



Massachusetts Bays Window

The Newsletter of the Massachusetts Bays Program

Fall/Winter 2010

Welcome to the Massachusetts Bays Window, the newsletter of the Massachusetts Bays National Estuary Program. Our quarterly newsletter reviews the latest Massachusetts Bays Program (MBP) projects and accomplishments. For more information about the MBP, please visit www.massbays.org.



Program Highlights

Prassede Vella Welcomed to the Mass Bays Team

MBP is very pleased to welcome Prassede Vella to our staff. Prassede is currently serving as the Ocean Management Analyst with the Office of Coastal Zone Management and will be detailed to MBP through the winter. Prassede will be the lead in administering the Research and Planning Grant Program and will also assist in various outreach and communications activities. She brings a wealth of qualifications and experience to the program, both local and international. Prassede holds a B.S. in Biology and Chemistry, and an M.S. in Biology from the University of Malta, and is currently reading for a Ph.D. in Environmental Science at the University of Massachusetts Boston. Prassede has over ten years of experience in ocean policy and planning, and has been assisting with the development of many facets of the Massachusetts Ocean Management Plan over the past two years. Prassede has already made significant contributions to MBP and we are very pleased to have her on board.

All of Massachusetts Bay and Cape Cod Bay Designated as No Discharge Areas

On July 27th, 2010, the remaining piece of the No Discharge Area (NDA) puzzle for the MBP was completed when the Upper North Shore (from Gloucester to Amesbury, and the tidal portion of the Merrimac River) was designated as an NDA. An NDA is a designated body of water in which the discharge of all boat sewage, treated or untreated, is prohibited. The Upper North Shore follows six other NDA designations in Massachusetts and Cape Cod Bays providing continuous NDA coverage from the New Hampshire boarder to the tip of Provincetown.

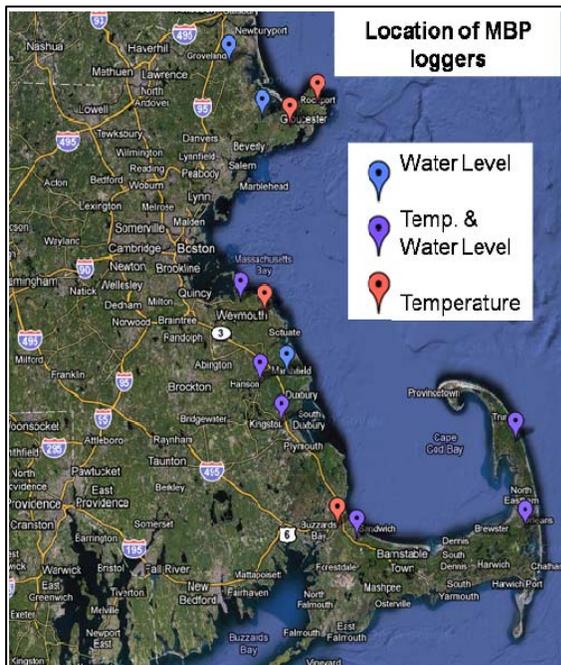
The MBP worked closely with the Massachusetts Office of Coastal Zone Management, the U.S. Environmental Protection Agency (EPA), and coastal communities to ensure that the basic criteria for an NDA in each region were met. MBP Regional Coordinators connected with local officials, harbormasters, and marina operators to gain local support for NDA designation and to collect data on vessel populations and the availability of pumpout stations. Before approving a state designation for an NDA, EPA must ensure that there are sufficient boat waste pumpout facilities for the vessel population within the proposed area.

Under the federal Clean Water Act, discharge of untreated (raw) sewage from a vessel anywhere in US waters is illegal, but an NDA affords the water body even greater water quality protection. Within an NDA, vessels with Type I and Type II Marine Sanitations Devices (on-board sewage treatment systems) are prohibited from discharging their wastes into the designated water body. The NDA therefore provides increased protection to environmental and public health by reducing or eliminating the discharge of disease-causing microorganisms, nutrients, and chemicals that are associated with treated and untreated sewage.

We congratulate and thank all the partners who worked on the NDA designation and who were part of this significant step forward in ensuring the long term health of our coastal waters. For more information on MA NDAs: www.mass.gov/czm/nda



No Discharge Areas in the Mass Bays Program planning area.



