Buzzards Bay National Estuary Program

Implementation Activities

Federal FY19 Funds Work Plan and Budget

Pursuant to Section 320 funding under
A Cooperative Agreement with the U.S. EPA

For work beginning July 1, 2019, to June 30, 2021
May 3, 2019

Massachusetts Maritime Academy intern testing stormwater samples.

Table of Contents

Section 1: Introduction and Overview

Since the completion of the watershed management plan titled *Buzzards Bay Comprehensive Conservation and Management Plan* (CCMP) in 1991, the ongoing focus of the Buzzards Bay National Estuary Program (NEP) has been to facilitate implementation of the recommendations contained in this CCMP. This mission was affirmed when the NEP Steering Committee approved the *Buzzards Bay Comprehensive Conservation and Management Plan 2013 Update* on November 26, 2013.

This year, the U.S. EPA has made available to the NEP $600,000 in Clean Water Act Section 320 funds. No additional funds were provided from EPA headquarters or EPA Region I. Section 3 of this work plan outlines the activities planned with the use of the current funds in meeting the program's goals.

A summary of previous NEP funding since 2005 is shown in Fig. 1. In FY14 and FY 15, the NEP administered $728,000 and $1,000,000 in SNEP grant funds at the request of the U.S. EPA, and in FY18, the NEP administered $500,000 in more targeted initiatives.

Any grants or assistance from the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) or Massachusetts Office of Coastal Zone Management (CZM) mentioned in this work plan are not considered match to this award unless expressly identified in the "Match to Cooperative Agreement" section in the final Cooperative Agreement. Mention of any non-match efforts by other agencies in this work plan are meant to demonstrate the collaborative or coordinating role of the NEP in achieving specific goals contained in the CCMP.

Section 2: FY18 Outcomes: Highlights and Accomplishments July 1, 2018, to

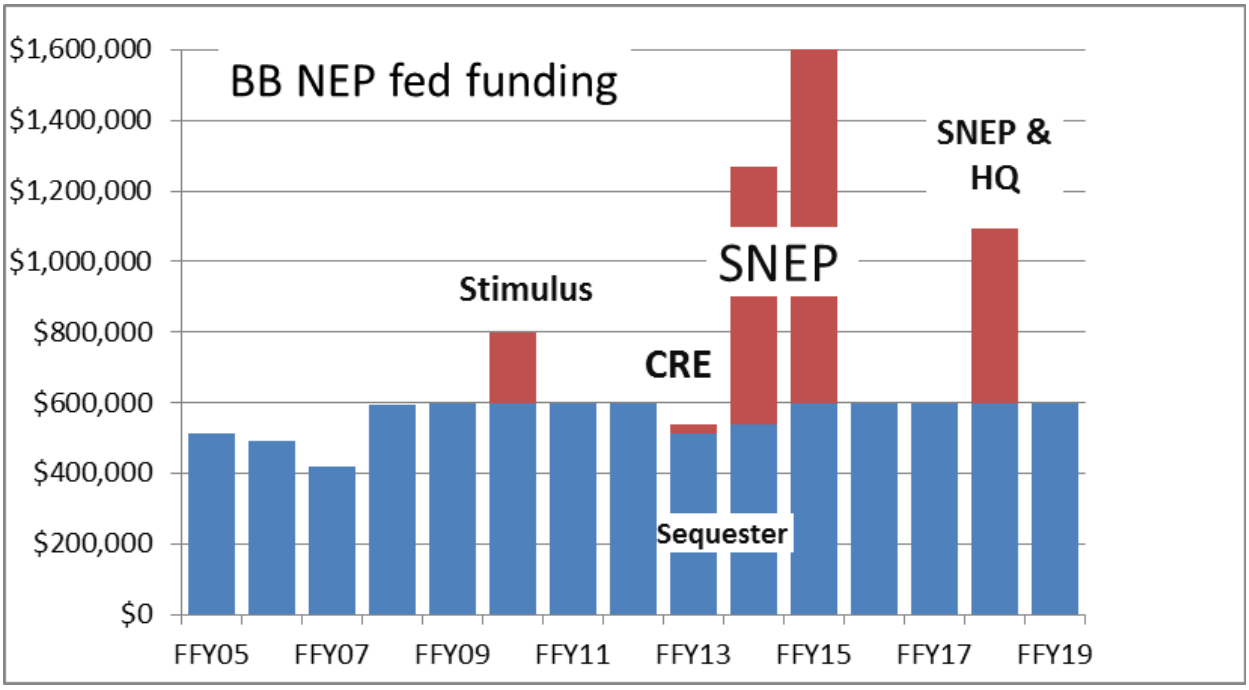

Fig. 1 Past NEP Section 320 base funding (blue) and various add-ons (red).

June 30, 2019

Status of FY18 Workplan, July 1, 2018, to present

This section summarizes the status of tasks in last year's workplan activities and describes key accomplishments by the NEP and our partners. The FY18 work plan Cooperative Agreement is ongoing because the grants awarded under that work plan have not yet closed, and some tasks, like the commencement of the stormwater engineering design procurement have been deferred until the fall of 2019. While this section summarizes many of the specific actions achieved, it is important to stress that our support of the Stormwater Collaborative represented the single largest commitment of staff resources.

FY18 Workplan Task 1 - Wetland Restoration and Open Space Protection and Restoration

As we have done in the past, the NEP continued to work and collaborate with the Buzzards Bay Coalition (Coalition), area land trusts, and municipalities in our ongoing effort to protect and restore valuable wetlands and upland wildlife habitat throughout the Buzzards Bay watershed. Through this effort, the NEP provided maps, helped develop state and federal grant applications, wrote letters of partnership and support to granting agencies, conducted land use analyses, and through the municipal grant program, provided mini-grant funds that help meet match requirements for leveraging grants from other programs. The success of Buzzards Bay municipalities, the Coalition, and the area land trusts can be seen in the acres of open space and habitat protected or restored in which the NEP was appreciably involved through funding or technical assistance (Fig. 2).

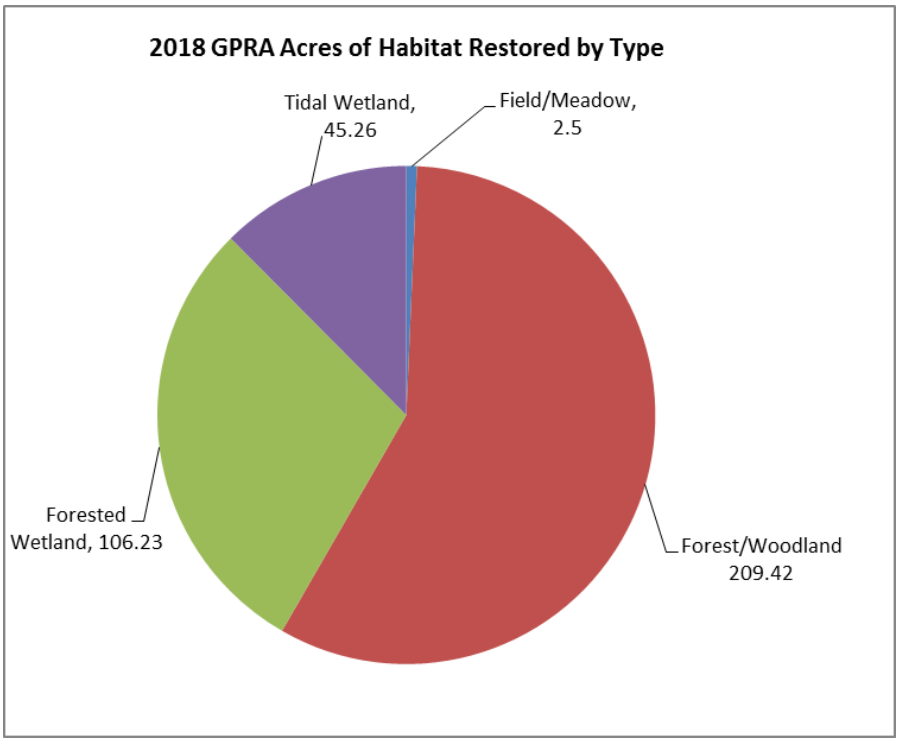

Fig. 2 Types of habitats protected or restored.

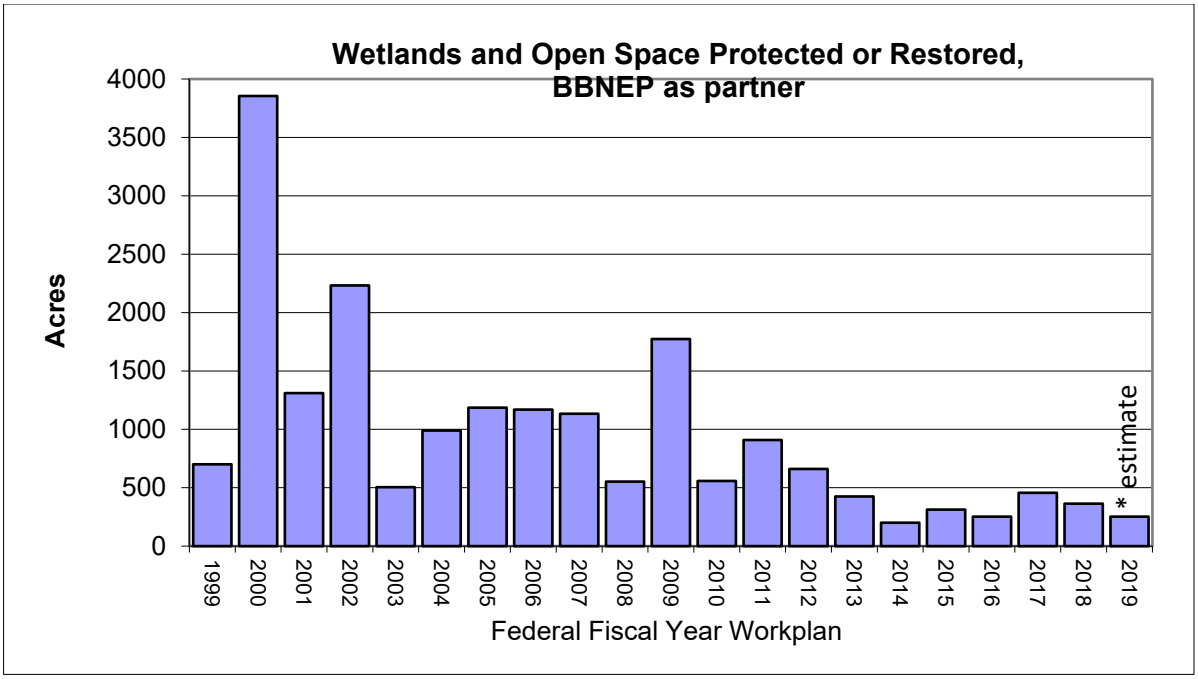

Fig. 3 Figure 3. Total wetlands and open space protected or restored.

The Coalition again had great success in the past year coordinating grant efforts on several projects in the Buzzards Bay watershed, many of which received supporting funding or technical support by the NEP in the last or previous fiscal years. One highlighted here is Hamlin Crossing's nine acres of wildflower fields, quiet woodlands, and river views that are now open to the public (Fig. 4). This project, was the result of a partnership between the Town of Acushnet, the Coalition and volunteers from Tabor Academy in Marion and service from members from AmeriCorps Cape Cod, TerraCorps, and the Commonwealth Corps. The NEP provided a grant, which helped leverage action, and provided technical support in the form of mapping products used to leverage the additional support.

Fig. 4 Ribbon cutting ceremony at Hamlin Crossing.

FY18 Workplan Task 2 - Stormwater Remediation and Technical Assistance

In the FY2018 NEP workplan, EPA awarded SNEP funds to the NEP, a portion of which was used to continue the Buzzards Bay Stormwater Collaborative. The Stormwater Collaborative was estab-

lished by the NEP and Buzzards Bay Action Committee (BBAC) in 2015, but in the FY2018 workplan, the NEP set off in a new direction by providing funds to the Massachusetts Maritime Academy (MMA) in the form of a subaward grant. This funding enabled the MMA to provide staff and interns to work with municipalities and the NEP to collect stormwater samples, inspect stormwater facilities, and map stormwater networks under the guidance of the NEP staff.

While the MMA initiative began in January 2019, NEP staff still worked with the BBAC staff and municipalities through December 2018 to fulfil tasks under the BBAC's Healthy Community grant from EPA. Completed tasks by the NEP during the past period included a report titled "Lessons learned in the implementation of the Buzzards Bay Stormwater Collaborative effort to map and monitor stormwater discharges" and individual water quality data reports for each municipality.

This initiative represented a major time commitment of NEP staff during the past year. The NEP was not only one of the leads in founding the BBAC Stormwater Collaborative project, but we were also responsible for many tasks such as QAPP update, training, GIS support and data management. During the past year, the NEP updated the QAPP, revised the monitoring guidance document, completed reports required under the EPA grant to the BBAC, and then reinitiated the effort through MMA, training students and staff in the program. The NEP director worked with the MMA Marine Science, Safety, and Environmental Protection (MSSEP) Professor William Hubbard to detail specifics of this project. Meetings were held with BBNEP staff during the fall of 2018 to discuss transferring the program to MMA.

In 2016, the NEP hired two stormwater specialists to implement the needed NEP technical support program for the Stormwater Collaborative with the BBAC. These stormwater specialists are now providing that support to MMA. In 2018 and 2019, one stormwater specialist updated the QAPP, field guide, training program, and monitoring protocols used for the program. The other NEP stormwater specialist managed the GIS and water quality database and manages mapping efforts. In January 2019, MMA hired their program coordinator, and in March 2019, the first round of students began participant as co-op students (jobs for credit). The MMA project manager is now responsible for coordinating student work with municipalities, equipment calibration, and overseeing testing, under the guidance of NEP staff.

In addition, the NEP stormwater GIS specialist made adjustments to and maintained the stormwater mapping elements of the program creating a stormwater database that tracks site visits and stormwater analysis data for each stormwater structure visited. This data has been related to the GIS data. This allows for an instant click and point result of all data pertaining to a specific stormwater structure. The NEP manages the Stormwater Collaborative water quality database, enters the data, and ensures that it conforms to EPA database management standards. The NEP also provides GIS support and maintains a GIS database incorporating the field investigations and transferring of plan data into the GIS database.

This initiative targets resources to benefit communities surrounding Buzzards Bay and will also help municipal governments and residents assess, understand, and reduce environmental and human health risks associated with stormwater discharges to shellfish beds, swimming beaches, and other impaired priority waters. By combining the strengths of each of the entities, we plan to build institutional and community capacity to understand and solve environmental and human health impairments caused by stormwater discharges.

