

Cyanobacteria in some Cape Cod waters can make you sick. What you need to know.

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As Rebecca Miller waded into Mashpee's Santuit Pond, mesh plankton net in hand, a vacationing couple walking a pair of dogs was retreating from the shoreline.

Like Miller, Matt Eastman and Alexis Parr are biologists, so they knew the importance of pulling the dogs back when they approached the pond's gently lapping waters.

"Benni just tried to drink the water and I made sure to tell him not to," Eastman said of the couple's schnauzer mix. "I heard on the local news in Connecticut that with all the rain there are high bacteria levels."

Eastman's instinct was spot-on.

Miller, lab manager for the Association to Preserve Cape Cod's cyanobacteria monitoring program, was wading through Santuit Pond that sunny July morning because the 172-acre body of freshwater has suffered from chronic blooms of potentially toxic blue-green algae over the past few years. The mesh net Miller towed across the water's surface would catch the cyanobacteria that she would later analyze under a microscope at APCC's lab.



Miller and her team had already alerted Mashpee's health department that the pond's ongoing cyanobacteria problem had returned. A paper sign posted on a tree in the pond's gravel parking lot warned people and pets to stay out of the water.

Certain cyanobacteria can be harmful to humans and deadly for dogs.

Changing plans: Cyanobacteria in ponds cancels annual Mashpee Wampanoag Tribe powwow race

In humans, cyanobacteria exposure can result in nausea, vomiting, diarrhea and liver problems, as well as conjunctivitis, earaches, swollen lips, headaches, sore throats and sometimes atypical pneumonia or a hay fever-like syndrome, according to the Centers for Disease Control.

The effects are more serious in animals, for which cyanobacteria exposure can cause foaming at the mouth, lethargy and neurological symptoms, including stumbling, behavior changes, twitching, tremors and respiratory paralysis.

Cyanobacteria exposure has caused death in fish, dogs, cattle and birds, according to the CDC.

“I was just on a call with someone in Falmouth who said that their dog died from cyanobacteria exposure last year,” said Kevin Johnson, manager of APCC’s cyanobacteria monitoring program. “For visitors especially, it might happen without them ever knowing that this was the cause.”

Quality freshwater on Cape Cod is a big priority

Cyanobacteria, the first photosynthetic organisms on Earth, occur naturally in the environment. Certain types in certain quantities are normal.

But over the past several years, scientists have begun sounding the alarm about the growing threat posed by toxic blooms of the algae, which are thriving because of the warming climate and the effects of development on the nutrients present in water bodies such as Santuit Pond.

Don't go in the water: Santuit and Ashumet ponds closed to swimming due to toxic blue-green algae blooms

Local governments are taking note, in part because of the potentially devastating effects of worsening water quality on the region's economy.

After a recent presentation by Cape Cod Commission Executive Director Kristy Senatori about the agency’s work to address the degrading water quality of the region’s 996 freshwater ponds and lakes, County Commissioner Mark Forest offered the assistance of the Barnstable County government.

Freshwater quality on Cape Cod, Forest said, is a priority for the Barnstable County Board of Regional Commissioners.

“The conditions are going in the wrong direction generally, and so the public is paying very, very close attention to this problem and is very much looking to

the county to play a role in coming up with the game plan on how to restore the health of our ponds and our waterways,” Forest said.

Cyanobacteria ‘a bigger and more prevalent problem than we anticipated’

Most of what is known about the Cape’s cyanobacteria problem comes from APCC’s cyanobacteria monitoring program and its researchers, including cyanobacteria scientists James Haney and Nancy Leland.

The program, which launched in 2017 to fill a gap in the ability of state and town governments to keep an eye on the public health threat, has expanded rapidly, a reflection of the scale of the problem locally.

‘It’s totally gone’: Mashpee’s water quality at an all-time low, report finds

In its first year, the program had a budget of \$50,000. This year, the budget rose to roughly \$220,000. *(Gannett, owner of the Cape Cod Times, through its foundation awarded \$15,000 to the APCC program in 2020. APCC has no influence in the conception or content in this article.)*

That increase in funding has allowed APCC to triple the number of ponds tested for cyanobacteria from last year to about 150. And for the first time, the organization is now monitoring ponds in every town on Cape Cod biweekly.



APCC Executive Director Andrew Gottlieb said that expanded monitoring has only confirmed the severity of the cyanobacteria problem.

"We're finding it at greater concentrations than we thought we might, and we're finding it for a greater portion of the year than we had thought we might," he said. "All told, it's a bigger and more prevalent problem than we anticipated."

