



COALITION Quarterly

Clean Water and Human Health

Paddle for the Bays: RACE Cape Cod 2019



BCleanWater.org

**BETTER DAYS
AHEAD!**

A Note from The Helm

“It’s not just what’s in the air...”

COVID-19 has provided us all with a frightening reminder that human life is precious and incredibly fragile. It is a stark indication of how little we know and understand about the risks we all face. Human interaction with our environment clearly creates many unintended consequences, including the potential threats coming from our contaminated waters.

Here at Barnstable Clean Water Coalition (BCWC), we are working on approaches to mitigate some of these risks. Environmental degradation caused by nutrient overload, mainly nitrogen and phosphorus, from our septic systems is one consequence of not updating standards - and no doubt a warning sign we should not ignore. Even more important for us here on Cape Cod is the fact that our wastewater flows back into our sole source aquifer. What are the consequences?

Cape Cod has long been known as a “hot spot” for various cancers, with especially high rates of breast cancer. Many suspect that contaminants in our drinking water are to blame. Why? Title 5 septic systems do very little to eliminate Contaminants of Emerging Concern (CECs) from wastewater before it flows through the groundwater into our drinking water supply. Silent Spring Institute notes that people on Cape Cod do not realize how much sunscreen they are drinking. Think about it... Whenever we shower after a day at the beach or on the boat, the sunscreen from our bodies flows right back into the groundwater.

We are gradually polluting all of Cape Cod’s waters. We dispose of pharmaceuticals, household products and other chemicals down our drains without understanding the consequences. The levels of nitrogen and phosphorus from wastewater, stormwater runoff and fertilizers have been rising for decades in local waterways and groundwater. We can, and must, do better!



BCWC is about to launch an innovative project aimed at improving this situation. Our goal is to move forward a new generation of septic system technologies that dramatically reduce nutrient overload and improve wastewater treatment. As noted in our last newsletter, this effort is unique in the United States. Our project partners include the U.S. Geological Survey (USGS), U.S. Environmental Protection Agency (US EPA), Massachusetts Alternative Septic System Test Center (MASSTC), The Nature Conservancy (TNC) and others at the federal, state and local level.

On the following pages, we will discuss our upcoming efforts in one neighborhood adjacent to Shubael Pond in Marstons Mills. This neighborhood is where we intend to install and test 10 to 40 high performance, low cost, long lived septic systems that augment an existing Title 5 septic system.

We will need to raise several million dollars to move this innovative project forward. Your contributions will be the key to its success. We hope this project starts a roadmap showing us the way to clean up the waters across Cape Cod, up and down the East Coast, and beyond.

The cover photo is from last year’s Paddle for the Bays: RACE Cape Cod event. A great reminder of how we can all work together for clean water. Let’s make it happen this year, too!!

Best,

COVID-19 and Helping Our Cape Cod Neighbors

This summer is going to be unlike any other we have experienced on Cape Cod. Everyone will be affected. Did you know that fishermen rely on restaurants for 90% of their business? Every business, big and small, will be impacted from your favorite ice cream shop, restaurant, retailer, kayak rental company, dry cleaner, hair salon... the list is endless.

Even as BCWC spreads the word and continues our work for clean water, we hope to do more for our local community. On April 22nd, the 50th anniversary of Earth Day, we teamed up with Cape Cod Beer and Cape Cod Oyster to provide locally brewed beer, locally harvested oysters, and good will in a “to go” bundle, which raised over \$4,000. We are looking for other ways to work together to help our local businesses weather this crisis. Please email me (zcrocker@bcleanwater.org) with your ideas!

Community Engagement and Outreach: The Shubael Pond Project

A strong and committed project team is critical to the success of any project, and we are fortunate to have such dedicated partners invested in the Shubael Pond Project. Over the past six months, BCWC has collaborated and met weekly with several federal, regional, state and county agencies and non-profit organizations.

As with any project, communication is key. To make sure we are meeting peoples' needs and listening to what different stakeholders have to say, we have been working on a community engagement and outreach plan that emphasizes open conversation and ensures we are communicating in a clear and precise manner. Regular and consistent reporting of the project's progress and status is crucial to its success.

Some of our key stakeholders include the residents who live all around Shubael Pond, and those that will not be directly involved in the project in the first round of innovative and alternative (I/A) septic system installations. In October 2019, we began meeting with Shubael Pond residents. Conversations started informally, from sitting at a neighbor's kitchen table, to meetings in the BCWC office and even on the beach. We were disappointed that our meeting on March 19 at the Osterville Library was cancelled due to circumstances surrounding COVID-19. It would have been our first formal effort at welcoming all Shubael Pond neighbors to ask their questions, share their concerns and learn about what the pond means to them. Since then, we have stayed connected with more than sixty residents representing all associations and neighborhoods around the pond and are delighted that the interest and enthusiasm in the project remains high. Like many people right now, we are adapting to the new way of communicating through



George Heufelder (left), former Director of the Massachusetts Alternative Septic System Test Center (MASSTC) at Joint Base Cape Cod with current Director Brian Baumgaertel. George and Brian lead a team of specialists that are working to protect our water resources by testing and researching products, including I/A septic systems that remove the myriad of nutrients and contaminants found in wastewater.

e-mails, videoconferences and socially distanced meetings at the Sand Shores beach and Fair Acres Country Day School.