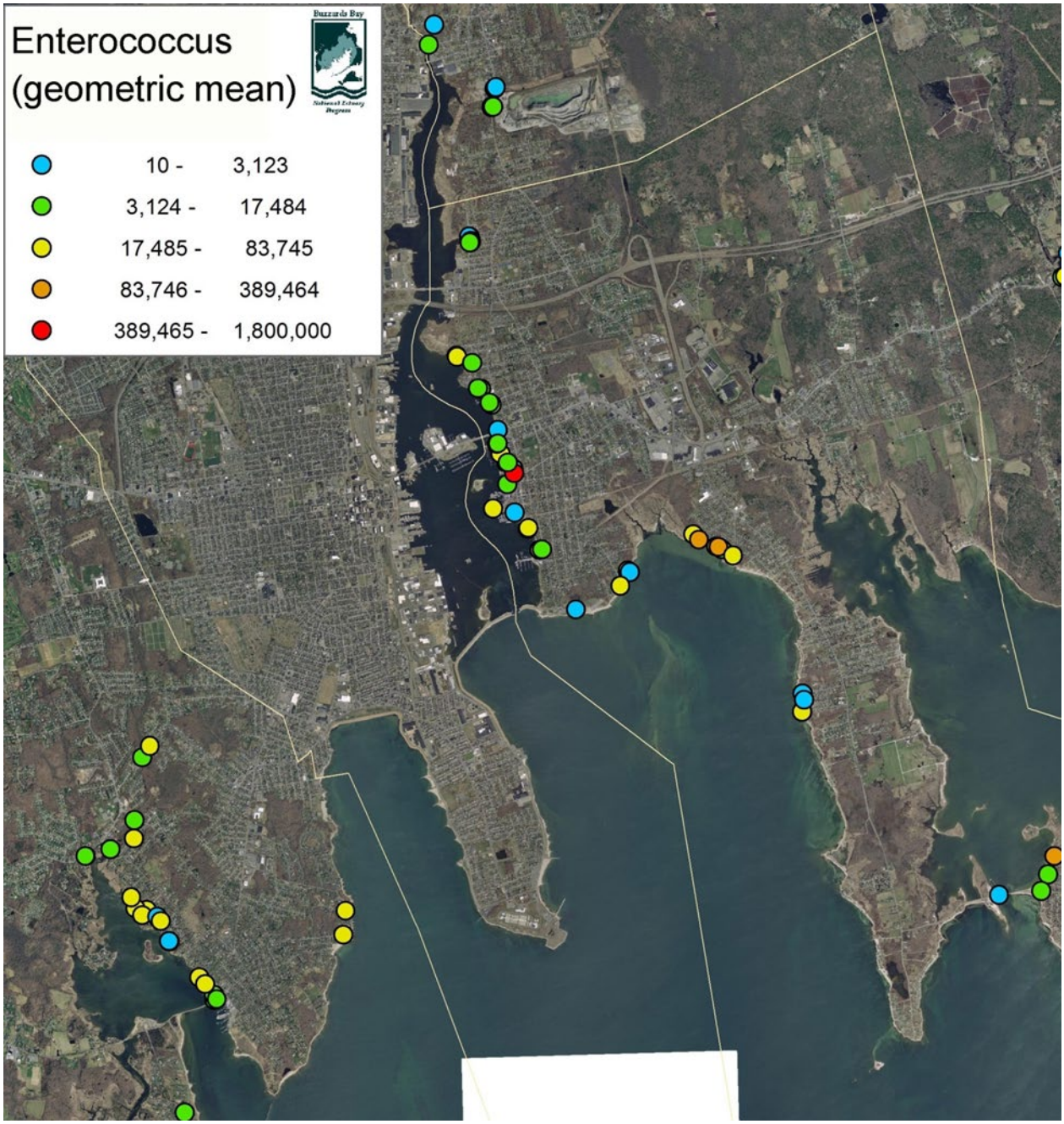

Fig. 5 Geometric means of Enterococcus concentrations of stormwater during wet weather.

Besides the Stormwater Collaborative support, the NEP helps towns on stormwater issues in a number of ways. First, we review stormwater designs proposed by towns for remediation projects, or at the request of a town board as part of local permitting or site plan review. Second, we help towns prepare grant applications for federal monies to help fund remediation of priority sites. Third, we assist towns to develop and implement stormwater management plans, like the Phase II MS4 NPDES municipal plans. Finally, we work with town boards to adopt local stormwater regulations and LID strategies.

FY18 Workplan Task 3 - NEP Technical Assistance and Municipal Grant Program

Through our grant and technical assistance programs, the NEP helps municipalities and our other partners achieve the goals and objectives of the CCMP. With respect to our grant program, the NEP ran three grant rounds during the cooperative agreement period. Funds for these awards were from some section 320 funds from past years, but mostly from SNEP funds awarded in support of the municipal grant program in the FY18 workplan. Funds available in the three grant rounds Round I ($79,338), Round II ($130,418 available, but most now awarded and rolled in Round III), and Round III ($95,418). The actual grants awarded were:

Round 1

Cuttyhunk Vessel Pumpout Station: The Town of Gosnold received $13,920 to purchase a stationary, self-service boat waste pumpout unit for the Cuttyhunk Vessel Pumpout Station. The pumpout, which is being operated and maintained by the Town's partner, the Coalition, is made available at no cost to recreational boaters. It is located at the dock entrance to Cuttyhunk Harbor and available seasonally from Memorial Day to mid-September. Boat sewage may contain bacteria and viruses, nutrients and chemicals that can be harmful to water quality and public health. With the nearest boat waste pumpout facility more than nine miles away, this project provided the opportunity to prevent the discharge of raw sewage into Cuttyhunk Harbor and Buzzards Bay by providing pumpout options to the thousands of summer boaters in Cuttyhunk.

Dartmouth Cowyards Salt Marsh Restoration Project phase II: The Town of Dartmouth received $35,000 to perform a restoration study to determine the causes of deterioration in the 16.6-acre Cow Yards salt marsh, located at the mouth of the Little River in Dartmouth. The salt marsh, owned and permanently protected by the Dartmouth Natural Resources Trust, is experiencing an extensive loss of vegetation and subsidence of the marsh surface. The Town has hired an engineering firm to assess existing conditions and hydrology within the salt marsh, identify restoration recommendations and evaluate feasibility of implementing the recommendations. This project is ongoing (ends June 30, 2019).

Round II

Dartmouth Dike Creek: The Town of Dartmouth received $35,000 to permanently protect 73 acres of undeveloped land fronting on Dike Creek. The property contains wetlands, saltmarsh and upland forest, and is designated as habitat for rare species. Surrounded on three sides by 380 acres of existing permanently protected land, protection of this parcel fills an existing gap in the protection of the Dike Creek watershed. The Town's partner, the Coalition, will acquire the property, which it will then sell to the Dartmouth Natural Resources Trust. The Town of Dartmouth Conservation Commission will hold a conservation restriction on the 73 acres. The purpose of the project is to permanently prevent development of the property and provide passive recreational opportunities to the public.

The Round III application deadline is May 1, 2019, and grants have not been announced.

Besides our grant program, through our technical assistance programs, the NEP often assists municipalities and non-profits to secure additional funds for projects that meet CCMP goals. This assistance includes project development and application preparation. Sometimes this assistance may be in the form of map and document preparation, or data analysis used in an application. Sometimes

the NEP commits to specific tasks should a partner be funded, and this support is identified in our partner's proposal or commitment letters prepared by the NEP.

Much of the day-to-day work of NEP staff revolves around technical assistance on specific projects. Such projects might include helping a town develop stormwater treatment designs to treat a stormwater discharge contributing to shellfish bed closures, developing funding and implementation strategies for specific projects, evaluating environmental impacts of specific activities, reviewing projects for compliance with local regulations, or helping develop local bylaws and regulations.

The Buzzards Bay Stormwater GIS Specialist in cooperation with the Town of Wareham IT Department conducted an ArcGIS Hands On Training class for the Town of Wareham during the winter of 2018. This three-day hands-on training class gave attendees a basic understanding of GIS and instruction on how to compose maps and do some data query and manipulation. Additional discussed topics included GIS terminology, GPS technology, projections and coordinated systems, the Town of Wareham GIS dataset, using ArcMap and ArcCatalog, using tables, working with CAD drawings, metadata, georeferencing plans, and editing.

As part of our technical assistance program, the NEP's Regional Planner also produced over 340 new or revised maps and fulfilled dozens of requests for data, calculations, or graphics to be used for newsletters, grants, etc. Numerous maps and GIS evaluations were prepared for the Coalition, area land trusts, and municipalities. Examples include municipal open space maps, Coalition fundraising maps and maps for their website, maps used by municipalities in open space reports and their grant applications, and for other purposes.

The NEP's grant and technical assistance programs continue to fund or advance progress on EPA's Clean Water Act core programs. For example, in the previous workplan the NEP directly contributed $30,000 to the citizen water quality monitoring program through a separate EPA Cooperative Agreement with a holdback of NEP Section 320 funds. During the past year, we instead provided a grant to the Coalition in support of the water quality monitoring program. The Coalition's Baywatchers program is not only one of the most effective volunteer-based water quality monitoring programs in the country, but the data is also being used as the basis for updates to the state's water quality assessment and integrated list of waters standards. It is also being used in models to develop watershed nitrogen Total Maximum Daily Loads (TMDLs) in Buzzards Bay embayment watersheds by the Massachusetts DEP's Massachusetts Estuaries Project. This work, together with efforts to help towns identify problem stormwater discharges and to support efforts to treat problem stormwater discharges through technical assistance and grants directly supports EPA goals to better control non-point source pollution on a watershed basis.

The NEP continues to maintain the BBAC website buzzardsbayaction.org (Created by the NEP in 2012). At the request of the BBAC, the NEP Director posts documents, meeting announcements, presentations, and videos.

FY18 Workplan Task 4 - Program Oversight and Administration

The NEP Executive Director and Administrative Assistant and MCZM Fiscal Officer ensure administration of the EPA and other grants and ISAs awarded to the NEP.

In September 2018, the NEP submitted Government Performance Results Act (GPRA) report in-

formation to EPA as specified in the EPA Funding Guidance. The GPRA report for NEPs includes annual estimates of habitat and wetlands protected or restored, and annual estimates of funds leveraged in some way by the NEP. As a requirement of this agreement, the NEP will provide information on the GPRA performance measures to EPA by their required date.

FY18 Workplan Task 5 - Buzzards Bay Citizens' Water Quality Monitoring

The Coalition continued its nationally recognized Baywatchers water quality monitoring program, which began in 1992. The Baywatchers program is supported by the Commonwealth of Massachusetts, the NEP, citizens, Coalition dues, and other sources. In 2018, the NEP provided $30,000 as a separate carve out to the NEP base funding, which was administered by the EPA. This represented a $5,000 increase over the previous year, with the added funds meant to support additional monitoring at the head of Buzzards Bay in order to collect baseline data for a potential relocation of the Wareham Wastewater facility to the Cape Cod Canal. The NEP provided technical support to the effort and collaborated with Coalition staff in data analysis and proposal development relating to the work. The NEP and the Coalition used data collected by the Coalition's program to advocate for nitrogen management in Buzzards Bay watershed communities. The data was also used by DEP's Massachusetts Estuaries Project in the development of TMDLs in the Slocums River TMDL study released in 2018.

In the fall of 2018, the Coalition submitted a data report and disk for the 2018 year. Altogether 166 volunteers participated in the Buzzards Bay Water Quality Monitoring Project's 25th water quality sampling season between May and September. The Coalition's effort was supported by the Buzzard Bay NEP, Commonwealth of Massachusetts, citizens, dues, and other sources. The Coalition's nationally recognized water quality monitoring program costs roughly $250,000 annually. The NEP provides technical support, and this year provided a $30,000 grant to support the program. The state legislature also provided $50,000 to the Coalition for a coastal water quality and natural resource monitoring program (Chapter 154 of the Acts of 2018), and these funds contributed match to the Cooperative Agreement.

The NEP director continued to participate in the Coalition SAC, which in 2018 conducted an evaluation of which sites and sample depths could be eliminated to allow for resources to be directed to other impaired areas of Buzzards Bay.

FY18 Workplan Task 6 - Environmental Indicators and Outcomes Tracking

The NEP tracks various environmental indicators on its website including shellfish bed closures (buzzardsbay.org/enjoy-buzzards-bay/shellfish/shellfish_closures_buzzards_bay/ and Fig. 6 and Fig. 7) and eelgrass abundance. The Buzzards Bay eelgrass estimates are based on DEP databases, and our own photointerpretation of aerial photographs in areas not covered by DEP's analysis. These data are also used during the Coalition's quadrennial State of the Bay reports (the last report was in 2016).

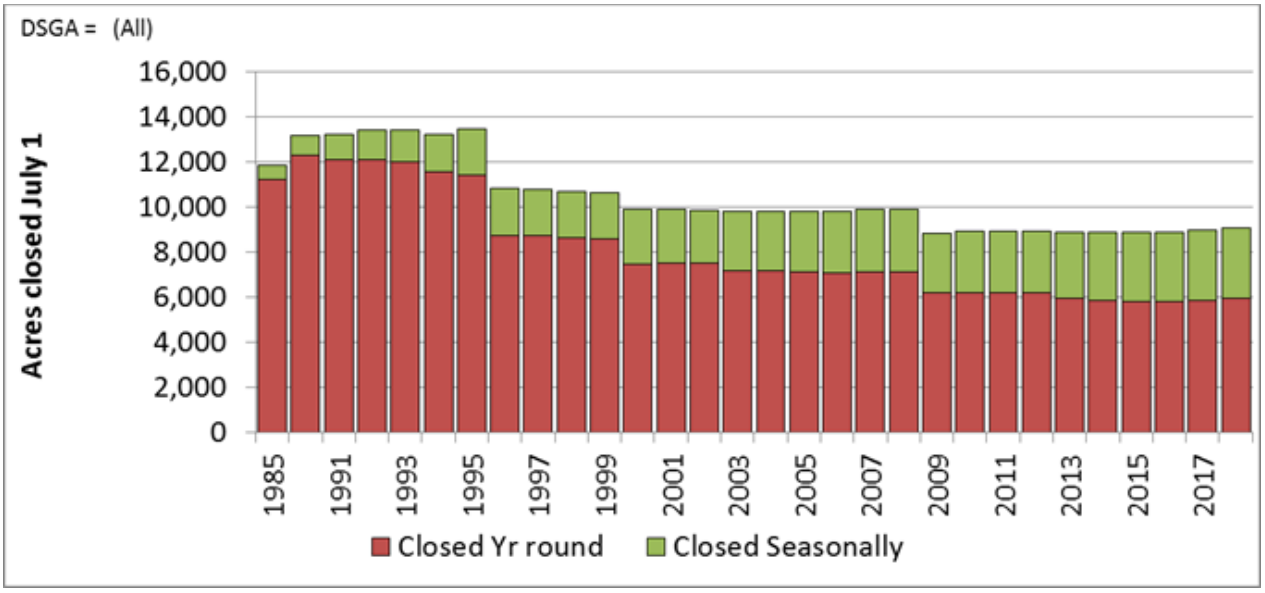

Fig. 6 Long-term shellfish bed closure trends.