Climate change contributes to cyanobacteria blooms

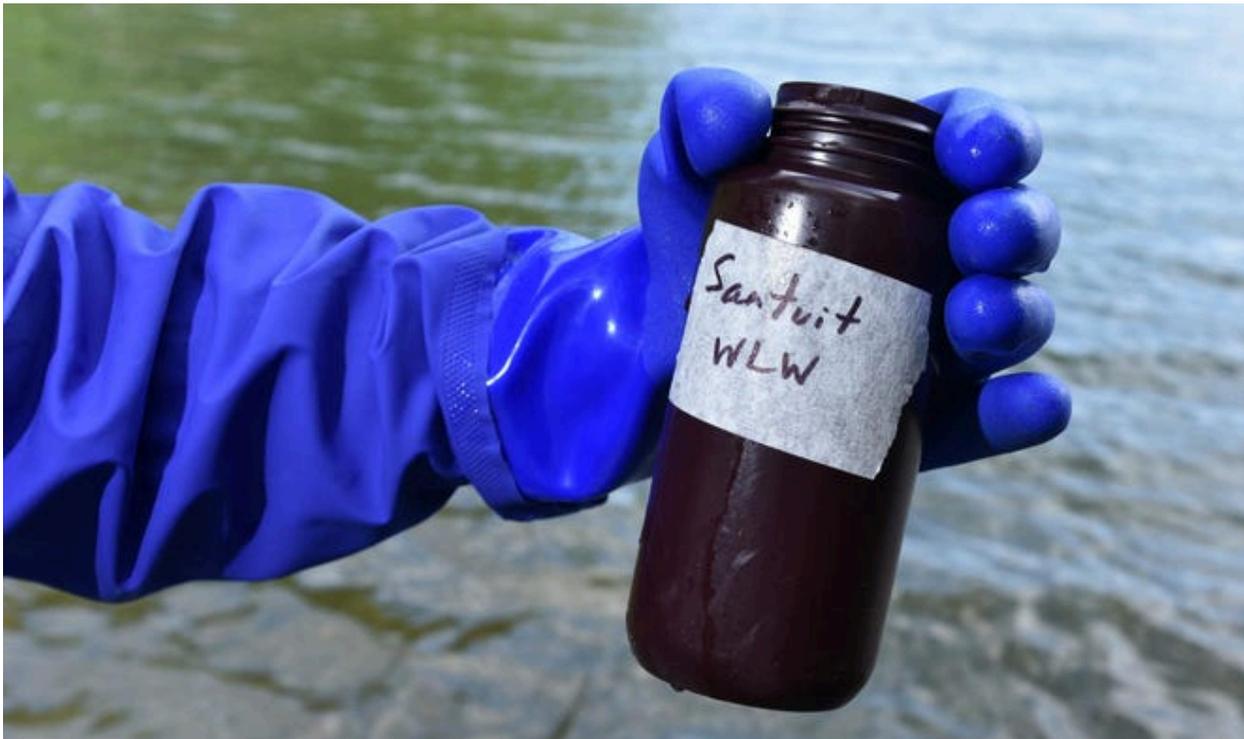
Warming global temperatures are one of the primary drivers of the cyanobacteria problem, experts said.

"If it's getting warmer and the growing season is longer, that provides a bigger window of opportunity for the cyanobacteria to expand," said Dr. Hans Paerl, a professor of marine and environmental sciences at the University of North Carolina at Chapel Hill. "Cyanobacteria, like the movie, like it hot."

In court: Conservation Law Foundation sues Barnstable, Masphee and state over wastewater cleanup

Cape Cod's annual average temperature currently stands at 49.9 degrees, but by mid-century, that number is expected to rise as high as 54.5 degrees, according to a new report about climate change from the Cape Cod Commission. And by the end of the century, the region's average annual temperature could shoot up to 58.1 degrees, according to the report.

Climate change-related temperature increases will also push average winter temperatures above freezing, the report authors warned, "leading to widespread ecological changes."



Johnson and the APCC team stopped monitoring the chronic cyanobacteria bloom at Santuit Pond on Christmas Eve last year, but even then, the bloom was still going strong.

"The town was continuing to check up on it, and I think they said it finally broke in February," Johnson said.

That's later in the season than he ever expected for a cyanobacteria bloom to survive.

"I didn't think these went past December," said Johnson, who first learned to swim in the ponds he now monitors for potentially toxic cyanobacteria blooms.

30 years of Baywatchers:Meet the volunteers helping to monitor Buzzards Bay

Santuit was closed to swimming last month due to the presence of cyanobacteria.

Climate change will also bring more extreme storms and more extreme droughts to the region, which, in combination, lead to more severe blooms of cyanobacteria.

"The storm events often lead to big releases of nutrients (such as nitrogen) and freshening of the waters downstream, and if that's followed by a drought, then you have kind of the perfect storm scenario," Paerl said.

Reducing nutrient loads key to controlling cyanobacteria

The second factor worsening the cyanobacteria problem is the addition of nitrogen and phosphorous — cyanobacteria's food sources — to water bodies.

On Cape Cod, 85% of buildings rely exclusively on on-site septic systems for wastewater treatment and disposal.