MBP logger stations in Mass Bays.

Anadromous Fish Monitoring Program in the Massachusetts Bays Planning Area

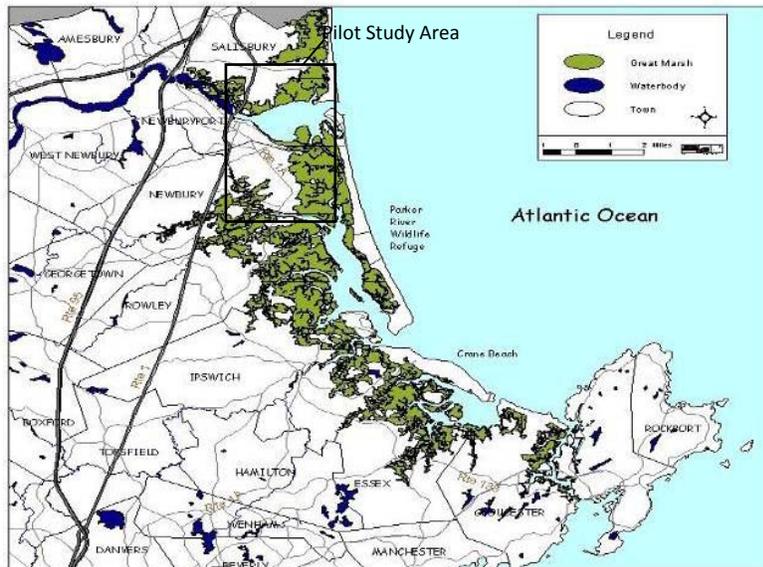
During spring and summer 2010, MBP conducted monitoring of coastal fish runs within the Mass Bays planning area. This monitoring program was made possible by a grant from the Massachusetts Environmental Trust to the North and South Rivers Watershed Association (NSRWA), MBP's South Shore Regional Coordinator. This funding has enabled the NSRWA to distribute 15 temperature loggers and 15 water level loggers to other MBP regions for the monitoring of coastal streams, which have important anadromous fish runs or serve as long-term monitoring sites for climate change impacts to flow and temperature.

The grant also enabled the NSRWA to hire two interns, Cindy Chu and Sherry Banks, to assist with the organization of volunteer fish counts, the installation of logger, and data management.

On November 3rd, the NSRWA, partnered with the National Marine Fisheries Service, the Massachusetts Division of Marine Fisheries, and the MBP Cape Cod Region to organize a training workshop on volunteer herring count methods for project partners.

In the Regions: Upper North Shore

Aerial Mapping of *Phragmites* in the Great Marsh



Great Marsh *Phragmites* signature pilot study area.

This past summer, the Upper North Shore local governance Committee, Eight Towns & the Bay, launched a pilot project, funded by the Massachusetts Office of Coastal Zone Management, to identify invasive *Phragmites australis* stands on the upper North Shore. The purpose of the project is to develop a *Phragmites* photographic signature using oblique aerial photography, which will be used to determine an individual *Phragmites* stand's probability of expansion in the marsh and assist in more prudent planning for future control of *Phragmites*.

A 25 square mile area at the northern end of the Great Marsh, extending from the Parker River in Newbury to Beach Road in Salisbury, was chosen for the pilot study. Over 50 individual *Phragmites* stands were identified as potential groundtruthing sites. Aerial surveys were conducted with Pictometry imaging, using visible light and infrared photography.

Pictometry imaging uses low-latitude, oblique-angle photography, which allows mapping of the aerial extent of *Phragmites* stands, and is useful in determining their heights, densities, and maturity. These characteristics are necessary for assessing the health of a stand and, together with other parameters, may be used to assess the potential of a stand to grow and expand into the marsh.



Stand of *Phragmites* grading into cattail..



Groundthruethed *Phraamites* stands at Salisbury Landing.



Monitoring in marsh adjacent to pilot *Phraamites* stand.

