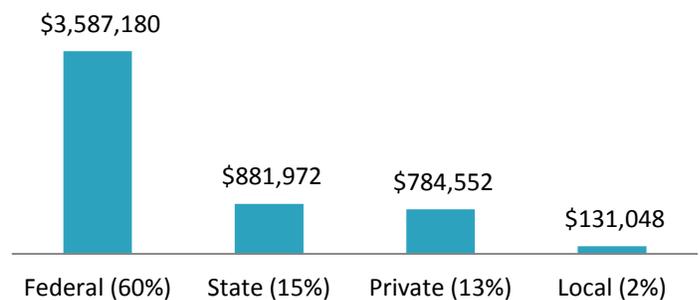
The Importance of Volunteers

In addition to acres of habitat restored (page 3), EPA also tallies cash and in-kind support leveraged by the National Estuary Programs. In contrast to matching resources that are held and applied directly by MassBays and the Regional Service Providers (see next page), leveraged resources are spent by others on programs complementary to our own, with some input from MassBays. We have leveraged our own program funds to prompt others to invest as well, by writing letters of support for grant proposals, convening stakeholders to prompt action, or providing seed monies to develop project designs.

In 2014, MassBays leveraged \$9 for every \$1 received from EPA under the National Estuary Program.

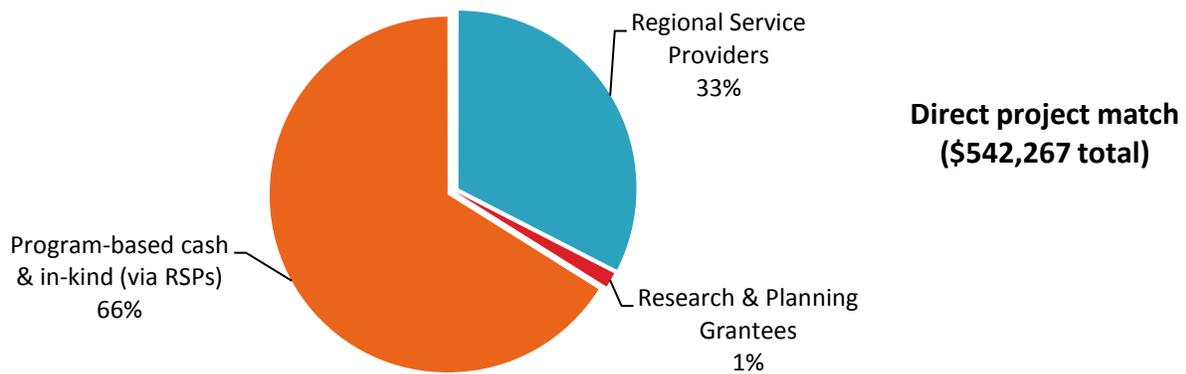
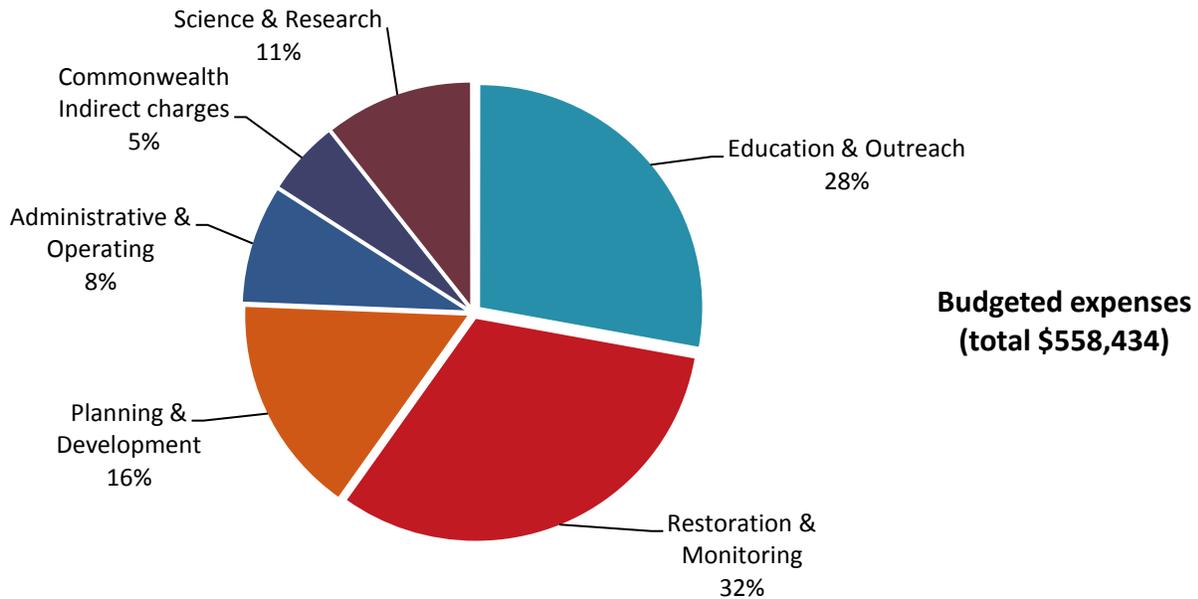
Volunteers are a big part of the leveraging that MassBays reports to EPA each year. In 2014, \$600K in in-kind services (volunteer time, or salaries paid by others) were provided by individuals and private entities. For example, the 400 volunteers who work with Salem Sound Coastwatch (SSCW), MassBays' RSP on the Lower North Shore, are known as "beachkeepers." These community members are trained through an Adopt-a-Beach Program to visually monitor the shoreline for sources of pollution, signs of erosion, and evidence of invasive plants; collect samples from storm-water outfall pipes and coastal streams for bacterial contamination testing; conduct or organize regular clean-ups, particularly after storm events; report on the effects of storms on coastal resources; and develop action plans to respond to observed problems and impacts. SSCW supports the volunteers through an online platform where beachkeepers can post their results and pictures and communicate with each other. The average volunteer, following at least 4 hours of training, spends at least 24 hours in the field each year.