"Septic systems do nothing to reduce phosphorus or nitrogen loads coming from human waste, and are major contributors to the eutrophication of our water resources," Gottlieb said.

Research has shown the Cape's septic systems cause 85% of the nitrogen pollution plaguing the area's marine environment, but Gottlieb said more research is needed to determine the scale of the impact that septic systems have on freshwater pollution locally.

While treatments that can kill cyanobacteria blooms do exist, Paerl described investing in those temporary fixes as akin to "throwing money down a rat hole."

Toxins: Did you live in Hyannis after 2006? PFAS researchers need your help

"They might kill the bloom, but they don't solve the long-term problem because they're not reducing the nutrient inputs," he said. "You're better off spending at least a significant part of your treatment money on reducing nutrients."

For decades, Cape town officials have debated wastewater infrastructure overhauls, and some towns are finally moving forward with the massively expensive projects.

Last spring, town meeting voters in Mashpee unanimously approved spending \$54 million to pay for the first phase of a wastewater plan that would support installing sewers.

Local governments are searching for ways to offset the cost of connecting to sewer lines for homeowners, which can sometimes cost thousands of dollars. For example, Barnstable County's septic loan program provides low-interest loans for homeowners who can't afford to replace failing septic systems.

Mashpee is also trying to limit other nutrient sources that can exacerbate cyanobacteria blooms.

This month, after board of selectmen approval, Mashpee Town Manager Rodney Collins sent a letter to property owners urging them to stop applying

fertilizer — another source of the nutrients that feed cyanobacteria — to lawns and landscaped areas.

The letter acknowledged that eliminating fertilizer use would not fully cure the problem of degrading water quality.

“This action will buy us time to develop and implement more permanent solutions to the water quality problems we face,” the letter stated.

Cape Cod Commission's freshwater initiative underway

The Cape Cod Commission’s freshwater initiative will likely play a large role in identifying those more permanent solutions.

The team working on the initiative will assess key drivers of freshwater degradation on the Cape, and then build a database of pond-specific strategies to reduce nutrients from entering freshwater, Cape Cod Commission Deputy Director Erin Perry said.

Those strategies could include replacing additional septic systems with sewer hook-ups or alternative septic systems shown to reduce nutrient output.

A Cape Cod Commission study of the area’s coastal resources called the 208 Plan, last updated in 2015, identified septic systems that towns should prioritize for replacement because of their effects on local marine environments, but that study did not examine which septic systems are contributing most to the degradation of freshwater ponds and lakes.

With that information, towns could better target septic replacements to have the greatest impact on all-around water quality.

Army of volunteers, organizations keep sampling going

In the meantime, the team at APCC will continue the cyanobacteria monitoring program, which is only able to sample the number of ponds that it does with the help of an army of roughly 100 volunteers from local pond associations across Cape Cod.

County staff working on the fecal bacteria monitoring program also contribute samples to the effort, as does staff with the town of Barnstable.

Still, even with its largest sample size yet, the program is only monitoring about 15% of the Cape's ponds and lakes for cyanobacteria.



Staff said more resources would mean that APCC could hire more people to monitor more ponds for longer periods of time.

More resources would also allow the group to conduct more toxin tests — currently used sparingly because of the cost per test — and more

research on the cascading effects of cyanobacteria blooms on the food chain and in the environment.

Monitoring for cyanobacteria important for public safety

The monitoring program is already proving to be a valuable service to Cape Cod's towns. Right now, the analyses done by APCC are the most cost-effective means by which town health agents can learn that a local pond has a potentially toxic cyanobacteria bloom.

Miller said one of the worst blooms she's seen this year is in Harwich's West Reservoir, which is now marked by signs that say, "CAUTION: Potential Toxic Algae Bloom. For Your Own Safety and Your Pet's Safety, Please Stay Out of the Water."



Catherine Cunio has been vacationing in Harwich since 1983. She owns a home there with her sister, and last week, she took her young sons down to the reservoir's edge to hunt for critters.

"I've never seen it like this," she said of the pond's greenish hue as her sons examined a frog they'd just caught in a net. "Normally there are people fishing here, but not today."

Cunio, who noted that her septic system needs to be replaced, said she had just been warned by a passerby that the pond was polluted.

Still clutching the net containing the frog, her son Henry looked out on the reservoir.

"I would never go in this water," he said.

HOW TO HELP:

People interested in volunteering to help APCC monitor Cape Cod ponds and lakes for cyanobacteria should apply on the group's website: www.apcc.org/get-involved/volunteer/

Another way to help is by forming a new pond association. A guide explaining how to do that is [available on APCC's website](#).

"Some of the real power in numbers comes from having active pond associations," Andrew Gottlieb, executive director of the Association to Preserve Cape Cod, said. "Start your own pond association, get in touch with us, and then we can get engaged on a more formal basis going forward."