About 40 stands were field- investigated in the study area in mid-July at the time of the aerial survey, to assess limitations of aerial mapping of invasive vegetative species. In order to calibrate this mapping tool, several configurations of *Phragmites* stands were assessed, including: stands at the edge of a tree canopy (to test the oblique angle view), *Phragmites* patches grading into cattails or smooth cordgrass (to distinguish from plants with a similar leaf structure), stands adjacent to salt pans, pools, and open water (to test the infrared signature capability), extremely low density stands (to test visual scale concerns), and a number of other confounding factors. Data on ambient conditions were also recorded.

Other attributes that were investigated included: up gradient land used to estimate potential degradation from stormwater input, marsh-side tidal flow impairments and restrictions that might reduce saltwater intrusion, and ambient marsh vegetation to establish the health of the adjacent marsh.

Currently, the aerial images are being analyzed and preliminary results will be available this winter. Based on the results, further field investigations of new *Phragmites* sites will be conducted to verify predictions made using the interpreted data. Final results will be available in early 2011.

Pepperweed Mapping and Control in the Upper North Shore

A number of environmental groups have come together to address the spread of pepperweed (*Lepidium latifolium*) which has become a pervasive problem in the Great Marsh. Led by the Massachusetts Audubon Society (Mass Audubon), the Eight Towns and the Bay Committee, Parker River National Wildlife Refuge (PRNWR), and the Gulf of Maine Institute (GOMI) and others have been actively mapping the distribution and implementing strategies to control this perennial plant.

Pepperweed is an aggressive, non-native plant of the mustard family notorious for creating dense stands and destroying habitat important for many animal species. Pepperweed is threatening the ecological integrity of salt marshes throughout southern New England and it is essential to take steps to prevent it from further degrading our estuarine habitats.



Perennial Pepperweed along marsh edge and roadside, Newburyport.

During the past summer months, mapping was focused on the fringes of the highly infested areas along the Upper North Shore (Salisbury, Newburyport, Newbury, Rowley, and Ipswich). Investigation of the upper Merrimack River, upstream of the Newburyport/Salisbury harbor area, revealed a small patch of pepperweed just upstream of the Lowell Boat Shop in Amesbury.



Pepperweed mapping in the Great Marsh, 2009.
Red areas denote presence of Pepperweed;
green areas are devoid of Pepperweed.

In 2007, a small stand was also encountered in the Conomo Point Section of Essex. Another fringe area, along the shoreline of Gloucester (outside the Annisquam River and its marsh system) was mapped in 2009 and monitored with the help of the City of Gloucester's harbormasters office. Although no pepperweed was encountered in this area, a single stand of pepperweed was identified in Hodgkin's Cove along the western shore of Gloucester. This stand represents the southernmost extent of pepperweed in the Upper North Shore region. The Rockport harbormaster's office was instrumental in the survey of Cape Ann's rocky and exposed coastline. Some areas that can only be accessed on foot still need to be mapped.

Further mapping within the pepperweed concentration zone uncovered significant patches in the northern section of the Newbury salt marsh, between Plumbush Creek and Little Pine Island Creek, as well as on Woodbridge Island and Seal Island in the Merrimack estuary. Pepperweed control efforts by Mass Audubon and the refuge involved chemical and mechanical control of stands of this invasive species in the PRNWR, as well as in the Towns of Salisbury, Newbury, Ipswich, Rowley, Newburyport, and Essex.

In the Regions: Salem Sound

Water Quality in Salem Sound Improved through the Clean Beaches and Streams Program

MBP's Salem Sound Regional Coordinator, Barbara Warren, and her host organization Salem Sound Coastwatch (SSCW), with help from its volunteers and college interns, conducted tests for bacterial contamination at 17 sites at outfalls and streams discharging into Salem Sound in 2010. This effort, which is part of the Clean Beaches and Streams Program, has played a key role in improving the region's water quality. High bacterial counts were recorded at the Derby Street Wharf outfall by SSCW during the 2008 and 2009 summer sampling. These high bacterial counts led the City of Salem to conduct an extensive stormwater infrastructure investigation to locate the source of the problem. Following remediation of three illicit connections, repeated monitoring this past summer revealed that bacterial counts had decreased by an order of magnitude, from over 24,000 cfu/100mL of enterococci to an average of 2,606 cfu/100mL.

In addition to bacterial monitoring and remediation, SSCW extended its water monitoring program to include monthly nutrient sampling at six stations in the Sound during the summer and fall of 2010. The aim is to duplicate the sampling process conducted by *Marine Fisheries* in 1997 and document changes in water quality over the last 13 years. A comprehensive assessment of the water quality results will be published in the State of Salem Sound report, due in March 2011.