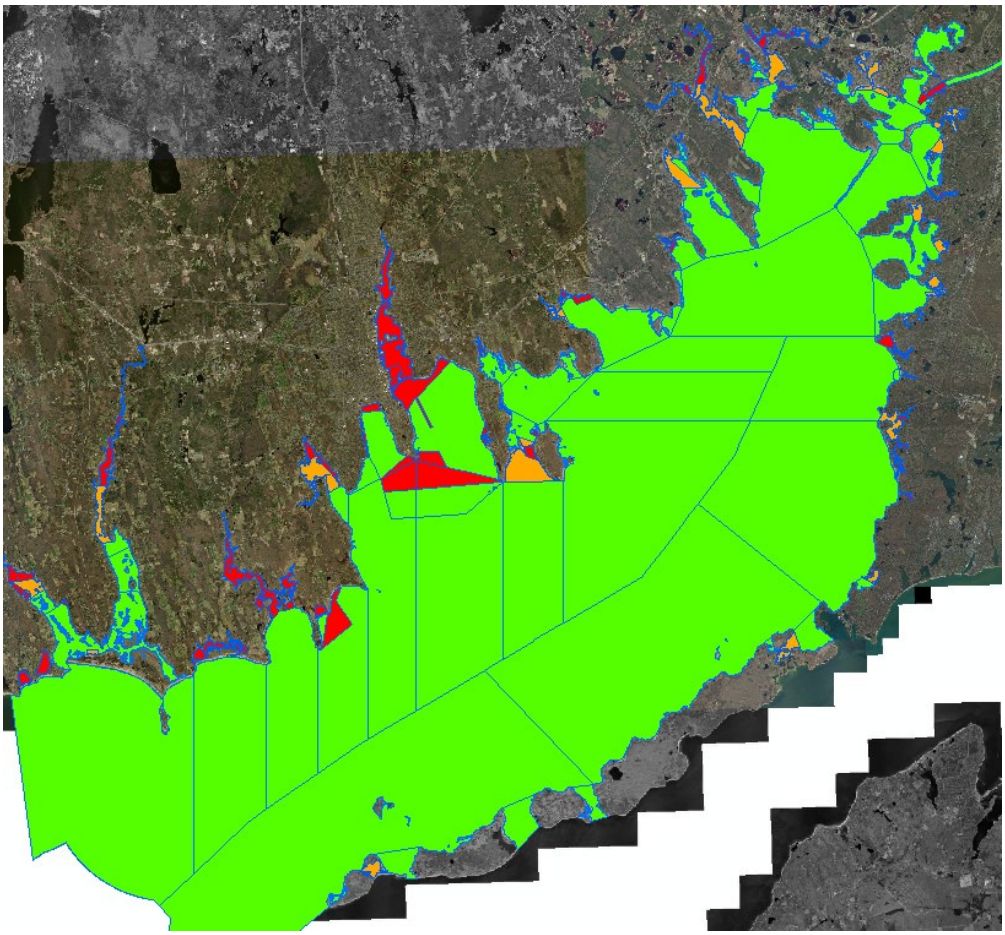

Fig. 7 Shellfish bed closure areas. Red shaded areas are closed year-round; orange shaded areas are seasonal closures.

During 2018, the NEP continued to work with the Division of Marine Fisheries staff to collate old shellfish sanitary survey reports in order to overhaul the NEP's shellfish closure GIS database to more accurately quantify historical shellfish bed closures in each embayment. Data was also obtained from municipalities. This work was undertaken as part of a study with Woods Hole scientists to document the relationship between nitrogen pollution and shellfish catch and reported in the Luk paper described in more detail below.

The NEP has been a member of the Coalition's SAC since its creation in 2014, and the NEP director attends the group's quarterly meetings and provides data and information at the request of the group. An SAC priority is to identify research and monitoring program priorities, assist in Coalition grant application development, and reviews results of environmental indicator studies in Buzzards Bay. The group has also been working to define water quality and habitat monitoring needs to support a permit application by the Town of Wareham to relocate the municipal wastewater facility outfall to the Cape Cod Canal. This work was ongoing through 2018, a continuation of an earlier SNEP grant awarded by the NEP and supported by some water quality monitoring funding by the NEP in 2018.

FY18 Workplan Task 7 - Outreach and Education

As a partner to the NEP on our workplan, the Coalition is the principal entity that targets outreach and education to the public. The Coalition undertook outreach and education activities highlighting the condition and state of Buzzards Bay, progress toward restoration and protection goals, and collaboration with the NEP in their activities. These activities included the June 2018 Swim Buzzards Bay event, their annual meeting, press events, and various publications including the annual report to their members.

The Coalition also produces brochures, fact sheets, press releases, and other events about citizen action to protect and restore Buzzards Bay. Some information on upcoming events is at http://www.savebuzzardsbay.org/events/. Information on past events may be found at https://www.savebuzzardsbay.org/news/.

On June 30, 2018, the Coalition held their Swim Buzzards Bay event. Three hundred and fifteen swimmers participated in the 25th anniversary of the Swim. These dedicated swimmers raised $153,000 for clean water at this signature outdoor fundraising event. The Swim drew participants from 160 communities in 17 states, including as far as away as North Carolina, Texas, and California

The Coalition held the 12th Annual Watershed Ride on Sunday, September 30, 2018. A record 242 cyclists pedaled across Southeastern New England to show their support for clean water during the Coalition's largest-ever Buzzards Bay Watershed Ride. The 12th annual event has raised $162,500 and counting to support the Coalition's education, conservation, research and advocacy work.

The Coalition continued to offer education programs throughout the year for all ages and abilities through the watershed. Examples include:

Saturday at The Sawmill	February 3, 2018, Acushnet
Seal and Seabird Watches	February 10 & 25, 2018, Woods Hole
Walking Through Winter	February 11 & 18, 2018, Wareham
Itty Bitty Bay Explorers	February 7, 14, 21 & 28, 2018, Acushnet/Fairhaven

Mindfulness Walk	February 17, 2018, Marion
Sunday Stroll	March 4, 2018, Dartmouth
Family Fridays: Amphibians	July 6, 2018, Rochester
Sunday Stroll: Cove Walk	July 8, 2018, New Bedford
Learn to Quahog	August 25, 2018, Mattapoisett
Saturday at the Sawmill: Birds	September 8, 2018, Acushnet
Stargazing at the Bogs	October 12, 2018**,** Mattapoisett

Learn to Quahog:
Participants learned how to dig their own quahogs (hard clams) from Buzzards Bay. During this free event with the Coalition participants were taught the basics of local quahogging: what you need, how to do it, and where to go. This was a fun and educational activity for the whole family.

Sunday Stroll:
A Sunday Stoll led by a Southcoast Health medical professional and a Coalition outdoor educator held one Sunday each month offered participants fresh air and exercise while learning how to maintain a healthy, active lifestyle and explore the outdoors.

Itty Bitty Bay Explorers:
Little ones discovered the outdoors during Itty Bitty Bay Explorers, a series of outings with the Coalition. Through fun games and hands-on activities, families learned about Buzzards Bay's animals, plants, and habitats. Itty Bitty Bay Explorers is recommended for families with children five and younger.

During 2018, the NEP continued to update and streamline the navigation of its website buzzardsbay.org and subdomains, climate.buzzardsbay.org and Stormwater.BuzzardsBay.org. New pages and information related to stormwater pollution, nitrogen loading, habitat protection, and climate ready adaptation efforts in the Buzzards Bay watershed were added. The stormwater website was updated to include results of the Buzzards Bay stormwater Collaborative Program. Most notably, the Interactive Map page was updated so that the monitoring program data for each site is displayed when monitoring sites are clicked upon (sites with data appear as red dots on the map).

The BBAC continues to be a strong partner with the NEP in guiding the Buzzards Bay municipal grant program and in holding monthly meetings on special topics. Speakers at the BBAC monthly meetings during 2018 included:

- **Thursday, October 25, 2018**. The meeting was held in the Marion Police Department's conference Room. Topic: Use of drones by municipalities. Speakers were Gary Carreiro of the Bristol County Radio Control Club, and Detective Gary Barboza of the Fall River Police Department. View the meeting video.
- **Thursday, December 20, 2018**. Meeting was held at the Wareham Selectmen's Meeting Room, Multi-Service Center. Topic: MS4 submission requirements and NEP technical assistance. Speaker: Newton Tedder (U.S. EPA); handout from Kevin Bartsch, and Bernadette Taber (NEP).
- **Thursday, January 24, 2019**. Meeting was held at the Marion Police Station Conference Room. Speaker: Dave Janik, MCZM. Topic: Upcoming CZM and EEA grant opportunities.
- **Thursday, February 28, 2018**. Meeting was held at the Mattapoisett Public Library. Topic: Cape Cod Stormwater Managers Group and the Cape Cod Stormwater Coalition. Speaker: Jo Ann Muramoto, Ph.D., MassBays Regional Coordinator, Association to Preserve Cape Cod. Muramoto presentation Excel spreadsheet: Customized-Cost-Estimator-for-MS4.xlsx.

Information about other meetings can be found on the BBAC's website buzzardsbayaction.org, which is managed and maintained by the NEP.

Since 1989, NEP has been training Conservation Commission members on how to delineate wetlands in cooperation with the Massachusetts Association of Conservation Commissions (MACC). Retired NEP Wetlands Specialist John Rockwell continues to provide these training sessions with support of the NEP. The support consists of printing and distributing various wetland training guides and brochures developed by Rockwell during his tenure at the NEP (go to our wetland delineation training web page to view them; Rockwell continues to volunteer to maintain and update the documents on this page). These two one-day workshops, focused on soils and vegetation. The Basic Wetland Delineation (BVW): Soils workshop had 15 attendees focusing on hydric soils, indicators of wetland hydrology, and understanding the DEP BVW Delineation Field Data Form: Section II. Basic Wetland Delineation (BVW): Vegetation workshop had 15 attendees and focused on wetland vegetation and understanding the DEP BVW Delineation Field Data Form: Section I. Vegetation.

Fig. 8 Video of UAV drone technology.

FY18 Workplan Task 8 - Other Specialized Technical Assistance

In 2018, the NEP director submitted a TMDL analysis article to a peer reviewed journal describing how simple mass balance equations can approximate complex TMDL models. The approach provides managers with a first estimate of needed load reductions, elucidates the significance of keystone variables, enables sensitivity analyses, and can help define TMDL margins of safety for processes affecting total nitrogen (e.g., climate drivers). The effort involved time from both the Director and Administrative Assistant. Ultimately the article was not accepted, and the paper is being rewritten for a different venue.

The NEP continues to provide technical guidance on nitrogen management issues to the towns and Coalition. Of particular note was the fact that the NEP continues to work with the Coalition on water quality monitoring database issues and Excel algorithms and formulas to facilitate and expedite the generation of graphics and data analysis for the Coalition's health index reporting. The NEP continues to distribute various specialized GIS datasets through its website to the municipalities and engineering firms.

FY18 Workplan Task 9 - Technology Transfer to Other Estuaries

The Executive Director attended the spring ANEP meeting in Washington DC in March of 2018. The Director also worked with EPA to guide the non-profit Restore America's Estuaries in the management of the SNEP program. The NEP Director is a member of the SNEP Steering Committee and Policy Committee.

The NEP Executive Director and Administrative help maintain grant award information on the Massachusetts Coastal Zone Management Grant Viewer. The CZM Grant Viewer is an interactive map of grants awarded by CZM, the NEP (NEP), and the Massachusetts Bays National Estuary Program (MassBays). It includes grants awarded throughout the Massachusetts Coastal Zone and Coastal Watershed, representing a strong investment in clean estuaries, resilient coasts, and healthy habitats.

The NEP Executive Director continues to participate in meetings on the Southeast New England Program for Coastal Watershed Restoration, to help guide its re-organization, structure, and committee function, as well as to identify funding needs of the region.

FY18 Workplan Task 10 - Website Maintenance and Innovation

The NEP continued to maintain an independent website to promote new approaches, receive feedback, communicate successes, track trends in water quality, monitor performance of government in implementing the CCMP, express the views and concerns of the NEP Steering Committee, create a forum for new initiatives and ideas of our partners, and support other obligations and tasks identified in this work plan. The website is also used to post results of the bay indicators and documents relating to the oil spill, and post procurement notices and grant announcements. The NEP has also been systematically scanning all old NEP reports and gray literature related to Buzzards Bay and posting it on our website.

As noted in the outreach and education task in more detail, the NEP continues to maintain three new subdomain websites. The first was the climate.buzzardsbay.org, launched in June 2013 to consoli-

date the NEP's climate related initiatives on one website. The second subdomain website was restore.buzzardsbay.org, launched in April 2014 in support of SNEP. This website was established on a fast track to support and expedite the release of grant funds for the Southern New England Coastal Watershed Restoration Program. The third, http://stormwater.buzzardsbay.org/, is the subdomain for the Buzzards Bay Stormwater Collaborative that was launched in 2016.

The NEP Director and Administrative Assistant continue to maintain and update the program's WordPress website (buzzardsbay.org). Sample posts in 2018 to 2019 include announcements about Buzzards Bay, an article on Roseate Tern habitat restoration in Buzzards Bay by Marine Defenders, and the MMA and NEP stormwater partnership.

In addition to our own websites, the NEP continues to maintain the BBAC's website, buzzardsbayaction.org. Their page is updated with stories, photos, videos, and presentations at the request of the BBAC to meet the needs of that organization, including Stormwater Collaborative activities.

FY18 Workplan Task 11 – Scientific collaboration on nitrogen TMDLs, climate impacts, and water quality impacts on natural resources.

The NEP collaborated with area scientists to publish results from the previous year's climate tasks and long-term trends including assessing impacts of climate change on water quality. As part of this task, the NEP conducted GIS analyses of watershed land use, including number of onsite systems, occupancy rates, land use types, estimates of impervious area, lawn area, extent of sewering, and agriculture. Specific accomplishments included:

- Provided assistance evaluating the Coalition's water quality data set.
- Updated the stormwater QAPP and monitoring guide in support of the stormwater collaborative.
- Drafted a new QAPP in support of the salt marsh loss study in collaboration with the Coalition SAC. Pursuant to that work, the NEP filed ten requests for determination with local conservation commissions to seek permission to undertake the salt marsh studies on what are mostly publically owned property.
- Defined sewer history in Buzzards Bay embayments, including the enumeration of septic systems over time based on municipal assessors' records of the year of construction of each property in the assessed watersheds.
- Worked with a group of Woods Hole scientists to quantify the impact of pollution and long-term trends on shellfish catch in selected Buzzards Bay municipalities. The work culminated in the paper: Luk, S. Y., Hoagland, P., Rheuban, J. E., Costa, J. E., and Doney, S. C. (2019). Modeling the effect of water quality on the recreational shellfishing cultural ecosystem service of Buzzards Bay, Massachusetts. Marine Pollution Bulletin, 140, 364–373. Link.
- The NEP worked to set up the new stormwater collaborative initiative with MMA. This effort ensured the continuation of the stormwater network mapping and discharge monitoring program with Buzzards Bay municipalities.

