



COALITION Quarterly

Invaders in Our Waters



*Orange Sheath Tunicate (Botrylloides violaceus),
Barnstable Harbor*

A Note from The Helm

We are moving into fall as I write this letter, but like everyone, I have fond memories from the summer of 2018. After a very wet spring, summer was warm and dry. These conditions allowed our waters to be a bit clearer than they have been the last few years. Many people remarked on the “improved” conditions.

Natural variability will give us good years and bad years. However, we cannot let our guard down. We must work toward improving our overall water quality by limiting the input of chemicals, nutrients like nitrogen and phosphorus, pharmaceuticals and other contaminants into our waters. Sadly, we are on track for more algal blooms and worse as our water quality continues to deteriorate. We are initiating a new *Quarterly Data Update* with this newsletter, so you can see the results of the water monitoring work we are performing on your behalf.

The importance of the “baseline” monitoring work cannot be underestimated. In fact, we still have more work to be done to ensure a substantial record of the existing conditions in our estuaries, ponds, rivers and aquifer. This information will become vital as we design and implement interventions to remove nutrients and other contaminants. We need to be able to prove the relative impact of these interventions, so we can deploy those that are successful on a wider scale. Only then will we be able to see community-wide improvement like they have seen in the Charles River and Boston Harbor.

In this edition of the Coalition Quarterly, we discuss an important part of our monitoring work: “Invasives.” In addition to water quality, we also look at the living world around our freshwater and marine ecosystems. An example is our work for the Marine Invader Monitoring and Information Collaborative (MIMIC), a state-run program that tracks marine invasive species and their distribution in our waters. Some species, like *Phragmites sp.*, take advantage of our deteriorating water quality to establish themselves, while others just hitch a ride in the bilge water of big boats and then find that the local habitat is very welcoming with few natural predators. Read on to learn more!



Education is one of our primary missions and I am pleased to highlight an important donation that will further this effort. Pictured below is one of the last Monomoy Surf Rescue Boats. These boats were launched from the beach into the surf, then rowed and sailed offshore through heavy seas to rescue people from ships that had run aground or were in distress. This boat has been an inspiration to me and to this organization. It is fitting that we received this donation, as we consider our work a “Rescue Mission” for clean water. We intend to utilize this boat to educate and motivate others in the community to join us in our fight for clean water. This boat provides a great reminder of the kind of blood, sweat and tears rescue missions demand!

A handwritten signature in black ink, appearing to read "Zee".

Zenas “Zee” Crocker
Executive Director



The Tompkins Family generously donated this boat to BCWC in memory of Hugh Tompkins.

Summer Fun in Support of Clean Water

From our inaugural Clean Water Challenge Golf Tournament to our 8th Annual Paddle for the Bays: RACE Cape Cod, participants and spectators came out in support of BCWC’s work for clean water at our summer fundraisers.

Clean Water Challenge Golf Tournament



Forty-four golfers teed off on a lovely, late August day at the Oyster Harbors Club in Osterville. The morning round of golf was followed by a luncheon and brief presentation by BCWC Executive Director Zee Crocker. Our first tournament was such a success that we look forward to next year’s Clean Water Challenge.



Paddle for the Bays: RACE Cape Cod



Under sunny skies and calm conditions, over 90 paddlers took to the bays in the race for clean water. From individual racers to costumed relay teams, volunteers to spectators, everyone enjoyed the festivities that included a beach-side barbeque, live music, prizes and games.



Thank you to our sponsors, golfers, racers, volunteers and spectators for helping us raise funds and awareness for clean water in Barnstable.

To view more photos from these events, visit our website at BCleanWater.org.

Aliens Among Us: Invasive Species in Our Waters

By Stephen McCloskey

They can be icky, unsightly or downright adorable. And they are already living in our local aquatic habitats. So, what are invasive species? An alien, exotic or non-indigenous species all describe the same thing - meaning non-native. Non-native species are introduced to new environments mainly from anthropogenic (man-made) sources. These range from accidental introduction (zebra mussels transported in ballast water); to specific purpose introduction (to help combat a native pest); to importation of exotic animals for pets (Burmese python in Florida); to the importation of plants for aquarium and water garden décor. A non-native species only becomes invasive if its presence and/or interaction within the native ecosystem negatively alters the structure and function of that ecosystem.

Invasive species possess the ability to infiltrate and thrive in ecosystems outside their native range. This ability disturbs the already established network of checks and balances between native plant and animal communities, and creates new competition for resources, such as space and food. In turn, this disturbance can diminish native plant and animal populations, sometimes to the point of extinction. This stems from the invasive species functioning as a predator in the ecosystem, acting as a vector for new diseases and parasites to be introduced, and expanding its population rapidly, thereby limiting resource availability for native populations.