To provide an educational opportunity to the residents around Shubael Pond and the general public, we have initiated the development of a video library that will cover a range of topics. Some are specific to the Shubael Pond Project, others are general topics related to water quality issues, and other projects we are working on at BCWC. Our plan is to share these videos and other topics of interest through our new blog which will launch in late May, as well as on our website, BCleanWater.org.

For more information on the Shubael Pond Project, please contact Jennifer Loughran at jloughran@bcleanwater.org.



Scott Laurie (left) and Patricia Uhlman (right), residents of the Sand Shores neighborhood, are two of the many community members working with BCWC on the Shubael Pond Project.

Some of the many topics covered in video library include:

- What is a Title 5 septic system?
- What will the new systems do differently?
- How much will the new systems cost?
- How will this project benefit the community?
- Will the team do any work related to viruses?

What Is The Shubael Pond Project?

BCWC and our partners have selected a neighborhood near Shubael Pond as the location to install and monitor next generation septic system technology. This area has many attributes that make it an important site.

- Hydrologic conditions (see page 6 & 7)
- Approximately 350 homes contribute to the Marstons Mills subwatershed.
- Many homes have existing septic systems that are near the end of their expected useful life of 20 - 25 years.
- Groundwater flows into this 53-acre kettle pond, which was closed throughout the 2019 summer season due to harmful cyanobacteria algal blooms.
- Many homes are populated with year-round residents.
- This location is not scheduled to get municipal sewerage for decades.
- The site is located within the Three Bays watershed, which is Barnstable's most troubled and the Cape's third worst in terms of nitrogen overload.

The town of Barnstable has identified this area as part of its recently filed Comprehensive Wastewater Management Plan (CWMP). Their 30-year plan calls for expansion of the existing municipal treatment plant to service an additional 9,800 households (out of approximately 25,000). Initial cost estimates for this expansion are \$1.1 billion, including finance costs. Construction costs alone were pegged at \$87,000 per household. Most of these costs would be covered via a variety of revenue sources, leaving a smaller amount that the individual homeowners are responsible for.

The Shubael Pond Project seeks a lower cost alternative and is designed to demonstrate that a new generation of septic systems can achieve levels of mitigation of nutrients, like nitrogen, that are equal to those of our municipal treatment facility. At scale, we hope to prove that these systems can be delivered for approximately 25% of the cost of municipal wastewater collection. In addition, longer term operating and maintenance costs should be substantially lower. One easy metric to consider is that a gallon of water weighs 8.34 lbs. Even today, pumping thousands of gallons of wastewater to the central plant comes at great expense, an expense that will rise dramatically with system expansion. On-site treatment eliminates that requirement.

This project will be grounded in data collection and analysis. For the first time, we will be able to collect data from underlying groundwater that will allow us to compare results for individual, distributed wastewater treatment versus the centralized treated wastewater injections which now occur. Expansion of municipal-scale wastewater disposal is one of the most challenging issues for every community.

Time is clearly of the essence given the well documented deteriorating conditions of our local waters. Lakes, ponds, estuaries and drinking water all need attention and addressing the main source of our problem, Title 5 septic systems, is the answer. This project may identify a tool that will allow our community to tackle the challenge more quickly and at a far lower cost.



(Above) Undocumented drainage pipe at Shubael Pond

However, much work needs to be done. The following criteria have been identified for an alternative system:

- High performance standards for the mitigation of nitrogen and other contaminants;
- Compelling installation, maintenance, and operating costs;
- Gravity driven operations with modest power requirements;
- Ability to operate at current Title 5 septic system standards in the absence of any power;
- Real time performance monitoring.

These and other criteria will be outlined in a “Request for Proposal” (RFP) that will be forthcoming as we move forward with this project.

Our efforts at Shubael Pond are not limited to septic systems, although we believe that they are the source of approximately 85% of the water-related issues. BCWC will also work closely with our partners to identify, document and remedy stormwater related issues. Further, we intend to work closely with individual stakeholders within the community to develop best practices for yard maintenance, fertilizer use, and landscaping alternatives that can help decrease nutrient overload conditions in the pond. This project is multifaceted with many additional considerations and potential benefits.