FY18 Workplan Task 12 – Salt Marsh Loss Assessment ($30,000 subaward to Coalition).

In the fall of 2018, the NEP and the Coalition began a second phase of their collaboration on a long-term study of salt marsh loss, sea level rise, and habitat change around Buzzards Bay. The effort

Fig. 9 The BBAC website homepage.

was a follow-up of the 2017 Westport River salt marsh loss study. The new effort was funded by a $25,000 headquarters monitoring grant plus $5,000 in supplemental SNEP funds directed to the Coalition, and $10,000 in additional SNEP funds used by the NEP to pay for benchmark supplies, monitoring equipment, and other materials in support of the program. In September 2018, the NEP met with a subcommittee of the Coalition's SAC to identify a minimum of ten potential salt marsh sites around Buzzards Bay. In October, the NEP began contacting property owners to undertake the work. The NEP filed permits in the fall of 2018 and spring of 2019 and finalized a QAPP for the work. Benchmark installation will commence in May 2019, and vegetation and elevation survey work will be completed in the summer of 2019. The six activities undertaken as part of this long-term salt marsh loss monitoring study are:

1) Install a NGS rod type survey benchmark in an adjacent upland area,
2) depending on the site, install 4-10 PVC pipe markers (2 to 5 transects) within the marsh to establish permanent transect lines (1-inch PVC pipe driven with a hammer to within 4 inches of the marsh surface and capped),
3) monitor elevation, vegetation, and other features along these transects up to 3 times per year for the first two years, then once per year thereafter (some Phragmites or vegetation trimming may be required around the benchmark to allow line of sight),
4) conduct a crab population survey with pitfall traps,
5) install a temporary staff with sensors in a tidal creek to document tidal elevation, and

6) periodically document the elevation of the High Tide Line during different tidal and weather conditions.

Subject to grant funding to our partners, the NEP will also work with the Coalition on additional projects, including the use of runnels to drain portions of salt marshes to facilitate the recovery of vegetation (principals include Linda Deegan, Woods Hole Research Center, University of Virginia PhD candidate, Alice Besterman, and Coalition Science Director, Rachel Jakuba). If this project is funded, the NEP will provide GIS support services for that study.

Outputs/Products:

1. The NEP posted an interactive map website to facilitate in the selection of potential salt marsh study sites.
2. In October 2018, the Coalition hired an aerial survey firm to complete a survey of Buzzards Bay salt marshes as part of establishing baseline conditions in Buzzards Bay. The Coalition undertook this work with a $30,000 private donation that is being used as match to this grant.
3. By June 30, 2019, ten benchmarks are expected to be installed.
4. The monitoring data, GIS output, and final report are expected to be complete by June 30, 2020.

FY18 Workplan Task 13 – Technical assistance to support Coastal Resiliency and Municipal Vulnerability Preparedness.

The Commonwealth of Massachusetts announced more than $6 million to the Coastal Resiliency and Municipal Vulnerability Preparedness grant programs in June 2018, and similar levels of funding are expected to be available again in May 2019. The CZM South Coast Regional Coordinator, located in the NEP office provided technical support and guidance to municipalities in the development of CZM's coastal resiliency grant program.

Outputs/Products:

Maps and guidance aided in the development of municipal applications to the program. Successful Buzzards Bay municipal applicants included.

Marion: Assessing the Threats from Climate Change to Marion's Vulnerable Wastewater Pumping Infrastructure, $93,660. The Town of Marion will evaluate the vulnerability of its wastewater pumping stations and related infrastructure to storm surge and sea level rise impacts and recommend improvements and future actions to reduce risk to the pumping stations.

Mattapoisett: Construction of Mattapoisett's Potable Water Infrastructure at the Pease's Point Water Main Crossing, $498,750. The Town of Mattapoisett will relocate an existing water main that traverses an inlet between Pease's Point and Point Connett to a more landward and deeper location to help ensure that service and water quality will be maintained during storm events and future sea level rise.

Wareham: Installation of Bypass Connection at Cohasset Narrows and Hynes Field Pump Stations, $153,375. The Town of Wareham will install mechanical sewer bypass connections at the Hynes and Cohasset Narrows pump stations to allow the pump stations to immediately continue servicing critical infrastructure facilities in the event of a catastrophic flood event. The town will also prepare design plans for a third bypass connection at the Narrows pump station.

Wareham: Resiliency Assessment of Overflow Lagoons at the Wareham Water Pollution Control Facility (WPCF), $63,750. The Town of Wareham will determine the additional storage capacity needed at the WPCF overflow lagoons for heavy precipitation and peak flow conditions with ele-

vated groundwater due to sea level rise. Wareham will evaluate potential modifications to the lagoons to prevent excessive wastewater discharging into the Agawam River during flood events.

FY18 Workplan Task 14 – Collaboration with the Ecosystem Center to evaluate PRB Technology for remediation of residential nitrate in treated wastewater ($60,531 subaward to the Marine Biological Laboratory Ecosystem Center).

The NEP collaborated with the Ecosystem Center at the Marine Biological Laboratory to conduct a study with SNEP funding to evaluate the feasibility of applying permeable reactive barrier (PRB) technology. Using wood chips as a carbon source, to reduce nitrogen inputs from an advanced wastewater effluent under different controlled flow conditions. PRBs are a proven technology that have been demonstrated to passively reduce groundwater nitrate concentrations from several mg/L to less than 0.1 mg/L. Funding for this project was not finalized until August 2018, and work was deferred until the spring of 2019 because the study is undertaken outdoors and could not be completed during freezing weather. The PRB columns will be built and installed at the Wareham Water Pollution Control Facility. The investigators will evaluate how flows through the PRB media can be scaled, controlled, and optimized to further reduce nitrogen concentrations in the Wareham facility's discharge. The facility discharge currently averages less than 3 mg/L total nitrogen, mostly as nitrate. Evaluation of this approach and technology has applicability to the pumping of groundwater plumes contaminated with ammonia and nitrates, and the use of the technology to polish the effluent of advanced nitrogen reduction facilities like Wareham's.

Outputs/Products:

Production of draft and final report on the outcomes of the pilot study are expected to be completed by December 2019 at the end of the grant period.

2018 Leveraged Funding (Federal FY18 Workplan funds)

Each September, the NEP submits to EPA, as part of our Government Performance Reporting Act requirements, a summary of state, federal and local dollars and in-kind services leveraged by the NEP or leveraged by our partners with technical support by the NEP, in support of the implementation of the CCMP. Some funds are leveraged through the municipal grant program; other funds are leveraged through other grant programs with our partners. For the period October 1, 2017, to September 30, 2018, the NEP's leveraged funds in the primary, significant, or support category totaled $3,588,621, $5,621,900, and $86,000 respectively.

Table 1. Summary of NEP role in leveraged funds

NEP Role (primary, significant, or support)	Total
Primary	$3,588,621
Significant	$5,621,900
Support	$86,000
Grand Total	$**9,296,521**

We will report our FY17 2018-2019 leveraged estimates to EPA in the fall 2019.

Section 3: FY19 Funds: Proposed Work Plan Activities July 1, 2019, to June 30, 2021.

In the sections below, we provide details of the specific tasks and actions expected in the coming year. Highlights of these activities include 1) closing out past grants and reissuing any residual grant funds, 2) continuing technical support for Buzzards Bay Stormwater Collaborative, 3) technical assistance to municipalities on MS4 and other issues, 4) continued collaboration with area scientists, the Coalition, and other partners on land use and water quality data sets to guide management action.

We have organized the work plan narrative summary using our past work plan structures for the most part and EPA's recommended logic model to the greatest extent possible. In this effort, we have conformed to EPA's terminology defined as follows:

- Activities: NEP work plan projects.
- Partnerships: involvement of local community partner agencies, organizations and/or individuals.
- Outputs: products and services resulting from the work plan (i.e., deliverables).
- Short-term outcomes: changes in knowledge, learning, attitude, and skills; raising awareness amongst targeted NEP partners and stakeholder groups.
- Intermediate outcomes: changes in behavior, practice, decisions, and involvement among targeted NEP partners and stakeholder groups.
- Pressures: changes, positive and/or negative, related to specific quantitative targets (e.g., percent of nitrogen reduction); and
- Long-term outcomes: changes in condition of the state, when possible.

FY19 Workplan Task 1 - Wetland Restoration and Open Space Protection and Restoration

CCMP/Work Plan Goal(s):
Wetlands and habitat protection and restoration in the wetland action plans and the land use management action plans principally. (Sub-element: Habitat, Water Quality, Living Resources, Healthy Communities. Program goal: Ecosystem Restoration & Protection)

Project/Activity Purpose and Description: (ongoing)
As we have done in the past, the NEP will continue to work and collaborate with the Coalition, area land trusts, and municipalities, in our ongoing effort to protect and restore valuable wetlands and upland wildlife habitat throughout the Buzzards Bay watershed. Through this effort, the NEP will continue to provide maps, help develop state and federal grant applications, and conduct land use analyses. Work related to this task will be principally generated through meeting requests for technical assistance by area lands trusts, municipalities, and the Coalition in their efforts to receive grant funds from other sources.

Responsible Partners and Their Role(s):
The Coalition, municipalities, and area land trusts are key partners in our combined efforts. These land trusts are vitally important in the development of grant applications, and in building local financial and political support for new initiatives. These non-profits also work with private landowners to become partners in these protection efforts.

NEP Staff:
Principal Staff involved in these tasks: Regional Planner will provide technical support to the Coalition, municipalities, and area land trusts. Additional support will be provided from other NEP staff, with guidance from the Executive Director, as well as with input from the Coalition Executive Director, municipalities, and area land trusts. The Executive Director and Regional Planner complete the GPRA report.

Outputs/Products:
1. Grant applications to state and federal grant programs by us or our partners with our support.
2. The NEP may provide support to towns to complete outdated local open space plans (which expire every seven years).
3. The permanent protection of new open space with wetlands and other important habitat in the Buzzards Bay watershed through conservation restriction or purchase in fee.
4. Annual GPRA reports on wetland and habitat protected or restored will be submitted through the NEPORT website.

Milestones:
1. Report to EPA each September via GPRA report on the NEPORT website. Other projects and activities as financial or local interest opportunities arise. Projects undertaken with technical support from the NEP. Maps or analyses prepared for area land trusts or other partners as needed and upon request.

Budget:
Staff time to meet requests for technical assistance. Roughly, $900 in office supplies and paper, and printer ink are projected to be expended on the production of maps, brochures, and outreach information.

Outcomes:
Short-term: Increased number of habitat acres protected and restored, including geographic information systems location data.
Intermediate: Increased number of wetland and habitat related actions in the Buzzards Bay Comprehensive Conservation and Management Plan that have been completed. Increased leveraging of resources committed to NEP activities or towards implementation of CCMP goals and recommended actions. Increased number of acres of protected open land through purchase or easement.
Long-term: CCMP Goal: Long-term increase of high-quality wetlands and coastal habitat in the Buzzards Bay watershed.
Supports CWA core program: CWA and state wetland protection efforts.

FY19 Workplan Task 2 - Stormwater Remediation and Technical Assistance

Stormwater continues to be a special focus area for the NEP. Stormwater is contributing to nutrient and pathogen impairments in Buzzards Bay. There are roughly 5,500 acres of shellfish growing areas closed year-round. These closures are the result of bacterial contamination related to stormwater discharges. Because of these concerns, a large portion of the NEP's focus will remain on continuing the efforts of the Buzzards Bay Stormwater Collaborative. Because last year's funding carries forward into the new fiscal year, staff effort will focus on completing work under the Massachusetts

Maritime ISA ($165,000), which ends in December 2019. The NEP will continue to work with MMA to secure external grant funds to continue the program in 2020.

In last year's workplan, $100,000 was included to hire an engineering firm to develop stormwater designs for five priority projects among the high priority discharges identified through the mapping and monitoring efforts of the stormwater collaborative. To stretch the cost effectiveness of this allocation, the Buzzards Bay Stormwater and GIS specialist will evaluate preliminary design options, characterize catchment areas, and work with municipal officials to identify the best candidate sites among the Stormwater Collaborative municipalities. An additional $4,000 is set aside in the category for any needed professional survey work for stormwater designs and other projects. This project was delayed, so work on last year's workplan task will be undertaken in this workplan instead.

The NEP staff will provide other routine stormwater management technical support ranging from MS4 NOI development and SWMP guidance, to project review of designs in complex local permit applications upon request.

CCMP/Work Plan Goal(s): Ecosystem Restoration and Protection:
Principally Stormwater Management, Shellfish Management, and Wetlands and Habitat action plans, secondarily Land Use, On-Site Septic System management plans.

Project/Activity Purpose and Description: (ongoing)
Presently, the NEP helps towns on stormwater issues in a number of ways. First, we review stormwater designs proposed by towns for remediation projects, or at the request of a town board as part of local permitting or site plan review. Second, we help towns prepare grant applications for state and federal monies to help fund remediation of priority sites. Third, we assist towns to develop and implement stormwater management plans, like the Phase II MS4 NPDES municipal plans. Finally, we work with town boards to adopt local stormwater regulations and LID strategies.

Under this task, we will also continue to manage and guide the efforts of the Stormwater Collaborative, and to also guide towns in their efforts to comply with MS4 permit requirements. As noted above, the funding provided to the MMA is being carried forward into the current fiscal year through the end of December 2019. Under the subaward grant, MMA staff and interns will work with municipalities and the NEP to collect stormwater samples, inspect stormwater facilities, and map stormwater networks under the guidance of the NEP staff. The NEP stormwater specialists will continue to manage this complex regional initiative, and the NEP is providing funds for laboratory services through the termination of the project.

The NEP's stormwater technical assistance program has clear measurable benefits including identification of potential illicit stormwater discharges, the creation of catchment and drainage system maps, and a water quality data management system to assist in municipal storm drain maintenance and tracking of stormwater problems. This information will be used for the creation of online data reports (see the stormwater interactive map) for each discharge that will establish priorities for the treatment of stormwater discharges conveying non-point sources of pollution. NEP reports and data will assist funding agencies and towns to target limited available dollars to treat stormwater discharges to improve water quality and open shellfish beds. This prioritization will aid municipalities in securing grants for remediation, such as CZM's Coastal Pollution Remediation fund. Another measure of the pilot program's success will be the participation of additional municipalities in future years.

Responsible Partners and Their Role(s):
On the Stormwater Collaborative Initiative, our principal partners on these projects are the watershed municipalities and their public works departments and the MMA. The Coalition provides ancillary outreach support about the initiative.