New Marine Invasive Species Discovered in Salem Sound

This summer marked the eighth year of citizen-scientist monitoring for marine invasive species in Salem Sound. SSCW staff, with the help of many local citizens, conducted monthly surveys of floating docks and intertidal rocky shore sites across the Sound in an effort to track non-native marine species that continue to invade the nearshore environment, causing significant shifts in the flora and fauna of Salem Sound and Massachusetts Bay. These volunteer monitoring efforts were supplemented by the third regional marine invasive species Rapid Assessment Survey led by MIT Sea Grant, the Massachusetts Office of Coastal Zone Management (CZM) and MBP. MBP Regional Coordinators, Barbara Warren (Salem Sound Coastwatch) and Sara Grady (North and South Rivers Watershed Association) provided support for the survey team, which was made up of expert marine taxonomists from around the world.



Newly discovered European shrimp, *Palaemon elegans*.

The survey resulted in the remarkable discovery of a non-native species, the European shrimp, *Palaemon elegans* in Salem's Hawthorne Cove Marina. This marks the first documentation of this species in North America. Later, SSCW staff again positively identified *P. elegans* at docks in Manchester-by-the-Sea, Beverly, and Marblehead. In addition, the shrimp was collected in a minnow trap set at a Forest River salt marsh. Marine Invaders ID cards developed by SSCW and CZM are being upgraded to include this newly documented invasive species.

Marine invasive species monitoring efforts continued to expand this summer in Salem Sound as SSCW initiated a pilot study to investigate the fouling of lobster traps by marine invasive species through funding from the CZM Coastal Habitat Grant Program. Two SSCW staff began monthly week-long excursions with local lobstermen to investigate this new area of research in the deeper waters of Salem Sound. Distinct differences were seen in the amount of fouling on traps in Salem Harbor compared to the rest of the Sound. The least amount of fouling was found on traps just outside of Salem Sound. Currently, data are being analyzed and will be presented at SSCW's State of the Sound Symposium scheduled for March 2011.

Eight Conservation Mooring Systems Installed in Manchester Harbor

This past October, eight conservation mooring systems were installed in the eelgrass meadow off the coast of Manchester-by-the-Sea, Massachusetts. The conservation moorings will replace traditional block and chain mooring systems, which can create large circular scars in eelgrass beds due to the large footprint of the block and the scouring action of the chain as it drags along the substrate (see the [Winter 2010 Massachusetts Bays Window](#)).

The conservation moorings, which were installed at no cost by our local partner, Crocker's Boat Yard, are attached to the seabed by a helical anchor, which replaces the large concrete block that typically serves as the footing. The chain is replaced with a



Helical anchors on their way to Manchester Harbor.



Buoys and elastic cord for conservation

floating elastic cord that eliminates scouring of the eelgrass bed. Prior to the installation of the new moorings, a team of divers from the Massachusetts Division of Marine Fisheries and the U.S. Environmental Protection Agency collected baseline information on the size of the mooring scars at each location in order to begin monitoring eelgrass recovery.

Next spring, eelgrass will be transplanted into a subset of the scars to determine whether transplanting is necessary to facilitate the transition to a healthy eelgrass bed. Seven more moorings will be replaced in Provincetown Harbor in the coming months.

The conservation mooring project is funded by a grant from the Association of National Estuary Programs and the National Oceanic and Atmospheric Administration with additional funding support from The Nature Conservancy. Salem Sound Coastwatch will coordinate the volunteer based monitoring of the recovery in Manchester Harbor beginning spring and summer 2011.

In the Regions: Metro Boston

Development of a Boston Harbor Habitat Atlas

The Massachusetts Bays Program is working with the Urban Harbors Institute at the University of Massachusetts Boston, the Neponset River Watershed Association, and the Massachusetts Office of Coastal Zone Management to engage stakeholders in a new habitat prioritization and restoration effort in the Boston Harbor Area. The project, funded by the Massachusetts Environmental Trust, will bring groups together to identify priority habitats and existing data about these habitats. The data will be analyzed and made available on the Massachusetts Ocean Resource Information System (MORIS), as well as in an on-line digital atlas. Additionally, the information will be used, in conjunction with stakeholder meetings, to identify habitat restoration and prioritization projects.