Cape Cod's established Blue Economy, operating throughout 559 miles of coastline, makes the Cape prime for the introduction of non-native and potentially invasive species into local marine and terrestrial ecosystems. In 2017, the Blue Economy Project estimated that there were 1,872 maritime businesses operating on Cape Cod that employ 20,530 people generating 1.4 billion dollars of gross revenue back into the local economy. The well-being of this economy and its extended influences into other local economies relies on the well-being and continued production of Cape Cod's unique ecosystems.

As invasive species can negatively influence ecosystems and connected local economies, it is both relevant and necessary to examine invasive species that pose a threat to our aquatic and terrestrial habitats. BCWC has been an active member of the Massachusetts Coastal Zone

Management's Marine Invader Monitoring & Invasive Collaborative (MIMIC), by monitoring and collecting data on marine invasive species at various locations throughout the town of Barnstable. This data can help scientists develop methods to combat the negative impacts of invasive species.

Let's look more closely at a few invasive species that we have seen in our waters.

Common Reed (*Phragmites australis*)

One invasive species found throughout Barnstable County is the Common Reed (*Phragmites australis*). Although a subspecies of *Phragmites* is native to parts of North America, another one originating in Eurasia is classified as invasive in Massachusetts. This *Phragmites* has established a significant presence on Cape Cod and can thrive in both fresh and brackish waters, especially those with high nutrients loads. It is a perennial grass that grows along kettle ponds, bogs, tidally-restricted marshes and other wetlands. *Phragmites* spreads rapidly at a rate of 15 feet per year horizontally, establishing a dense and impenetrable root system in deeper waters or as floating mats. The problem with the structure and density of this root system is that it reduces water flow, which in turn reduces the flood retention capabilities of wetlands. In addition, *Phragmites* can grow 15 feet tall, shading out native plants and ultimately diminishing native species diversity. This reduction results in a decrease in food source availability for native animals that rely on the diversity of native plants for their survival.



Hydrilla (*Hydrilla verticillata*)

Hydrilla is another common invasive species that has invaded our local waterways on Cape Cod. Originally found in Africa and Southeast Asia, it is commonly thought that *Hydrilla* was brought to the U.S. for use as an aquarium plant back in the 1950s. Since then, this submerged aquatic plant has made its way into lakes, ponds, rivers, and tidal zones. *Hydrilla* grows aggressively at a rate of up to one inch per day and is not adversely affected by poor water quality. It can grow in both oligotrophic (low nutrient levels) and eutrophic (high nutrients levels) aquatic habitats, and up to depths ranging from three to fifteen meters below the water's surface as it does not need significant amounts of sunlight to survive. As this invasive species expands and grows denser along the surface of the water, *Hydrilla* decreases water flow and blocks sunlight from reaching submerged, native aquatic plants. In addition, reduced water flow hampers overall water supply/distribution, drainage, irrigation, and recreational use of the body of water it is impacting.



Codium (*Codium fragile* ssp.)

More commonly referred to as Deadman's Fingers or Green Fleece due to its appearance and texture, *Codium* is most likely washing up on or covering a beach near you. Originally native to Japan, this invasive seaweed arrived on the eastern shores of North America via Europe in the mid-20th century. *Codium* thrives in a wide range of light and nutrient conditions, water salinity and temperature. It grows especially well on hard substrates, including pilings, rocks and shells. *Codium's* nickname the "oyster thief" is a result of this buoyant seaweed's ability to attach to oysters (and other shellfish) and transport them away by wave action. *Codium* also disrupts shellfish productivity by overgrowing and smothering shellfish beds, thus threatening Cape Cod's thriving aquaculture industry. Excess nitrogen entering our coastal waters has increased the presence of *Codium* along our shorelines tremendously. Increased nitrogen levels, mainly from septic systems and to a lesser degree from stormwater runoff and fertilizer, correlates directly to increased amounts of *Codium* in shallow coastal waters, where it has outcompeted environmentally important native plants such as eelgrass.