On site-specific projects, partners will involve various municipal boards, districts, and environmental groups. Other partners may arise during project revisions, collaborations related to MEPA permit submissions, or projects commencing that are of regional significance.

NEP Staff:
As described above, about 80% of the full-time and part-time Stormwater Specialists' time will be dedicated to tasks associated with the Stormwater Collaborative, with the balance of time related to broader stormwater management goals and services to municipalities not yet participating in the Stormwater Collaborative.

The part-time Stormwater Specialist will conduct the stormwater design reviews and will assist in the implementation of stormwater regulations. The Stormwater Specialist and Executive Director will develop state and federal grant applications and attend meetings as needed or as opportunities arise.

The NEP Director not only oversees all elements of the program but is also the architect of the stormwater water quality database and the stormwater GIS database and website management elements of the program.

Outputs/Products:
1. Oversee and guide the stormwater monitoring program.
2. Maintenance of the stormwater collaborative water quality database.
3. Maintenance of the stormwater collaborative GIS database.
4. Coordination of stormwater collaborative activities.
5. General local stormwater initiative products include stormwater plan updates, review and analysis of stormwater calculations.
6. General local stormwater grants and technical assistance will result in proposals to fund stormwater designs developed by municipalities, minimize impacts of new development, and work with towns to adopt improved stormwater regulations and policies.
7. Assistance in the completion of past projects including facilitation of permitting, as well as past projects where the NEP prepared preliminary stormwater treatment designs, or where the NEP completed stormwater designs.

Milestones:
This year's workplan goal is to finalize the program’s reports and document lessons learned and present the findings to municipalities. The NEP will then work with municipalities to tackle action with the highest priority discharges, ensure that any illicit connections have been eliminated, and work with them to identify the most viable sites to develop designs for the treatment of stormwater. Timelines will be defined by meetings with the towns and diagnosis of potential illicit connections.

For the general stormwater technical and financial assistance program, most products and activities in this technical assistance program are developed and are completed as needed on an ad hoc basis,

and as permit applications are submitted, or as towns express interest and have match available to apply for federal and state grants. Some activities are defined by stormwater grants in the Buzzards Bay municipal grant program. Other specific milestones arise from projects already initiated.

Budget:

The costs are NEP staff time is $165,000 (salary + fringe + indirect). Other funds are those that have carried forward from the last cooperative agreement workplan, including $100,000 for stormwater engineering services contractor for stormwater treatment designs for five pilot projects, and the balance of the ISA with Mass maritime Academy which runs from January 1, 2019, to December 31, 2019, crossing fiscal years. $160,000 would be provided to our partner organization, the Mass Maritime Academy for the needed personnel and interns to work with the municipalities. In the budget, $10,000 is set aside for lab testing contracts, and $16,418 for supplies, materials, data loggers, survey equipment, GPS units, in support of the program, including printing of educational materials. $4,000 is set aside for any needed survey work needed for this project or the salt marsh monitoring project.

Outcomes:

Short-term:

Stormwater Collaborative Initiative: maintain database structures to meet needs, collect samples, implement management oversight, and program control measures.

General stormwater technical and financial assistance program: Increased citizen and government actions to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan.

Intermediate:

Stormwater Collaborative Initiative: With the continued funding of the program, we hope to add additional towns as participants and work to include more municipal staff in the program, to make them more self-sufficient in implementing monitoring and mapping programs. This outcome will require local training to expand municipal self-reliance. Continue to transfer more management of the program responsibilities to municipalities.

General stormwater technical and financial assistance program: Increased leveraging of resources committed to NEP activities or towards implementation of CCMP goals and recommended actions.

Long-term:

Stormwater Collaborative Initiative: Eventual independence of Buzzards Bay municipalities from NEP management and oversight or stormwater monitoring and mapping obligations.

General stormwater technical and financial assistance program: Actions taken to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan.

Pressures affecting outcomes:

Stormwater Collaborative Initiative: It remains essential for the Stormwater Collaborative to receive adequate funding support and technical support from the NEP. Moreover, it remains critically important for the NEP to illustrate how to diagnose and take action to reduce or treat stormwater discharges that contain tens of thousands or hundreds of thousands of bacteria per 100 ml. We must work diligently to prove the value of this regional collaboration and attempt to develop increased participation by municipalities, and commitment of municipal resources. The expected reissuance of the MS4 permit will help prompt continued municipal collaboration. During this period, it will be essential to build local leadership to manage the program and develop financial self-sustaining mechanisms so that it eventually becomes an independent, and self-sustaining regional program.

General stormwater technical and financial assistance program: Interest and local match availability. The NEP can handle requests for technical assistance depending upon workload and ongoing projects.

Supports CWA core program: 1) improving water quality monitoring, 2) developing strategies to meet Buzzards Bay total maximum daily loads (for bacteria), 3) controlling non-point source pollution on a watershed basis, 4) strengthening National Pollutant Discharge Elimination System (NPDES) permits, and 5) supporting sustainable wastewater infrastructure.

FY19 Workplan Task 3 - NEP Technical Assistance (including stormwater designs contractual assistance)

CCMP/Work Plan Goal(s):
Technical Assistance and Capacity Building and NEP technical and financial assistance May address Stormwater, Nitrogen, Shellfish, Wetlands and Habitat, Land Use, On-Site Septic Systems, and other action plans.

Project/Activity Purpose and Description: (ongoing)

Due to level funding, increasing operation costs, and the lack of add-on SNEP program funds, no municipal grants will be awarded pursuant to this workplan. However, the stormwater grant design project ($125,000) in last year's work plan has been deferred until the FY19 workplan. The Regional Planner, Executive Director, and the NEP Stormwater Specialists will help manage this program.

Responsible Partners and Their Role(s):
Buzzards Bay municipalities are the key partner in developing stormwater designs. The BBAC is also a key partner in ensuring continued interest and participation in the program.

NEP Staff:
Principal Staff involved in these tasks includes the Regional Planner who oversees grants and contracts, Executive Director, and CZM and other staff as needed.

Outputs/Products:
Scopes developed, contracts awarded, press releases prepared, website updated with projects, projects overseen, projects completed, match documents received, and contracts closed.

Milestones:
1. Work commences with five Stormwater Collaborative municipalities to identify 5 high priority sites. Five potential sites in each municipality are selected by July 2019.
2. Final sites and preliminary designs (one site per municipality) are developed in-house. Selected sites go to an RFP for the procurement of engineering services: September 2019 (a single firm will be selected October 2019).
3. Designs completed January 2020.
4. Work with municipalities to secure construction funding (through June 30, 2020).

Budget:
$125,000 in federal (SNEP) funds carried forward, plus cost of staff time dedicated to this effort.

Outcomes:
Short-term: Increased citizen and government actions to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan.
Intermediate: Increased leveraging of resources committed to NEP activities or towards implementation of CCMP goals and recommended actions.
Long-term: Actions taken to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan.
Pressures affecting outcomes:
There are two principal issues that can delay this effort. First, the state may delay the award or release of funds for various reasons. Second, municipalities may have problems meeting grant schedules for various reasons and request extensions in their grant agreements.

This task may support many of the CWA core program including: 1) strengthening water quality standards, 2) improving water quality monitoring, 3) developing total maximum daily loads, 4) controlling non-point source pollution on a watershed basis, 5) strengthening NPDES permits, 6) supporting sustainable wastewater infrastructure and CWA and state wetland protection efforts.

FY19 Workplan Task 4 - Program Oversight and Administration

CCMP/Work Plan Goal(s):
Supports all program activities.

Project/Activity Purpose and Description: (ongoing)
The NEP Executive Director and MCZM Fiscal Officer ensure administration of the EPA and other grants and ISAs awarded to the NEP.

The NEP will submit complete Government Performance Results Act (GPRA) report information to EPA as specified in the EPA Funding Guidance. The GPRA report for NEPs includes annual estimates of habitat and wetlands protected or restored, and annual estimates of funds leveraged in some way by the NEP. As a requirement of this agreement, the NEP will provide information on the GPRA performance measures to EPA by their required date.

Responsible Partners and Their Role(s):
The NEP parent agencies of MCZM and EEA are responsible for the fiduciary and financial reporting requirements of the NEP.

NEP Staff:
Principal Staff involved in these tasks: NEP Executive Director with additional support from the MCZM financial management assistant.

Outputs/Products:
1. Financial reports to EPA.
2. Preparation of work plans, cooperative agreements, grant amendments.
3. Steering Committee meetings needed to review the work plan.
4. Performance reports to EPA.

Milestones:
1. Account draw downs and reports as needed and required.
2. GPRA and leveraging reports due to EPA annually in September.
3. Draft 2019 work plan sent to Steering Committee in April/May 2019.
4. Approved Cooperative Agreement sent to EPA in June 2019.
5. EPA finalize award by 30 July 2019.

Budget:
The only costs are NEP staff time.

Outcomes:
Short-term: Increased leveraging of resources committed to NEP activities or towards implementation of CCMP goals and recommended actions.
Intermediate: Increase and improve upon the information that the Buzzards Bay community leaders, environmental managers, scientific and education community, Commonwealth of Massachusetts, federal officials, and the general public has for making management actions related to the restoration, protection, and sustainable use and enjoyment of Buzzards Bay and its watershed.
Long-term: Increased citizen and government actions to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan.
Pressures affecting outcomes: Various administrative delays are possible at levels in the hierarchy.

This task does not directly support any CWA core programs.

FY19 Workplan Task 5 - Buzzards Bay Citizens' Water Quality Monitoring

CCMP/Work Plan Goal(s):
Principally Nitrogen Management, but also some assistance toward goals in Stormwater, Shellfish, Wetlands and Habitat, Land Use, On-Site Septic Systems, Sewage Treatment Facilities action plans.

Project/Activity Purpose and Description: (ongoing)
With its support from the NEP, the Commonwealth of Massachusetts, citizens, Coalition dues, and other sources, the Coalition will continue its nationally recognized water quality monitoring program which costs roughly $250,000 annually. For the first time in many years, the NEP will be unable to provide any funding to the Coalition for the program in this year's workplan ($30,000 was provided last year, and $25,000 most preceding years). The NEP will continue to provide technical support to Coalition staff in implementing the monitoring Program. The NEP and the Coalition will continue to use data to advocate for nitrogen management in Buzzards Bay Watershed communities and to evaluate trends in Buzzards Bay. The data is also used by DEP's Massachusetts Estuaries Project in the development of TMDLs. The Commonwealth of Massachusetts for a number of years provided between $50,000 and $150,000 annually towards this program that was used as match to our program.

The NEP director will continue to participate in the Coalition SAC workgroup, which continues to work on a number of tasks, including a recommended monitoring and modeling requirements for any potential new wastewater outfalls that would be allowed under a changed state law that would enable such new outfalls.

Responsible Partners and Their Role(s):
The Coalition is the lead for the water quality program and is responsible for meeting state and federal QAPP requirements. They are also the lead on the SAC, but the NEP Director is also a member of that committee and can provide technical and material support for some of their activities. The NEP Regional Planner provides GIS products in support of the water quality monitoring program. The NEP Executive Director coordinates with the Coalition Executive Director, and the Coalition's newly established SAC, on needed program support, and provides technical assistance and guidance on biannual water quality and related state of the bay products.

NEP Staff:
Principal Staff involved will be the NEP Executive Director, Regional Planner, and other NEP staff as required.

Outputs/Products:
1. Annual data disks provided to the NEP.
2. Updates posted to Coalition and NEP website.
3. Electronic rainfall database maintained for evaluating impacts to water quality.

Milestones:
1. Though not required under a grant, the Coalition will share the water quality data for the summer of 2019 monitoring in September of 2020.

Budget:
The only costs of Section 320 funds under this Cooperative Agreement with EPA is the NEP staff time (principally the NEP Director) working with Coalition staff. The Coalition's budget for the monitoring program is approximately $250,000, much of which is used as match. The NEP will also work with Coalition staff to secure additional sources of funding, including through EPA targeted grants to the NEPs

Outcomes:
Short-term: Increased information availability for use by Buzzards Bay community leaders, environmental managers, scientific and education community, Commonwealth of Massachusetts, federal officials, and the general public to make better management decisions and actions related to the restoration, protection, and sustainable use and enjoyment of Buzzards Bay and its watershed. Increase involvement of citizens to protect the natural resources of Buzzards Bay by actively empowering people to get involved and make a difference in the sound management and restoration of the Bay's resources.
Intermediate: Improved public and governmental understanding of Buzzards Bay environmental issues, increased productivity of partners needing information or Buzzards Bay documents, and increased public and financial support for action to protect and restore Buzzards Bay. The advancement in knowledge on the effects of nitrogen pollution and documentation of the condition of localized water quality throughout Buzzards Bay harbors in relation to nutrient loads from the watersheds. Provide external water quality data for the Massachusetts Department of Environmental Protection to assess water body health and develop cleanup plans for impaired waters.
Long-term: Maintain, and ideally increase, the number of acres of eelgrass habitat in Buzzards Bay through reduced nitrogen loading. Meet nitrogen action plan goals: 1. Ensure that beneficial water uses will not be lost, nor will ecosystems be adversely affected by excessive contributions of nitro-

gen to any embayment within Buzzards Bay. 2. Restore any beneficial water uses and ecosystems lost or impacted by the excessive contribution of nitrogen to any embayment within Buzzards Bay.
Pressures affecting outcomes: Turnaround time in receiving data and data analysis from the Coalition's analytical laboratory.

This task supports these core programs: 1) strengthening water quality standards, 2) improving water quality monitoring, 3) developing total maximum daily loads, 4) controlling non-point source pollution on a watershed basis, and CWA and state wetland protection efforts.

FY19 Workplan Task 6 - Environmental Indicators and Outcomes Tracking

CCMP/Work Plan Goal(s):
All Action Plans.

Project/Activity Purpose and Description: (ongoing)
The U.S. EPA requires an assessment of environmental "outputs" and "outcomes", and a method to measure achievement of outputs and outcomes in our efforts to implement the CCMP, and to meet our overarching goal to protect and restore water quality, wetlands, and habitat in Buzzards Bay and its surrounding watershed. The NEP defines environmental outcomes and preliminary indicators through its annual Government Performance Reporting Act submissions.

The NEP submitted its first report to EPA in October 2003 and continues to submit this information annually. To a large degree, the NEP will measure this work plan's outputs and outcomes based on annual reporting of work plan tasks completed, CCMP recommendations implemented, remediation projects completed, and our GPRA/environmental indicators reporting. Each work plan will contain a summary of tasks and measurable outcomes accomplished over the previous year, and tasks ongoing through program extensions.