Sources of leveraged cash and in-kind resources (\$5,994,400 total)



Financial Data, 2014

MassBays' yearly budget and workplan are reviewed and approved by our Management Committee and submitted to EPA for funding under Section 320 of the Clean Water Act. Non-federal funds provided as match from our grantees, dollars leveraged via on-the-ground projects, and in-kind support from CZM allow us to carry out our work.



Administration

Staff

Pam DiBona, Executive Director
Prassede Vella, Staff Scientist
Sarah Stanley, 2014 graduate intern
Lisa Berry Engler, Communications and Outreach (through March 2014)

Regional Coordinators, 2014

Peter Phippen, Upper North Shore
Barbara Warren, Lower North Shore
Lisa Berry Engler, Metro Boston (through March 2014)
Sara Grady, South Shore
Jo Ann Muramoto, Cape Cod



“Live Blue Ambassadors” from the New England Aquarium contributed to green crab studies in Essex Bay. Photo: L. Berry Engler

Management Committee

All National Estuary Programs are governed by a volunteer board, charged with setting priorities for the region. MassBays is fortunate to have an active and engaged Management Committee representing multiple stakeholders and partners.

Samantha Woods (Chair), North and South Rivers Watershed Association
Jon Kachmar (Vice Chair), The Nature Conservancy
Wendy Leo (Past Chair), Massachusetts Water Resources Authority

Julia Blatt, Massachusetts Rivers Alliance
John Brawley, The Woods Hole Group
Robert Buchsbaum, Salem Sound Coastwatch
Bruce Carlisle, Massachusetts Office of Coastal Zone Management
Sam Cleaves, Metropolitan Area Planning Council
Mel Coté, Environmental Protection Agency Region 1; Regina Lyons/Alternate
Ed DeWitt, Association to Preserve Cape Cod
Kathryn Ford, Massachusetts Department of Fish & Game/Division of Marine Fisheries; Mark Rousseau/Alternate
Alan Macintosh, Merrimack Valley Planning Commission (retired July 2014)
Judith Pederson, MIT Sea Grant (retired July 2014); Juliet Simpson/Alternate
Tim Purinton, Massachusetts Department of Fish & Game/Division of Ecological Restoration; Hunt Durey/Alternate
Vandana Rao, Executive Office of Energy and Environmental Affairs
Maureen Thomas, Town of Kingston
Kristin Uiterwyk, Urban Harbors Institute; Jack Wiggin/Alternate
Cathy Vakalopoulos, Massachusetts Department of Environmental Protection; Jane Peirce/Alternate
Colin Van Dyke, Mintz, Levin, Cohn, Ferris, Glovsky and Popeo