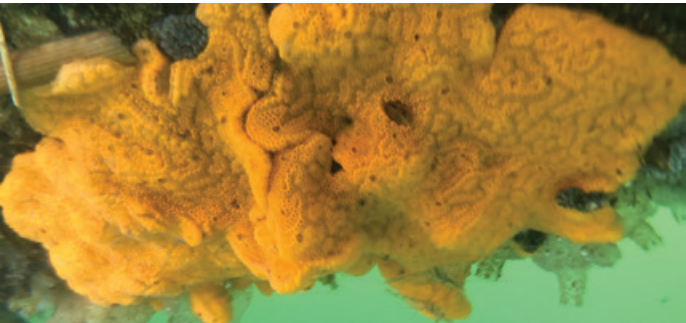
Asian Shore Crab (*Hemigrapsus sanguineus*)

Visitors to Cape Cod beaches like to flip rocks over in search of crabs and other marine organisms. One of the most common crabs now found on our beaches is the Asian Shore Crab. More than likely transported from the western Pacific to the U.S. in ballast water from ships, this invasive crab competes directly with native species like blue, purple marsh and fiddler crabs for space and food. Asian Shore Crabs not only survive in a wide variety of environmental conditions, but they reproduce rapidly and have a voracious appetite. An opportunistic predator in shallow tidal habitats, Asian Shore Crabs eat blue mussels, common periwinkles, other crabs, juvenile fish, barnacles and saltmarsh grasses. The problem with this added predation is that blue mussels and common periwinkles play a vital role in mitigating the abundance and density of algal communities, which are becoming more common on the Cape due to warmer water temperatures and increased nitrogen levels in the water.



Orange Sheath Tunicate (*Botrylloides violaceus*)

Most of the docks that BCWC staff monitored this summer, as part of the MIMIC program, contained copious amounts of *Botrylloides violaceus*. Vessels or shellfish more than likely brought this colorful, colonial tunicate from its native Siberian and Asian roots to the U. S., where it has established populations on the east coast from Florida to Maine. *Botrylloides* grows and spreads rapidly, engulfing non-moving organisms such as barnacles and mussels, as well as other tunicates. In addition, it grows on a wide range of surfaces including docks, boat hulls, ropes, tires, seaweeds and rocks, and fouls commercial aquaculture equipment. *Botrylloides* filter feeds on phytoplankton and zooplankton and outcompetes other filter feeders, such as commercially important shellfish, for food and space.



Field Notes from Meg

Our second summer as Barnstable Clean Water Coalition proved to be our busiest yet. We expanded our monitoring programs to encompass not just the compromised Three Bays watershed, but the entire town of Barnstable. BCWC's exceptional seasonal staff and volunteers supported this broadened effort.

SMAST/CCS Estuarine Sampling

For over 20 years, we have worked with the University of Massachusetts-Dartmouth's School for Marine Science and Technology (SMAST), which is part of the larger Massachusetts Estuaries Project (MEP), on water quality sampling throughout the Three Bays estuary. Four times during the summer, BCWC collects water samples at 13 stations that are tested for nitrogen, as well as other impactful nutrients like phosphorous, chlorine and potassium. We also record turbidity, temperature, dissolved oxygen, and total depth along with visual observations at each location. The last sampling date in mid-August revealed record-low dissolved oxygen readings for all estuarine stations. In addition to working with SMAST, BCWC has participated in the Center for Coastal Studies (CCS) Water Quality Monitoring Program since 2014. From May through late October, BCWC assists in the collection of data from five stations in the Three Bays estuary. This data includes temperature, salinity, turbidity, and water samples that are analyzed for a wide variety of nutrients.



PALS

Cape Cod Commission has worked with towns and community organizations since 2000 to coordinate the Cape Cod Pond and Lake Stewardship (PALS) program, a monitoring program that provides a snapshot of freshwater lake and pond water quality. BCWC staff and volunteers collect water samples and data from lakes and ponds in Barnstable during a one-month period from mid-August to mid-September. From the deepest part of each pond/lake, we record water depth, turbidity, dissolved oxygen, temperature, and collect water samples. Samples are taken to the Coastal Systems Program lab at SMAST, where they are analyzed for total phosphorus, total nitrogen, chlorophyll a, and pH. This year, BCWC monitored 31 ponds and lakes, eight more than in 2017! Due to the extremely wet spring, the pond and lake water levels were considerably higher than in past years. We observed more plant growth than usual on ponds, such as the abundance of water lilies and sages found on Red Lily in Centerville. In addition, cyanobacteria, which can carry harmful toxins, was found in two of the ponds BCWC sampled, Hinckley Pond in West Barnstable and Schoolhouse Pond in Hyannisport.