The NEP will continue its work with the Coalition to analyze and publish results from the Citizens Water Quality Monitoring program database, including assessing climate change impacts. Specifically, the NEP continues to track and monitor key environmental indicators to document the success of the CCMP. Besides the ongoing water quality monitoring program of the Coalition, DEP eelgrass data, together with new historical eelgrass information collated by the NEP, are quantified for Buzzards Bay and reported every three years in the Coalition's State of the Bay reports. Because a new Coalition State of the Bay report is expected late 2020 or early 2021, the NEP will prepare shellfish closure statistics and eelgrass cover summaries under this workplan. Other data tracked by the NEP are shellfish bed permanent closures (also quantified for the Coalition's State of the Bay reports), percentage of stormwater discharges with some form of stormwater remediation implemented, tracking of CCMP accomplishments, ongoing monitoring of two key Buzzards Bay herring runs, and the ongoing tracking of protected open space and new land acquisitions (GPRA data).

To more readily transmit information collected through the citizen water quality monitoring program (see Task 5), the Coalition plans to continue to enhance its website to include annual updates of its water quality testing program to show individual trends for Buzzards Bay embayments. The NEP believes this important endeavor enables citizens and managers to see clearly trends in embayments of interest.

Responsible Partners and Their Role(s): (ongoing)
The Coalition is a key partner in this effort and is the lead in the collection and tracking of several data sets. The Massachusetts Division of Marine Fisheries is the lead agency in collecting and assessing shellfish closures, and provides this data to the NEP. The NEP coordinates closely with DMF in creating Buzzards Bay GIS shellfish bed closures.

NEP Staff:
Executive Director.

Outputs/Products:
1. Annually updated shellfish bed closure maps for Buzzards Bay posted at the program's annual summary shellfish closure web page.

Milestones:
1. Shellfish bed closure map for the summer of 2019: To be initiated August 2020 and completed September 2020.
2. Eelgrass cover map for the summer of 2019: To be initiated August 2020 and completed September 2020.

Budget:
The only section 320 funds are NEP staff time, with some supplies for map products. The Coalition's budget includes staff and outreach and publication costs.

Outcomes:
Short-term: Increased information availability for use by Buzzards Bay community leaders, environmental managers, scientific and education community, Commonwealth of Massachusetts, federal officials, and the general public to make better management decisions and actions related to the restoration, protection, and sustainable use and enjoyment of Buzzards Bay and its watershed.
Intermediate: Improved public and governmental understanding of Buzzards Bay environmental issues, increased productivity of partners needing information or Buzzards Bay documents, and increased public and financial support for action to protect and restore Buzzards Bay. The advancement in knowledge on the effects of nitrogen pollution and documentation of the condition of localized water quality throughout Buzzards Bay harbors in relation to nutrient loads from the watersheds.
Long-term: Increased citizen and government actions to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan.
Pressures affecting outcomes: Unanticipated demands on staff time.

This task may indirectly support any of these CWA core program: 1) strengthening water quality standards, 2) improving water quality monitoring, 3) developing total maximum daily loads, 4) controlling non-point source pollution on a watershed basis, 5) strengthening NPDES permits, 6) supporting sustainable wastewater infrastructure and CWA and state wetland protection efforts.

FY19 Workplan Task 7 - Outreach and Education

CCMP/Work Plan Goal(s):
CCMP Actions: Will address Stormwater, Nitrogen, Shellfish, Wetlands and Habitat, Land Use, On-Site Septic Systems, Sewage Treatment Facilities.

Project/Activity Purpose and Description (ongoing):
The NEP's outreach and education efforts principally focus on the general public thorough the program's website, and to more directed efforts in support of municipalities through training workshops, participation in public meetings, and preparation of brochures and handouts as requested by towns. Some of these specific actions are included in other tasks of this workplan.

The NEP will continue its support for the two annual Wetlands Delineation Workshops and special request workshops (as needed) conducted by the MACC. These workshops are conducted by retired NEP specialist John Rockwell, who does the work on a pro bono basis.

In order to avoid redundancy of public outreach efforts in the face of diminishing funds and staff resources, the NEP relies on the general public outreach of the Coalition[1]. The Coalition will continue to undertake outreach and education activities highlighting the condition and state of Buzzards Bay, progress toward restoration and protection goals, and collaboration with the NEP in their activities. These activities include the July 2019 Swim Buzzards Bay, October 2019 Buzzards Bay Watershed Ride, their annual meeting, press events, and various publications, including the annual report to their members. The annual swim consists of a 1.2-mile open water swim across outer New Bedford Harbor. It highlights the role a clean and healthy Buzzards Bay plays in the lives of watershed residents.

The Coalition will continue to maintain their website. The Coalition will also continue its advocacy efforts through their various programs.

Additionally, the BBAC has expanded its efforts to include environmental education in local schools. They also provide relevant speakers to the members for their monthly meetings and host workshops for Mass CZM and the NEP. They have also expanded their website to include recent actions and accomplishments such as their Earth Day activities.

Responsible Partners and Their Role(s):
The Coalition and the BBAC are our principal partners, but we may partner with other organizations such as the MACC. The NEP may also periodically prepare newsletter articles for MCZM's Coastlines magazine. The BBAC promotes increased awareness in their municipalities' intra town networking, and they are attempting to create a school education program.

NEP Staff:
Principal Staff involved will be the NEP Executive Director and other NEP staff as required.

[1] This strategy was agreed to as part of a 2005 Memorandum of Understanding between the NEP, Coalition, and the Buzzards Bay Action Committee.

Outputs/Products:
Coalition and NEP websites. Coalition newsletter, flyers, posters, press releases, and reports to their members and residents about actions to protect and restore Buzzards Bay.
Improve NEP website information, brochures, and flyers. Help update the BBAC website. Wetlands delineation materials and web page.

Milestones:
Both the Coalition and BBAC have established schedules to meet their own goals and guidelines and are not included in this work plan.

Budget:
The only section 320 fund costs are the NEP staff time, and occasional costs for light refreshments and/or meals served at meetings, conferences, training workshops and outreach activities (events), consistent with 41 CFR 301-74.7, and as approved by the Director.

Outcomes:
Short-term: Increased information availability for use by Buzzards Bay community leaders, environmental managers, scientific and education community, Commonwealth of Massachusetts, federal officials, and the general public to make better management decisions and actions related to the restoration, protection, and sustainable use and enjoyment of Buzzards Bay and its watershed.
Intermediate: Improved public and governmental understanding of Buzzards Bay environmental issues, increased productivity of partners needing information or Buzzards Bay documents, and increased public and financial support for action to protect and restore Buzzards Bay.
Long-term: Increased citizen and government actions to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan.
Pressures affecting outcomes: Many of the Coalition outreach efforts evolve around specific projects that may occur in the future. Unanticipated demands on staff time.

This task will principally support this CWA core program: 4) controlling non-point source pollution on a watershed basis but may also indirectly support 1) strengthening water quality standards, 2) improving water quality monitoring, 3) developing total maximum daily loads, 5) strengthening NPDES permits, 6) supporting sustainable wastewater infrastructure and CWA and state wetland protection efforts.

FY19 Workplan Task 8 - Other Specialized Technical Assistance

CCMP/Work Plan Goals:
Various action plans including nitrogen management, stormwater management, land use planning, and open space protection.

Purpose and Description: (ongoing)
The Buzzards Bay Comprehensive Conservation and Management Plan (CCMP) is largely a non-regulatory document, with most recommendations directed toward municipalities because they have the greatest authority and capacity to address the growth-related and non-point source pollution problems facing the bay and watershed. As a result, since completion of the CCMP, the focus of the

NEP has been to provide technical assistance, and where feasible, financial assistance to towns in their efforts to implement the CCMP.

Because municipalities often lack adequate technical staff to develop or implement many of the recommendations contained in the CCMP, since 1992, the NEP has been providing essential and much needed specialized technical assistance to municipal boards. This technical assistance not only focuses on specific initiatives funded with NEP, state and federal funds, but a wide range of CCMP issues as well. This task includes items not included in the above tasks and includes special requests from our non-governmental organization partners.

Responsible Partners and Their Role(s):
The Coalition, the BBAC, Buzzards Bay municipalities, other state and federal agencies.

NEP Staff:
All NEP staff work on these projects as needed or required.

Outputs/Products:
1. Provide specialized technical assistance to municipalities to promote low impact development, remediate stormwater discharges, and adopt stormwater management strategies, promote better management of on-site septic systems and innovative wastewater systems; improve local wetlands and habitat protection, manage nitrogen loadings, prepare and adopt open space plans.
2. Identify new local actions needed to support the development of the updated CCMP.
3. Encourage towns to take actions that support the updated CCMP.
4. Promote Low Impact Development and Smart Growth strategies and stormwater management in Buzzards Bay communities.
5. Help towns develop concepts, remediation strategies and help prepare grant applications to implement programs and projects to implement CCMP recommendations.
6. Promote better management of on-site wastewater systems and use of innovative technologies.
7. Help municipalities improve local wetlands and habitat protection through regulatory and non-regulatory approaches.

Milestones:
Depends on future projects that cannot be anticipated at this time.

Budget:
The only costs are NEP staff time.

Outcomes:
Short-term: Increased information availability for use by Buzzards Bay community leaders, environmental managers, scientific and education community, Commonwealth of Massachusetts, federal officials, and the general public to make better management decisions and actions related to the restoration, protection, and sustainable use and enjoyment of Buzzards Bay and its watershed.
Intermediate: The advancement in knowledge on the effects of nitrogen pollution and documentation of the condition of localized water quality throughout Buzzards Bay harbors in relation to nutrient loads from the watersheds.
Long-term: Increased citizen and government actions to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan.

Pressures affecting outcomes: We provide technical assistance on a first come first serve basis and as allowed by available staff time.

This task may directly or indirectly support any of these CWA core program: 1) strengthening water quality standards, 2) improving water quality monitoring, 3) developing total maximum daily loads, 4) controlling non-point source pollution on a watershed basis, 5) strengthening NPDES permits, 6) supporting sustainable wastewater infrastructure and CWA and state wetland protection efforts.

FY19 Workplan Task 9 - Technology Transfer to Other Estuaries

CCMP/Work Plan Goal(s):
All CCMP actions to some degree.

Project/Activity Purpose and Description: (ongoing)
The NEP Director anticipates attending both the spring and fall NEP national meeting. The U.S. EPA requires NEP attendance at out-of-state conferences, particularly the spring and fall National Estuary Program meetings. Because of financial limitations, only the NEP Director will attend these meetings. The NEP Director also participates in the Coalition Science Advisory Committee (SAC). Additionally, the NEP Director participates in the SNEP. The NEP Director will also from time to time provide technical assistance to other NEP directors and programs in efforts to communicate the benefits of protecting and restoring national estuaries.

Responsible Partners and Their Role(s):
The Coalition and the NEP send the appropriate staff to these meetings, or participate in collaborative NEP conference calls, webinars, training events, and meetings.

NEP Staff:
The NEP Executive Director or his designee will attend spring and fall NEP meetings and participant in conference calls, web meetings, and communication efforts. Other NEP staff may attend meetings as required by the Executive Director.

Outputs/Products:
1. Attendance at NEP meetings.
2. Presentations at out of state meetings.
3. Information transfer to Buzzards Bay communities.
4. Informational materials to area legislators.

Milestones:
Attendance of fall 2019 and spring 2020 EPA-NEP meetings at a minimum. Staff may also attend other national conventions (on planning, wetlands, and stormwater as budget, availability, and staff time allows.)

Budget:
The travel budget ($4,400) covers all out of state meeting expenses, as well as all in-state travel of staff.

Outcomes:
Short-term: Information and lessons from Buzzards Bay transferred to other entities.
Intermediate: Increased involvement of citizens to protect the natural resources of Buzzards Bay by actively empowering people to get involved and make a difference in the sound management and restoration of the Bay's resources.
Long-term: Increased citizen and government actions to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan.
Pressures affecting outcomes: Unanticipated budget shortfalls can require elimination of out-of-state travel.

This task does not directly support any CWA core programs.

FY19 Workplan Task 10 - Website Maintenance and Innovation

CCMP/Work Plan Goal(s):
Supports all activities, in particular outreach and education components.

Project/Activity Purpose and Description:
The NEP shall continue to maintain an independent website (Buzzardsbay.org) to assist the NEP to promote new approaches, receive feedback, communicate successes, track trends in water quality, performance of government in implementing the CCMP, express the views and concerns of the NEP Steering Committee, create a forum for new initiatives and ideas of our partners, and support other obligations and tasks identified in this work plan. The website is also used to post results of the bay indicators and documents relating to the oil spill, data in support of the Coalition's State of the Bay reports, and post procurement notices and grant announcements. The NEP has also been systematically scanning all old NEP reports and gray literature related to Buzzards Bay and posting it on our website main website buzzardsbay.org and the subdomains climate.buzzardsbay.org, and stormwater.buzzardsbay.org.

In addition to our own website, The NEP designed and continues to maintain the BBAC's website, buzzardsbayaction.org. Their page is updated with stories, photos, videos, and presentations at the request of the BBAC.

Principal Staff involved in these tasks:
Executive Director.

Responsible Partners and Their Role(s):
The NEP coordinates with the Coalition to ensure that each of our indicator and tracking pages are consistent where we provide overlapping information.

NEP Staff:
The NEP Executive Director is the web master and principal author of the website. Other NEP staff contribute to the site with specific documents and materials, and review.

Outputs/Products:
1. Posting of new web pages and documents.
2. Update of existing web pages.

Modify all pages and documents to meet state and federal requirements for Accessibility of the site for those with disabilities including W3C, WAI, and Section 508 compliance.

Milestones:
Updates and postings as need or required.

Budget:
The only costs are NEP staff time.

Outcomes:
Short-term: Improved public and governmental understanding of Buzzards Bay environmental issues, increased productivity of partners needing information or Buzzards Bay documents, and increased public and financial support for action to protect and restore Buzzards Bay.
Intermediate: Increased citizen and government actions to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan.
Long-term: Assists in advancing all CCMP goals
Pressures affecting outcomes: creation of new pages limited by time availability of the Executive Director (webmaster) to add new information and links.

This task does not directly support any CWA core programs but may indirectly support 2) improving water quality monitoring, 4) controlling non-point source pollution on a watershed basis, 6) supporting sustainable wastewater infrastructure and CWA and state wetland protection efforts.

FY19 Workplan Task 11 - Scientific collaboration on nitrogen TMDLs, climate impacts, and water quality impacts on natural resources

The NEP will continue to work with the Coalition and area scientists to complete and publish findings related to the Coalition's water quality data set and land use changes in Buzzards Bay. This will include any requested support to the Valiela study (SNEP 2016 proposal: Assessing climate effects on watershed and stormwater nitrogen loads and vulnerabilities in meeting TMDLs), and other collaborations involving areas scientists.

Conduct GIS analyses of watershed land use, including number of onsite systems, occupancy rates, land use types, estimates of impervious area, lawn area, extent of sewering, and agriculture.