Some of the most important work in this effort will be the information we will gain by monitoring the groundwater. How will the groundwater data in this I/A septic system



(Above) Aerial view of Shubael Pond

installation compare to the current treatment approach of centralized wastewater treatment? What changes will take place in the groundwater as it travels one to four feet a day carrying treated wastewater (or effluent) from the septic system? How does this compare with the resulting concentrated “plume” of effluent produced on a municipal scale?

Typically, on the Cape, this treated effluent is injected into the ground in high volume. For example, in Boston, wastewater is disposed of via an outfall pipe into Massachusetts Bay. We believe that successfully distributed treatment of our wastewater may be a far better choice both environmentally and financially.

The financial challenges are not trivial. To protect both our recreational waters and our drinking water, we estimate that the Cape may need over 100,000 of these systems in addition to the expansion of municipal systems. BCWC is working closely with The Nature Conservancy to identify financing alternatives. Many possibilities exist: private “impact” investments, local, state and federal funding, tax credits and water usage funding are all in the mix.

Operations and maintenance must be consistent and reliable. Our goal is to develop a model that allows individual homeowners, and the community at large, to know that the systems installed are operating to the expected standards. To date, the earlier generation of alternative septic systems have largely failed in this regard. The plan is to address this issue by developing a model that will allow the same level of performance we have all come to expect from our existing utilities and trusted service providers.

We have ambitious goals and the Shubael Pond Project is just the beginning. We have the funding to get started thanks to your continued support. Although these first I/A systems may be fully subsidized, we will need to continue to raise more money and work hard to build a sustainable financial model. PLEASE HELP US SAVE CAPE COD'S WATERS.

Stay connected with us by checking our website BCleanWater.org. Turn the page to learn more about how and why we chose the Shubael Pond area for this project.

How The Project Team Chose The Shubael Pond Site

Assessment of Hydrologic Conditions in the Three Bays Watershed in Support of Nutrient Management Activities, Cape Cod, Massachusetts

From the New England Water Science Center

In 2019 the USGS began a partnership with the U.S. Environmental Protection Agency (EPA) Office of Research and Development (ORD), EPA Region 1 Southeast New England Program for Coastal Watershed Restoration (SNEP), Barnstable Clean Water Coalition (BCWC), and other stakeholders to conduct hydrologic monitoring and assessment in support of multifaceted nutrient-management activities in the Three Bays watershed on Cape Cod. Hydrologic monitoring will be used to evaluate the effectiveness of non-traditional technologies such as innovative and alternative (I/A) septic systems and permeable reactive barriers (PRBs) for reducing groundwater nitrogen concentrations and loads.

The Three Bays watershed (fig. 1) has been selected by EPA ORD as a location to promote the development and implementation of innovative nutrient management solutions in a southern New England coastal setting. Similar to other areas on Cape Cod, Three Bays is a groundwater dominated watershed in which substantial fractions of the total nitrogen load to surface-water bodies are delivered by groundwater. Consequently, understanding the groundwater-flow system (for

example, flow directions and rates, depth to groundwater, subsurface geologic conditions, and water quality) is important. Although the groundwater-flow system in the watershed is generally understood from regional modeling studies, assessments of local groundwater conditions will be needed for most of the technology demonstration projects.

Current (2020) work is focused on identifying sites in the watershed that are potentially favorable for demonstrations of I/A septic systems at the neighborhood scale. More information about I/A systems is available at the Massachusetts Alternative Septic System Test Center (MASSTC) web site (<https://www.masstc.org/>). The effectiveness of new I/A system designs will be evaluated for individual systems installed in the watershed (for example, seasonal measurement of influent and effluent nitrogen concentrations for individual systems) and a group of 30-50 systems clustered in a selected neighborhood. The goals of the neighborhood-scale demonstration are to determine cumulative changes in groundwater quality, primarily concentrations of nitrate, and quantify changes in groundwater nitrogen loading to downgradient surface-water receptors in response to installation of clustered I/A systems.

To select a neighborhood for the demonstration, USGS conducted an analysis of hydrologic and land-use characteristics of the watershed in the fall of



Test well being drilled at Cammett Way (USGS)



2019 and recommended four sites for preliminary site characterization (fig. 1). In November 2019, USGS conducted the preliminary site-characterization field work in collaboration with EPA ORD. Vertical profiles of generalized geologic conditions and groundwater quality from well clusters installed at the four sites are shown in Figure 2. Based on the results of this work, a neighborhood adjacent to Shubael Pond in the northeastern part of the watershed (fig. 1) was selected for the I/A system demonstration.

Planned future work in the Shubael Pond neighborhood will include additional focused site characterization to better define local hydrologic and water-quality conditions followed by installation of a larger groundwater and surface-water monitoring network. The monitoring network will be sampled periodically to determine (1) baseline (pre-intervention) water-quality prior to I/A system installation, and (2) cumulative effects of installed I/A systems on groundwater-quality and nitrogen loading over time. Knowledge of local hydrologic conditions developed from the site characterization work will be used

to inform the locations and orientation of the clustered I/A systems and monitoring network to optimize detection of changes in groundwater quality. Periodic sampling of the monitoring network likely will continue for several years after installation to account for the relatively slow movement of groundwater and associated response to I/A system installation.