MIMIC

The 2018 Marine Invader Monitoring and Information Collaborative (MIMIC) season was busy with the addition of two new monitoring stations on Hyannis Harbor. We now monitor for marine invasive species at seven locations throughout the town of Barnstable. Our two new Hyannis Harbor sites contained numerous invasive species, including the Striped Sea Anemone (*Diadumene lineata*), which we have not seen at other sites until this year. The most commonly observed species at all seven sites were the Star Tunicate (*Botryllus schlosseri*) and the Sheath Tunicate (*Botrylloides violaceus*). Both tunicates were found growing on docks, lines, buoys and boat hulls.



Dead Neck Sampson's Island Birds

This summer was disappointing and discouraging for the Piping Plover (*Charadrius melodus*) and Least Tern (*Sterna antillarum*) populations that nest on Dead Neck Sampson's Island. Between predators and extreme high tides, the eight Piping Plover pairs observed on the island had a hard time building scrapings (nests) and producing a clutch of eggs. Only one plover chick survived to fully fledge. American crows were the main threat to chicks. The Least Terns didn't yield any nests, due to the high tides washing the scrapings away. We are hoping for a more successful summer next year, especially with the dredge spoils that will help create more nesting habitat for these shorebirds.



Marstons Mills River Watershed

Every week, BCWC collects streamflow measurements and water samples from the Marstons Mills River with the help of volunteers, seasonal staff, and now an AmeriCorps Member. We record water velocity at 10 stations, starting up in the Hamblin bogs and down to the mouth of the river. We also collect water samples to test for Nitrates and TKN (Total Kjeldahl Nitrogen, or total concentration of organic ammonia and nitrogen). With this data, we can calculate the total load of nitrogen moving through the river per day and how much nitrogen is entering the Three Bays estuary. This baseline data also reveals seasonal trends in nitrogen levels relating to precipitation, thus allowing us to pinpoint specific areas along the river that contribute nitrogen to the overall system.



Hyannis Oyster Upweller

BCWC staff spent many hours this summer at Gateway Marina tending to the 50,000 seed oysters that were placed in the newly built and installed upweller tank in late July. The oysters grew quickly in their buckets from the warm, nutrient-rich water pumped into the tank from Hyannis Harbor. The buckets of oysters had to be cleaned and sorted frequently as they grew. BCWC staff did double duty at the upweller, not only caring for the oysters, but educating the public about oysters and water quality. On September 11th, staff from the Barnstable Department of Natural Resources placed the oysters in Cotuit Bay, where they will mature and improve water quality in our local bays.





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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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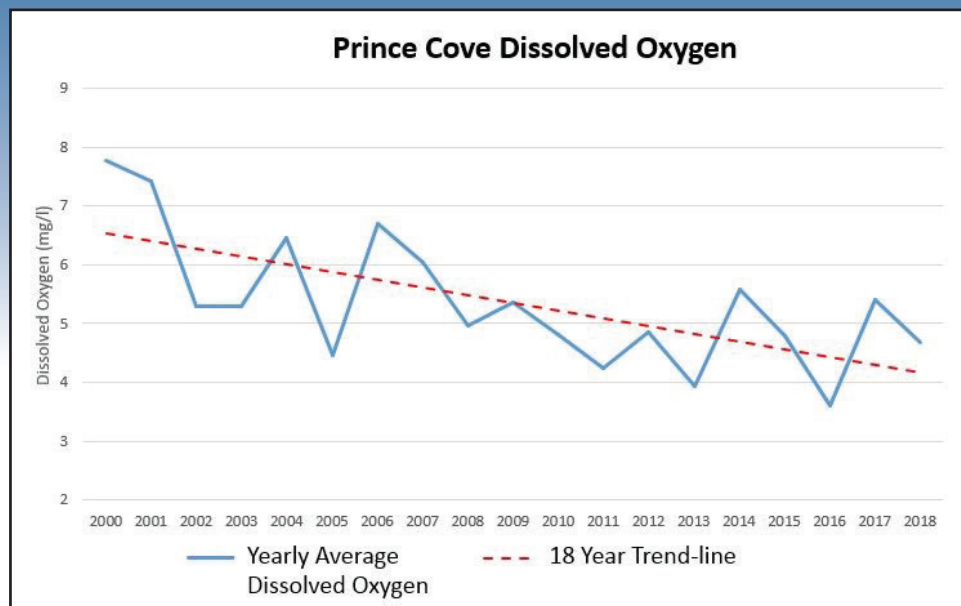
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New! Quarterly Data Update

This graph illustrates the annual dissolved oxygen levels from water samples collected in Prince Cove (Marstons Mills) since 2000. Dissolved oxygen is necessary for aquatic plants and animals to survive. Decreasing dissolved oxygen levels are an indicator of declining water quality, which in Prince Cove is most likely caused by high levels of nitrogen.



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