- Conduct a similar analysis for the catchment area of each stormwater discharge monitored in the study.
- Provide assistance evaluating the Coalition's water quality data set.
- Provide guidance on the preparation QAPPs in support of these studies, and if appropriate, amend the Stormwater Collaborative QAPP to include analyses by a laboratory.
- Define sewer history in Buzzards Bay embayments, including the enumeration of septic systems over time based on municipal assessors' records of the year of construction of each property in the assessed watersheds.
- The NEP will work with the MMA to ensure the collection of stormwater samples and sample splits to be analyzed by a laboratory.

Principal Staff involved in these tasks:
Executive Director.

Responsible Partners and Their Role(s):
The NEP coordinates with the Coalition, and the SAC to ensure that the findings derived from the water quality datasets and precipitation and climate records are sound.

NEP Staff:
The NEP Executive Director is the lead on this effort. Other NEP staff contributes to the effort with specific documents, data entry, and review.

Outputs/Products:
1. Posting of new web pages and documents in support of the effort.
2. Production of data set that meets EPA, NEP, and Coalition and collaborating researcher goals and needs.
3. Issuance of a report on the history of wastewater loading to Buzzards Bay.

Milestones:
Updates and postings as need or required.

Budget:
The only costs are NEP staff time.

Outcomes:
Short-term: Improved Coalition water quality data set that can be imported into other applications, and incorporates necessary QA records, information, and metadata.
Intermediate: Increased utility of the data set for more expedited development of water quality health index scores and facilitated joining to GIS data.
Long-term: Increased utility and use of the dataset by independent researchers.
Pressures affecting outcomes: work on the data set limited by time availability of the Executive Director.

This task supports several CWA core programs indirectly including elements: 2) improving water quality monitoring, 4) controlling non-point source pollution on a watershed basis, 6) supporting sustainable wastewater infrastructure and CWA and state wetland protection efforts, and climate adaptation related priorities.

FY18 Workplan Task 12 - Salt Marsh Loss Assessment (carry forward of $30,000 subaward to Coalition)

The NEP and our non-profit partner organization, the Coalition will continue to study salt marsh die-off in Buzzards Bay. In last year's workplan, $30,000 was provided. Because this was a summer survey project, work was deferred until the summer of 2019. The Coalition previously received $30,000 in matching private funds for this work, primarily to pay for and October 2018 aerial survey of salt marshes in Buzzards Bay. The NEP will have installed most elevation benchmarks in support of this study by June 30, 2019. Elevation surveys will be undertaken by the NEP during the NEP and vegetation surveys by the Coalition during the summer of 2019 at 10 priority sites. The data will be used to verify the remote sensing data and collect additional water quality data and document specific damage associated with crab grazing, storm damage and several other marsh in-

dicators. The NEP will be the lead on the GIS analysis. This effort will follow and refine draft marsh monitoring protocols developed by a MA DEP and MA CZM under an EPA Wetlands Program Development grant awarded last year. We will include, as one of our priority monitoring sites, the single Buzzards Bay pilot site used by UMass Amherst under that grant. The NEP will support the effort through Light Detection and Ranging (LiDAR) analysis[2]. To support these activities, the NEP to procure scanned historical aerial imagery at the priority sites. The BBC will provide training to any citizen volunteers participating in the program.

A previous approved QAPP developed for the FY12 task of the expansion of salt marshes with sea level rise study will be used as the starting point of a new QAPP twill be complete by the start of this workplan. The NEP is also a partner on a SNEP grant application by the coalition to study adaptation techniques to minimize salt marsh loss in Buzzards Bay. Should the Coalition receive funding, that additional work will be undertaken under this task

Principal Staff involved in these tasks:
Executive Director, Administrative Assistant, Coalition Staff, Coalition SAC subgroup (Giblin, Neill, Deegan will be among the principals).

Responsible Partners and Their Role(s):
The NEP coordinates with the Coalition, and the SAC to ensure that the findings derived from analysis are sound.

NEP Staff:
The NEP Executive Director is the lead on this GIS component of the effort. Other NEP staff may contribute to the effort with specific documents, data entry, and review.

Outputs/Products:
1. Posting of new web pages and documents in support of the effort.
2. Production of GIS data sets that meets EPA, NEP, Coalition, and collaborating researcher goals and needs.
3. Issuance of a report on the history of salt marsh boundary changes at the selected sites and like causes prepared by the Coalition and SAC principals.
6. Incorporation of marsh loss into future Buzzards Bay State of the Bay reports (as a narrative element). The Coalition prepares these reports with NEP support, and changes in salt marsh area or condition are not currently reported. In future reports the Coalition will report findings from periodic aerial surveys of marsh condition (narrative element).

Milestones:
The Summer monitoring season is expected to be complete by October 1, 2019. GIS coverage of the 2018 aerail survey will be completed by June 30, 2020. Other updates and web postings as need or required.

Budget:
NEP staff time, principally the Director.

[2] See http://climate.buzzardsbay.org/marsh-migration-methods.html

Outcomes:
Short-term: Baseline vegetation and elevation data at a minimum of 10 reference sites. Improved GIS data set of existing and historical marsh boundaries. Data set that can be imported into other applications, and incorporates necessary QA records, information, and metadata.

Intermediate: Increased utility of the data set for more expedited analysis of saltmarsh loss. A report on the potential or likely cause of marsh loss in each of the 10 sites.
Long-term: Increased utility salt marsh change dataset that can be used by independent researchers.
Pressures affecting outcomes: For the NEP task, limited by time availability of the Executive Director. At the Coalition, the efficacy and efficiency of the salt marsh field monitoring and sampling protocols.

This task supports several CWA core programs indirectly including elements: 2) improving water quality monitoring, 4) controlling non-point source pollution on a watershed basis, 6) supporting sustainable wastewater infrastructure and CWA and state wetland protection efforts, and climate adaptation related priorities.

FY19 Workplan Task 13 - Technical assistance to support Coastal Resiliency and Municipal Vulnerability Preparedness

The Commonwealth of Massachusetts announced more than $6 million to the Coastal Resiliency and Municipal Vulnerability Preparedness grant programs in June 2019, and similar levels of funding are expected to be available again in May 2020. The NEP has been providing technical support to Buzzards Bay municipalities and CZM on priority needs in the Buzzards Bay watershed based on past sea level rise studies and technical analyses conducted previously by NEP or other entities. This technical assistance included developing maps, analyses, and information that can be used to support Buzzards Bay municipal applications.

Principal Staff involved in these tasks:
NEP Executive Director and Regional Planner; and collaboration with the CZM SouthCoast regional coordinator.

Responsible Partners and Their Role(s):
As has been done in the past, the NEP director will coordinate with the CZM South Coast Regional Coordinator to provide technical support for the development of proposal concepts for future state grant reports. Technical support will include LiDAR data, watershed, and landuse GIS analysis in support of applications, guidance on the development of tasks and project budgets, and other activities that would support Buzzards Bay municipality participation in these grant programs.

NEP Staff:
The NEP Executive Director is the lead on this task.

Outputs/Products:
Production of maps, data, and information that will support municipal applications to the Coastal Resiliency grant program.

Milestones:
Work on this project would be performed upon request on an ad hoc basis. At the start of the Cooperative Agreement, an announcement would be sent from the NEP to all applicable boards about the availability of NEP technical support for municipal applications to the Coastal Resiliency program. The announcement will include back links to the NEP website with existing interactive maps and datasets relevant to municipalities that support this task.

Budget:
NEP staff time. An estimated $500,000 in grants to Buzzards Bay municipalities for Coastal Resiliency and Municipal Vulnerability Preparedness projects to be used as cash match to this Cooperative Agreement.

Outcomes:
Short-term: Increased number of municipal applications to the Coastal Resiliency Program and Municipal Vulnerability Preparedness grant programs.
Intermediate: Increased number of awards from the Coastal Resiliency Program and Municipal Vulnerability Preparedness grant programs from Buzzards Bay municipalities.
Long-term: Increased coastal resiliency and municipal vulnerability preparedness within the Buzzards Bay watershed.
Pressures affecting outcomes: For the NEP, limited by time availability of the Executive Director, and programmatically, local commitment of staff to support and application, and the level of competition for state grant funds.

This task supports several CWA core programs indirectly, including supporting sustainable wastewater infrastructure and CWA and state wetland protection efforts, and climate adaptation related priorities.

FY18 Workplan Task 14 - Collaboration with the Ecosystem Center to evaluate Permeable Reactive Barrier (PRB) technology (a subaward to the Marine Biological Laboratory carried into the current FY).

The NEP collaborated with the Ecosystem Center at the Marine Biological Laboratory that received targeted SNEP program funding to evaluate the feasibility of applying PRB technology, using wood chips as a carbon source, to reduce nitrogen inputs from an advanced wastewater effluent under different controlled flow conditions. PRBs are a proven technology that have been demonstrated to passively reduce groundwater nitrate concentrations from several mg/L to less than 0.1 mg/L.

Because this was a summer study, the work in last year's work plan was deferred until the spring of 2019 and will be completed by December 2019. The proposed work, which will be conducted also in partnership with the Wareham Water Pollution Control Facility, will evaluate how flows through the PRB media can be scaled, controlled, and optimized to further reduce nitrogen concentrations in the Wareham facility's discharge. The facility discharge currently averages less than 3 mg/L total nitrogen, mostly as nitrate. Evaluation of this approach and technology has applicability to the pumping of groundwater plumes contaminated with ammonia and nitrates, and the use of the technology to polish the effluent of advanced nitrogen reduction facilities like Wareham's.

Figure 10 shows Nitrate concentration collected along a 30 m transect running parallel to the beach at the seepage face (intertidal region where groundwater emerges) down gradient from both control

(0-14 m, grey and orange lines) and PRB (16-30 m, blue and green lines) at depths of 0.7 m and 1.4 m below grade. Photo shows exposed seepage face with algal growth along control site, which abruptly stops downgradient from the PRB. Rust colored deposits are oxidized iron that precipitates from reduced iron mobilized by the PRB.

The pilot project would evaluate the relationship between flow rates through the media and nitrogen removal. The Ecosystem Center scientists will construct six replicate small-scale test reactors (6" diameter pipe x 8 ft long) and manipulate conditions within these to maximize denitrification and removal of the residual nitrate. Reactors will be filled with either fresh wood or wood excavated from our existing 13 year old barrier (to evaluate longevity of the media). The investigators will pump treated effluent from the WPCF through these systems at varying flow rates to control residence time. They will collect inflow, outflow, and interstitial water within the reactor to measure total N, NH_3, NO_3, PO_4, dissolved oxygen, DOC, and dissolved inorganic carbon at different points along the flow path. They will also measure denitrification (nitrate conversion to N_2 gas) directly using our membrane inlet mass spectrometry system. They will evaluate ways to enhance rates of denitrification within reactors to reduce the required residence time. Strategies include the addition of amendments with dissolved carbon sources such as methanol or glucose drawn from a separate reservoir, as well as the addition of a layer of iron or sulfur in series with the wood chips might foster auto-trophic denitrification so that contaminated waters would be subject to both heterotrophic and autotrophic nitrate removal in sequence. This pilot project will be an evaluation of a proof of concept, and if successful, provide a springboard for securing additional funding from other sources to scale up the treatment system and to better understand the biological processes involved.

Principal Staff involved in these tasks:

The NEP Executive Director will facilitate coordination between the wastewater facility and the principal investigator and communicate activities and findings of the project on the NEP website. The work will be undertaken by MBL staff and interns.

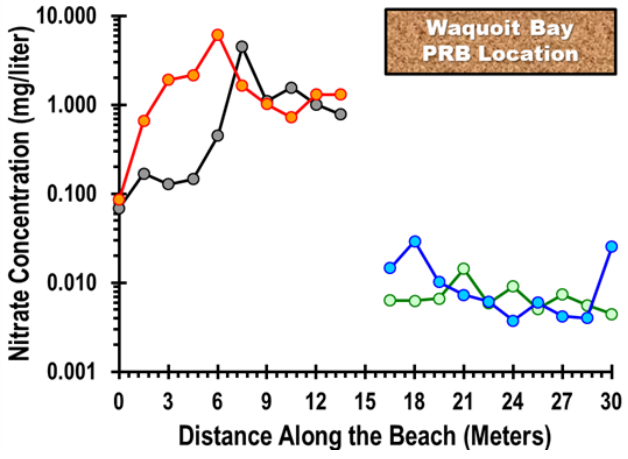

Fig. 10 PBR technology

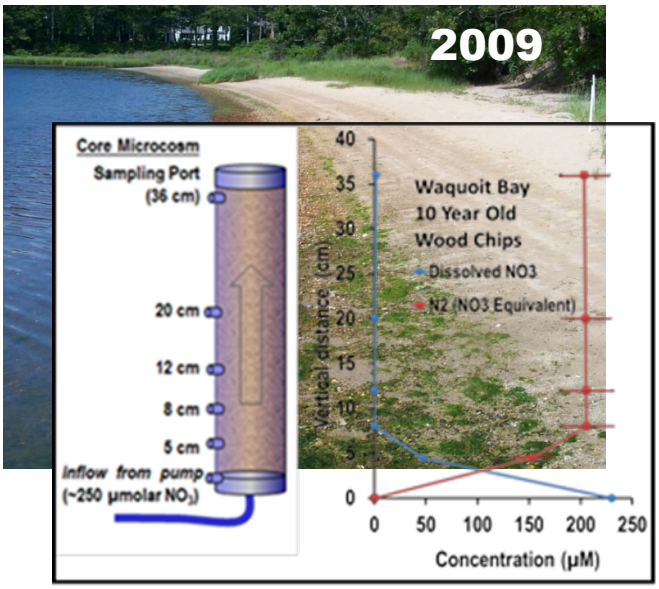

Figure 2. Complete conversion of nitrate to the equivalent amount of N_2 as groundwater is pumped upward through a reactor column filled with wood chips excavated from the Waquoit Bay PRB 10 years after installation in the field.

Responsible Partners and Their Role(s):
Dr. Ken Foreman, SES Director, is the project leader for MBL, and will oversee and manage the pilot study. Other associated Ecosystem Center staff include Vallino, Cardon, and Giblin.

NEP Staff:
The NEP Executive Director and Regional Planner will help oversee the grant to MBL.

Outputs/Products:
Production of draft and final report on the outcomes of the pilot study.

Milestones:
Work on this project would begin as soon as funding is secured, and a grant written to the MBL.

Budget:
The requested $60,531 covers materials, salary for a senior research technician (2.5 months) and two weeks of time for the principal investigator as well as for a student intern. All processing of samples and chemical analyses are done in-house by the ecosystem center.

Outcomes:
Short-term: Data defining the relationship between flow and nitrogen reduction under different control conditions.
Intermediate: A report summarizing the outcomes of the pilot study with recommended next steps and opportunities.
Long-term: If the technological approach is viable, application of the technology for larger scale volumes or field deployment for pump and treat of groundwater plumes. Further studies of bacterial process successful.
Pressures affecting outcomes: Pressures for the NEP are defined limited by time availability of the Executive Director. There may be unanticipated costs when implementing the program.