The first large stakeholder meeting, held in August 2010, drew approximately 40 people from federal, state, and local government, non-profits, academic institutions, and private firms. Attendees learned about the project and had an opportunity to talk about some of the habitat management issues they are working to address. Those who became involved in the project became members of the newly formed Boston Harbor Habitat Coalition. They will assist with identifying priority habitat data, provide insight on how the data can be organized and displayed in a useful way, and work to implement the habitat protection and restoration plan.

For more information contact Kristin Uiterwyk at kristin.uiteryk@umb.edu or 617-287-5570.



Boston Harbor Habitat Atlas stakeholder meeting, August 2010.

In the Regions: South Shore

Tracing the Source of Bacterial Contamination in the South River

The Town of Marshfield has been working with the North and South Rivers Watershed Association (NSRWA) to trace the source of bacterial contamination in the South River. The South River runs through downtown Marshfield before discharging to extensive clam flats at its mouth. Over the years, the South River has had chronically high counts of fecal coliform bacteria, indicating the presence of contaminants associated with human and animal waste, and resulting in the closing of these shellfish beds.

With support of a grant from the Massachusetts Department of Environmental Protection, the town and NSRWA hired a project leader and three interns to launch a bacterial monitoring program along the river.



View of the South River, Marshfield.



Volunteers monitoring for bacteria in the South River.

Grant funds were also used to purchase laboratory equipment to process water quality samples at the Cohasset Center for Student Coastal Research.

The results of dry weather and wet weather sampling rounds have helped narrow down the bacterial sources to a few trouble spots. This helped identify potential locations for stormwater best management practices (BMPs) and preliminary designs will be developed by a consulting firm as part of the project.

The highest bacterial counts are found within the downtown area of the Town of Marshfield.

First Herring Brook Public Forum

The results of three years of studies to bring herring back to First Herring Brook and to identify future water supply sources for the Town of Scituate were presented at a public forum in June 2010. The studies are the result of a partnership between the Town of Scituate, the North and South Rivers Watershed Association (NSRWA), the First Herring Brook Watershed Initiative, and a team led by The Nature Conservancy, MBP, and the Massachusetts Division of Ecological Restoration. The studies focused on several key issues, including: (1) management of the Town of Scituate water to maintain a healthy in-stream habitat, (2) re-introduction of the herring population, and (3) identification of potential sources of untapped water that could be used to supply municipal and ecological demand.



First Herring Brook, Scituate.

The next step will focus on implementation of water conservation measures, including a project working with Scituate High School AP Biology students to analyze the Town's water use.

In the Regions: Cape Cod

Twenty-seven Restoration Projects to be Funded by the Cape Cod Water Resources Restoration Project

In June 2010, the Barnstable County Coastal Resources Committee (CRC) recommended a set of 27 restoration projects to be funded by the Cape Cod Water Resources Restoration Project. The sum of \$6.5 million has been allocated for 17 stormwater remediation projects, six salt marsh restoration projects, and four fish run restoration projects. Examples of projects located in the MBP planning area include: (1) stormwater remediation at Good Templar Place in Provincetown, Commercial Street and Holbrook Road in Wellfleet, Paines Creek in Brewster, and Scudder Lane in Barnstable (2) salt marsh restoration projects in Sunken Meadow in Eastham, and Freeman's Pond in Brewster; and (3) a fish passage repair project on Monument River in Bourne.

The Cape Cod Water Resources Restoration Project is a landmark watershed restoration program led by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) and the Cape Cod Conservation District. The 10-year program will restore shellfish beds through the design and installation of stormwater treatment systems, and will rehabilitate impaired salt marshes and anadromous fish runs.

The Coastal Resources Committee serves as MBP's regional planning body for Cape Cod, and is also the coastal advisory committee for Barnstable County. The Coastal Resources Committee and MBP's Cape Cod Regional Coordinator, Jo Ann Muramoto, have been working with NRCS, state partners and towns to identify and prioritize projects for funding. State partners include the Massachusetts Division of Marine Fisheries and the Division of Ecological Restoration, which have provided technical advice and recommendations.