In addition to the I/A system demonstration, USGS may provide hydrologic support for other EPA-led nutrient management activities in the watershed. Other potential nitrogen-reduction projects include installation of permeable reactive barriers, pond dredging, and restoration of cranberry bogs and wetlands. Baseline information needed to support these activities generally includes streamflow and pond-level monitoring; water-quality data for surface waters (rivers, ponds, embayments) and groundwater; and local-scale hydrogeologic data consisting of groundwater levels and flow directions and subsurface geology.

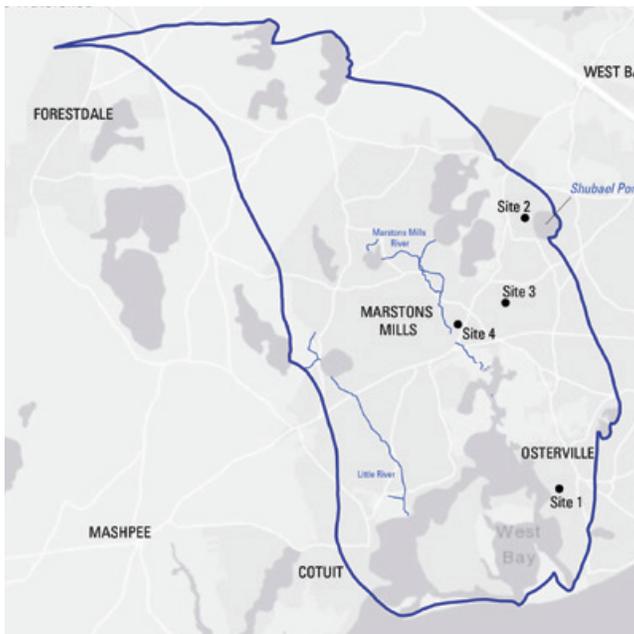


Figure 1
Three Bays watershed area and locations of four sites for preliminary hydrogeologic site characterization, Barnstable, Massachusetts.

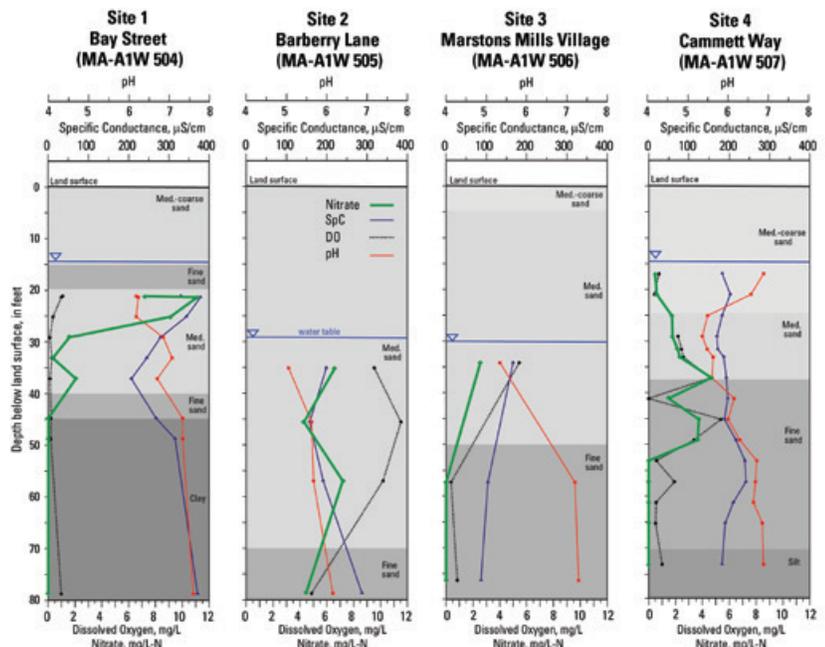


Figure 2
Results from USGS/EPA drilling and sampling at four locations in Barnstable, MA, November–December 2019.



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Mission Statement

Barnstable Clean Water Coalition works to restore and preserve clean water in Barnstable. BCWC utilizes science as its foundation to educate, monitor, mitigate and advocate for clean water.

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Upcoming Virtual Event

We cannot wait until we can be together again in person!
 Until then, support BCWC by attending our

Virtual Annual Open House | Thursday, June 25th at 5 pm



Join us online to learn more about our pilot projects
 at Shubael Pond and the Marstons Mills cranberry bogs.

Visit BCleanWater.org for further information on registering for our
 Virtual Annual Open House and for updates on future events.

Help BCWC continue its work for clean water by donating today.



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