This task supports several CWA core programs indirectly, including supporting sustainable wastewater infrastructure and CWA and state wetland protection efforts.

Section 4: Budget Summary and Explanation

This workplan is a new Cooperative Agreement. The new budget is summarized according to these EPA grant categories. The FY19 budget is summarized in Table 2 and the pie chart in Fig. 112.

Table 2. Summary of Expenditures by EPA Grant Category	
EPA Category Summary	FY2019
PERSONNEL	$364,817
FRINGE	$138,594
OTHER: Rent, operations	$48,124
OTHER: Municipal Grants	$0
OTHER: Subawards	$0
CONTRACTUAL	$0
SUPPLIES	$3,095
TRAVEL	$4,400
INDIRECT	$40,970
TOTAL	$600,000

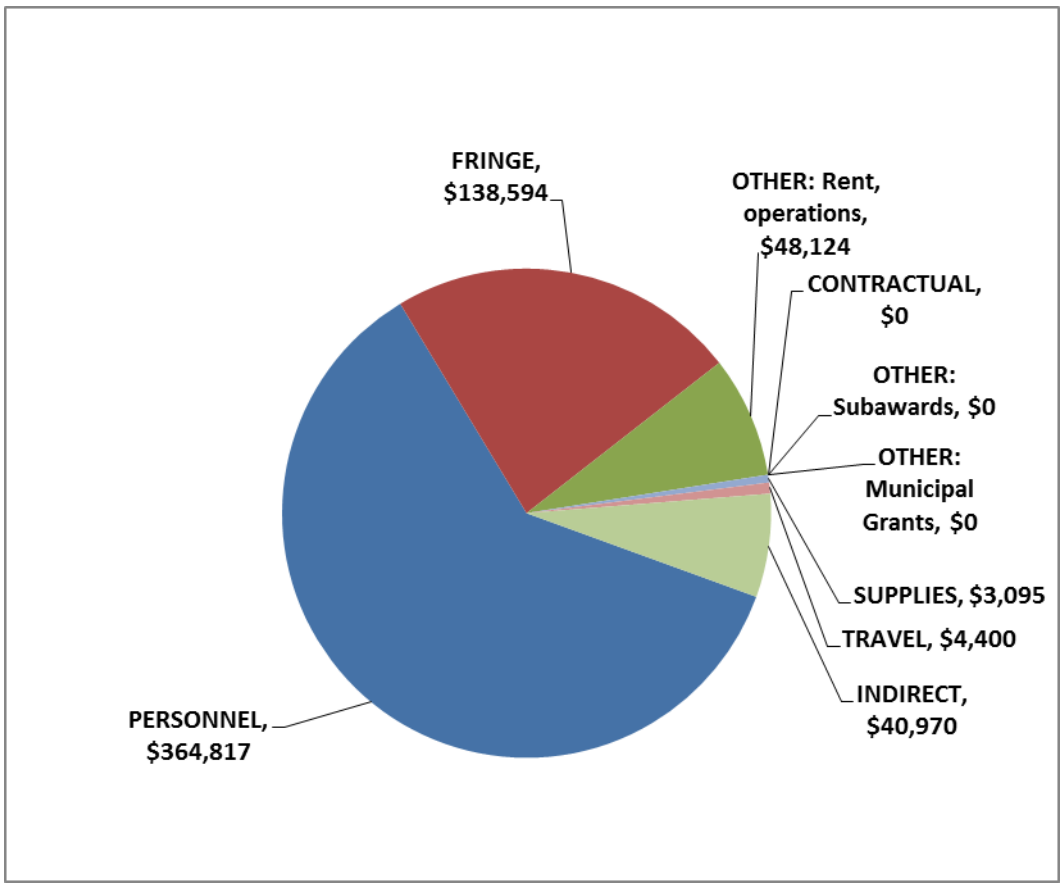

Fig. 11 Pie chart of FY19 federal budget.

Federal FY19 BUDGET DETAIL

Award: $600,000

Personnel: $364,817 (Personnel costs are based on the following staffing levels)

PERSONNEL	FTE* cost	Percent of FTE*
Executive Director	$111,158	100%
Admin. Assistant ¼ time	$13,715	24%
Regional Planner	$94,120	100%
Stormwater Specialist	$102,939	100%
Stormwater Specialist 1/2 time	$42,885	50%

*FTE = Full-Time Employee

Travel: $4,400

Travel estimate is based on the actual expenditure from other years and new projections. The majority of travel is done within the Buzzards Bay watershed (site visits or partner meetings), with additional agency partner meetings in Massachusetts, and tech transfer meetings in New England. It is estimated that NEP staff will participate in the following:

Executive Director: 2 National meetings, 3 NE tech transfer meetings, 23 in-state and watershed partner meetings, 15 in-state site visits.

Regional Planner: 5 state and watershed partner meetings, 5 site visits.

Stormwater Specialist (Full-time Employee): 1 NE tech transfer meeting, 10 state and watershed partner meetings, 26 site visits.

Stormwater Specialist (Half-Time Employee): 7 state and watershed partner meetings, 26 site visits.

Fringe: $138,594

35.55% + 2.44% Medicaid, etc. charge on all personnel

Supplies: $3,095

Postage, printing, paper, office supplies

Other: $48,124

Program Operations

12 months' rent and utilities, cleaning, disposal, state audit, computer leases, repairs, telephone and internet charges, other chargebacks. It should be noted that cleaning, disposal, and repairs and maintenance (copy machine, printers, etc.), are not contractual purchases by the NEP. The vendors for these items are selected from state blanket contracts.

Indirect costs: $40,970

A 11.15% charge on “Personnel,” plus selected expenditures in the “Other” category (signified by an asterisk on detailed budget breakdown).

Table 3. FFY19 Budget for Workplan Total Award Proposed to Commence July 1, 2019		
EXPENSES:	**Cost Category Detail**	**Cost Category subtotal**
Technical Assistance and Program Costs		
PERSONNEL*		**$364,817**
Joe Costa, Executive Director	$111,158	
Admin. Assistant 1/4 time	$13,715	
Sarah Williams, Regional Planner	$94,120	
Kevin Bartsch, Stormwater Specialist	$102,939	
Bernadette, Taber Stormwater Specialist 1/2 time	$42,885	
FRINGE (37.99% combined)		**$138,594**
TRAVEL (in state + out of state)		**$4,400**
SUPPLIES		**$3,095**
water	$87	
subscriptions	$300	
janitorial supplies	$225	
office supplies (paper, printer, plotter, copier)	$2,183	
postage	$300	
CONTRACTUAL		**$0**
OTHER		**$48,124**
rent + utilities	$33,662	
cleaning*	$2,496	
Frades disposal*	$135	
repairs, maintenance (copy machine, printers, etc.)	$500	
Phone, internet	$1,944	
Data Center, Single Audit, etc.	$7,323	
Printer/Copier/Scanner lease	$2,064	
TOTAL DIRECT		**$559,030**
INDIRECT (11.15% on * items)		**$40,970**
TOTAL		**$600,000**

Section 5: Match to the Cooperative Agreement

Below is a summary of the $600,000 match that is being provided to meet the match requirement under this Cooperative Agreement to the Commonwealth. The largest portion of the match is provided by the Coalition programs followed by the municipal grant program. The Coalition, which last year had an operational budget of over $3.5 million, works in a close partnership with the NEP on several tasks, including application of the water quality testing program, and work in support of wetland and habitat protection and restoration. The Coalition also provides a vital role in assisting communities to develop applications to the Buzzards Bay municipal grant program. Another important contributor to the match total is the cash and in-kind contributions from the member communities of the BBAC. These collaborations have led to a very high rate of leveraging in our municipal grant program and continue to represent one of the cores of the match to our cooperative agreement.

1) Coalition Water Quality Monitoring Program ($278,209).
For the past decade, the Coalition secured nonfederal funds through grants, members' dues, state earmarks, and donations to support its water quality monitoring program and related outreach.

The cost of the core elements of this program (staff, publications, contractual laboratory testing services, and supplies) approaches $180,000 per year. The core program elements plus the volunteer time increases the value of the program to more than $250,000. We have estimated this volunteer time at $124,804.68 based on $31.17/hr. x 143 volunteers x 28 hours per season which is an underestimate since most volunteers contribute 40 hours per year.

Our match under this agreement for this task ($278,209) includes these specific expenditures of the program: a portion ($42,000) of the Director of Monitoring salary not used as match elsewhere, contractual laboratory analyses, and volunteer time ($140,616), other miscellaneous expenditures ($1,880), supplies ($9,052), and travel ($4,354).

2) Municipal support to BBAC ($10,400).
The municipalities of Buzzards Bay pay $10,400 per year to the BBAC to support projects to implement the CCMP. These funds pay the costs of a part-time Executive Director, defray organization costs, helped fund a school education pilot program, and pay for meeting and workshop expenses.

3) BBAC and workshop meetings ($14,300).
The BBAC is composed of high-level municipal officials, generally Selectmen, Town Administrators, or Department heads that meet monthly (12 municipalities, about 10 officials typically attend, at 8 meetings per year for 2 hours per meeting). The average hourly rate assigned to these municipal officials is estimated to be $78 per hour.

4) Other Coalition support: education and land conservation programs ($172,091).
The Coalition's annual operational budget exceeds $1.4 million and includes a wide range of activities that compliment this work plan. These activities include public education and outreach initiatives and publications, water quality data management updates for their website, in-stream monitoring program, oil spill area contingency plan updates with municipal officials, newsletters and events that include the cost of Director, outreach staff, and communication costs. The applicable matching amounts support and coincide with the NEP tasks identified in this work plan.

The Coalition also has a vigorous land protection program to encourage Bay-focused watershed land protection, empower local land trusts, and educate private landowners about land conservation options. These efforts are supported by foundation and donor-supported programs, include several staff members, and has outreach costs. Expenditures under this program by the Coalition, especially land acquisition, continue to represent a large portion of this non-profit's expenditures. The activities support a key goal of the CCMP, the protection of wetlands, habitat, and open space to protect water quality, and living resources. Publicly accessible open space also helps build support for other environmental initiatives of both our programs.

The NEP is a key partner with the Coalition, preparing hundreds of maps and conducting GIS land use evaluations for targeted acquisitions. Our support is integral in the Coalition's outreach for their program and has helped the passage of municipal town meeting legislative articles in support of conservation land acquisitions.

5) CZM Coastal Resiliency Grant program ($125,000)
Grants awarded by CZM for projects in the Buzzards Bay watershed.

Table 4. Summary of proposed match.

Proposed MATCH (non-state)	Total	Personnel	Fringe	Contractual	Other	Supplies	Travel	Indirect	TOTAL
1. Coalition WQ Monitoring Program (1)	$278,209			$278,209					$278,209
2. BBAC dues	$10,400			$9,400		$1,000			$10,400
3. BBAC, other municipal meetings, workshops	$14,300	$14,300							$14,300
4. Other Coalition Support (2)	$172,091	$170,391					$1,700		$172,091
5. CZM Coastal Resiliency Grant program	$125,000				$125,000				$125,000
Summary	$600,000	$184,691	$0	$287,609	$125,000	$1,000	$1,700	$0	$600,000

Footnote 1: In this category, we are including the value of the time volunteers contribute to the Coalition's Water Quality Monitoring Program. This contribution is based on 143 volunteers x$31.17 (see https://independentsector.org/resource/vovt_details/ and download the data to see the most recent rate for Massachusetts) x 28 hours per season (=$124,804.68, also added to the contractual category), plus additional cash provided by the state legislature to the program. The volunteer time contribution represents an underestimate of BBC volunteer time. We estimate actual average time per volunteer as more than 40 hours per year with retraining and samplings times for participants in the regular monitoring program (22 oxygen samplings and 4 nutrient samplings), but as little as 6 hours per year for a minority of volunteers who sample only the four nutrient dates. Travel includes both in-state and out-of-state estimated reimbursements. Supplies includes chemicals, replacement and new test kits, sampling devices and repairs, handheld monitoring devices, and a wide range of support materials related to the operation of the program. Other includes postage, printing, and program insurance.
Footnote 2: Portions of Coalition Staff in these positions: VP Education & Public Engagement ($55,000) VP Watershed Protection ($50,000), Director of Land Protection ($40,000), Communications Specialist ($40,000), Director of Land Protection ($49,000), and Restoration Specialist ($45,000).

Section 6: Reprogramming of FY18 Funds

No reprogramming is required.

Section 7: NEP Staff

Dr. Joe Costa is Executive Director of the NEP. Besides overseeing and administering the Program, he provides technical assistance on nitrogen loading assessment and management, water quality analysis, watershed planning, build-out analysis, data analysis, and software support. His research in marine ecology, particularly nitrogen loading effects on eelgrass beds and coastal ecosystems has been put to use in the Coalition's citizen monitoring program and the NEP's nitrogen management approach. The director is also the program's webmaster.

Kevin Bartsch is one of the NEP's Stormwater Specialists (full-time). He has a master's degree in Watershed Science and over 20 years' experience in GIS data development and modeling. Kevin has a wealth of knowledge in utility (water, wastewater, electric) infrastructure, asset management, soil erosion, natural resource management, and open space protection. At the NEP, Kevin works with municipalities and the MMA to create a comprehensive stormwater GIS and management program. Kevin also volunteers as a board member and as former Director and President of the Wareham Land Trust.

Bernadette Taber is one of the NEP's Stormwater Specialists (part-time). A long-time former employee of the USDA Natural Resource Conservation Service detailed to the NEP office since 1991, Bernie re-joined the NEP after leaving federal service in 2015. Bernie evaluates and develops engineering solutions for stormwater remediation in both agricultural and urban environments. Bernie has reviewed many engineering plans at the request of Buzzards Bay municipalities and has developed the preliminary stormwater and habitat restoration designs identified in collaboration with Buzzards Bay municipalities and their contractors.

TBD Administrative Assistant. Longtime NEP Administrative Assistant Tracy Warncke retired at the end of the last workplan period. The position was filled at an 80% full-time employee. because the NEP has been level funded during the past 15 years, inflationary budget costs during that period, and the lack of supplemental SNEP funding, the position will be reduced to 20% full-time employee.

Sarah Williams is the NEP's Regional Planner (full time). She provides assistance to municipalities on land use and watershed planning, land conservation, buildout analysis, habitat restoration, and mapping as well as some of the administrative function of the project. She is a coordinator between the towns and the NEP on our Municipal Grant Program and prepared the NEP's regional open space plan. Sarah was also a former member of the Fairhaven-Acushnet Land Preservation Trust and Fairhaven Conservation Commission and brings this valuable experience to bear on her activities.

Appendix 1. Index of Tasks

Section 2 (FY2018 Workplan Tasks) represents status of last year's tasks, Section 3 (FY2019 Workplan Tasks) represents this year's tasks.