Since funding for this first round of projects is granted under the American Recovery and Reinvestment Act of 2009, these construction projects must be completed by December 2011. To this end, the projects are initiated during the fall 2010.

Fish Run Improvements Completed at Pilgrim Lake, Orleans

Pilgrim Lake in Orleans is the town's most important diadromous fish run, supporting river herring, which migrate from the ocean to freshwater systems to spawn, and American eels, which reproduce at sea and then live the remainder of their lives in freshwater systems. In the past year, two separate restoration projects have improved passage for these species in the watershed.

The Association to Preserve Cape Cod, MBP's Regional Coordinator for the Cape Cod Region, along with the Orleans Shellfish and Waterways Advisory Committee has been conducting fish counts along the Pilgrim Lake run



PVC pipe installed to connect Pilgrim Lake to the fish run.

since 2008. Although counts of river herring have been low in recent years with run quantities ranging from 1,000 to 1,500 each year, volunteers have observed thousands of juvenile eels swimming up the fish ladder each spring. Monitors noted that the eels were struggling to migrate through a tiny hole at the top of a water control structure that controls lake levels, making them vulnerable to predators and expending valuable energy. These serendipitous observations provided the Committee and town officials with the information they needed to refer to fisheries managers for help in improving the eel passage.



Funnel-like structure channels stream flow and attracts herring to the run.

This past spring, Brad Chase and Ed Clarke of the Massachusetts Division of Marine Fisheries (*Marine Fisheries*) met with local groups to solve the water control barrier problem. The low tech but ingenious solution involved the installation of a PVC pipe that bypasses the water control structure, connecting the Lake to the fish run. In addition, an eel trap was installed to facilitate the counting of eels swimming upstream. Following the installation of the new pipe, from May 17 to July 6, over 2,400 juvenile eels were counted in the trap and then released, with the highest counts on May 26 (863 eels) and May 27 (828 eels). The last eels counted were on June 25, 2010.

The second structural improvement to the fish run, completed in fall 2009, allows river herring to swim more easily from one pond to the next during their spring migration. A funnel-like structure now channels outgoing stream flow to attract migrating herring into the culvert beneath the road leading to the fish ladder and hence up to Pilgrim Lake, where they can spawn.

This funnel facilitates the passage of herring during rising and high tides, when the outgoing stream flow would otherwise be too weak (compared to the tidal flow) and therefore unattractive to herring. Funding and technical support for this project were provided by the NRCS and *Marine Fisheries*.

Stony Brook, Brewster, Tidal Culvert Replaced this Fall

Salt marsh restoration at Stony Brook in Brewster took place this fall from October through November. The construction work involved replacement an undersized 4 foot tidal culvert beneath a state highway (Rte 6A) with an 18 foot box culvert and creating openings in an existing diked trail to allow better tidal flow across the restricted marsh.

Pre-restoration surveys have been ongoing since fall 2009 and include monitoring of stream water quality and water level, anadromous fish counts during the spring migration, salt marsh vegetation and salinity, rare species, and photo-documentation.

This year, the warm, wet spring weather appears to have fostered rapid plant growth and instigated an earlier start of the upstream herring migration. Although fish count data are still being analyzed, preliminary results indicate that the 2010 herring migration was the



Looking south into the restricted side of the Stony Brook marsh, fall 2009. Dense stands of *Phragmites* are in the distance.



Construction work involves placement of sheet piling coffer dams to keep tidal flow out of the construction area, a temporary fish bypass culvert to allow herring to pass through, and installation of culvert, headwall and sidewalls.

mouth of Stony Brook; and repair of the fish passage at the Lower Mill Pond dam.

Within the last four years, 24 acres of open space have been protected through the acquisition of conservation easements or the application of use restrictions. Brewster's watershed-based method for restoration and protection serves as a model approach because each restoration effort builds upon and supports other efforts.

largest in the four years since the volunteer count program was initiated.

The Stony Brook salt marsh and fish passage restoration project is one of several complementary restoration projects that the Town of Brewster is undertaking in this watershed. Other projects include remediation of stormwater discharges into Stony Brook at locations in the lower, middle, and upper watershed; restoration of a restricted salt marsh near the



Improvements to the South trail include removing fill from the existing raised trail to improve tidal flow.