

Summer is for science!

Summer 2021 Issue
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Harborwalk? Science Walk!

Make your way to [Martin's Park in Boston](#), where you'll find a series of family-friendly posters describing restoration, monitoring, and research supported by MassBays. Learn about horseshoe crab monitoring, the best designs for marsh-friendly docks and piers, where the herring go when they swim upstream, why we should care about seagrass... all while strolling the harborwalk! The posters will be in Boston until July 28th, and will travel around the bays from there. Can't wait to see them in person? They're also [online](#).



Summer fun & safety

Join #MassWrack to help MassBays find out what's living on the beach! #MassWrack uses [iNaturalist](#) -- just download the app and start taking pictures of the bugs, birds, and seaweeds that rely on this important habitat.

Great River Race, both virtual (July 24-August 6) and in real life (August 7), hosts paddlers traveling down the North River from Marshfield to Hanover. Register by August 6th.

Cyanobacteria monitoring in Cape Cod's lakes and ponds is underway this summer, led by the Association to Preserve Cape Cod. Learn more and sign up for pond-

In the News: Coastal & Ocean Acidification

For several years shellfishers and aquaculturists have reported changes in shell thickness and growth rates, a symptom of coastal acidification and a real concern for this important coastal industry. In 2018 the state legislature formed a special Commission to investigate the Commonwealth's preparedness for coastal and ocean acidification and its impacts on commercially harvested species. MassBays contributed significantly to the effort: South Shore Regional Coordinator Sara Grady was a member of the Commission and two working groups, Lower North Shore Regional Coordinator Barbara Warren presented at a hearing for the full Commission, MassBays Staff Scientist Prassede Vella helped to assemble technical information to support the Commission's work, and MassBays' funding and research contributions are documented in the final report.



The [Commission's report](#) concludes with nine recommendations, including three that align with MassBays' own priorities:

1. Establish a broad, sensitive ocean acidification monitoring system.
2. Conduct studies to understand the effects of ocean acidification, for example to characterize the impacts on shellfish and limit stressors that contribute to acidification.
3. Educate the public about ocean acidification and the health of coastal waters.

Several news outlets took up the Commission's report when it was released in February of this year; MassBays continues to push ahead on these critical actions as we await the results of the legislature's attention to the issue. For example, the poster at the bottom of this newsletter is one of two focused on coastal acidification as part of MassBays' Science Walk.

Raising the bar on Environmental Justice

On June 24th, EEA published an updated definition of environmental justice (EJ) populations in an updated [EJ Policy](#). The associated [EJ maps viewer](#) pinpoints neighborhoods that meet criteria regarding income, minority status, and English isolation (or a combination of these). MassBays has tied its own goals to this definition, and is committed to providing improved access to decision making processes for these communities. Be sure to reach

specific alerts on their [cyanobacteria webpage](#).

out to MassBays staff and regional coordinators for help through the contact links below.

Coastal acidification affects us all; monitoring helps us understand how to best respond

OCEAN ACIDIFICATION

CO₂ + H₂O → H₂CO₃ → HCO₃⁻ + H⁺

Increased CO₂ in the atmosphere leads to increased CO₂ in the ocean. This causes the ocean to become more acidic, which can harm marine life.

Acidification of coastal waters impacts the entire food web by interfering with growth, reproduction, metabolism, and survival. Some species like shellfish are directly affected. Other species are indirectly affected because they eat or live in habitats created by directly impacted species.

Because acidification is reducing the availability of carbonate ions, animals that form shells, such as oysters and clams are some of the most vulnerable species.

Shellfishing is a way of life on Cape Cod

On Cape Cod, there are 205 shellfish growers working on more than 600 acres of habitat. In 2016 they harvested:

- > 26 million Oysters valued at > \$14.5M
- > 3.7 million Quahogs valued at about \$1M... and are increasing each year.

Why It Matters

- Ecology:** Many marine species and ecosystems are threatened by the rapidly increasing acidity of our coastal waters.
- Economy:** The shellfish industry in the U.S. is projected to lose more than \$400 million annually by 2100 as a result of ocean acidification.

What You Can Do

Although our actions have accelerated ocean acidification, there are things we can do to slow down the process both individually, and through supporting legislation, for example by:

- Using and creating energy more efficiently so less CO₂ is emitted into the atmosphere.
- Reducing nutrient pollution to our coastal waters.
- Protecting marine habitats and wildlife so that the ocean is more resilient.
- Supporting research and monitoring efforts addressing ocean acidification.

Understanding coastal acidification through monitoring in Cape Cod waters

With funding from Mass Bays, the Center for Coastal Studies added acidification monitoring into its long-term water quality monitoring program, which includes sites around the Cape and islands.

Eutrophication is the process by which a body of water becomes enriched in nutrients, especially phosphates and nitrates, that promote excessive algae growth, leading to increased organic material and decreased oxygen.

Eutrophication contributes to coastal acidification and is impacting shellfish, but how much? Our monitoring will help us understand where to take action.

Increased nitrogen levels and decreased oxygen concentrations, both indicators of eutrophication, are correlated with decreased availability of calcium carbonate (CaCO₃) which makes it harder for shellfish to form shells.

Tracking acidification in Cape Cod Bay

With funding under MassBays' [Healthy Estuaries Grant program](#), the Center for Coastal Studies is collecting new data from Duxbury to Provincetown. With information about pH and total alkalinity, we will have a better idea about the availability of calcium carbonate for shell-building. Click on the image above to see their poster on MassBays' website, visit [CCS' website](#) for more about their monitoring program, and watch [this video](#) (produced by the [Northeast Coastal Acidification Network](#)) to learn more about the how and why of coastal acidification in the Gulf of Maine.

Regional Coordinators & Staff

Upper North Shore:

[Peter Phippen](#) and [Jennifer Hughes](#), [Merrimack Valley Planning Commission](#)

Lower North Shore:

[Barbara Warren](#), [Salem Sound Coastwatch](#)

Metropolitan Boston:

[Torrie Hanley](#), [Northeastern University Marine Science Center](#)

South Shore:

[Sara Grady](#), [North and South Rivers Watershed Association](#)

Cape Cod:

[Jo Ann Muramoto](#), [Association to Preserve Cape Cod](#)

Boston-based staff:

[Pam DiBona](#), Director
[Prassede Vella](#), Staff Scientist
[Jill Carr](#), Coastal Data Scientist

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The Massachusetts Bays National Estuary Partnership is a cooperative venture of the Massachusetts Executive Office of Energy and Environmental Affairs, the Massachusetts Office of Coastal Zone Management, and the U.S. Environmental Protection Agency.

- [Commonwealth of Massachusetts](#) - Charlie Baker, Governor; Karyn E. Polito, Lieutenant Governor
- [Executive Office of Energy and Environmental Affairs](#) - Kathleen A. Theoharides, Secretary
- [Office of Coastal Zone Management](#) - Lisa Berry Engler, Director
- [Massachusetts Bays National Estuary Partnership](#) - Pam DiBona, Executive Director

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