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Cyanobacteria A Growing Problem For Cape Ponds

by Rich Eldred

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A cyanobacteria bloom identified in Harwich's West Reservoir. APCC PHOTO

BREWSTER – Cape Cod is famous for salt water beaches, but there are over 890 ponds and lakes on the Cape. Unfortunately, that fresh water isn't always clean and safe.

Cyanobacteria are naturally occurring organisms prevalent in both salt and freshwater, and some species can exude toxic compounds making swimming risky.

Currently there is a cyanobacteria advisory for Upper and Lower Mill Ponds in Brewster. Levels of the bacteria are declining, but to be cautious, the health department is advising people and especially pets to avoid contact.

The Association to Preserve Cape Cod and Barnstable County have combined to monitor cyanobacteria blooms on Cape for a number of years. The APCC now oversees the collection of water samples from 145 sites at 134 ponds.

In addition to the two ponds in Brewster, the APCC has recommended restrictions at the West Reservoir in Harwich, which has a pond scum dominated by dolichospermum species.

The APCC is looking for two specific types of cyanobacteria in its tests. Microcystis colonial forms are frequent components of toxic algal blooms. They can produce a hepatotoxin (liver) formed from 10 amino acid residues. Symptoms can include pallor, convulsions and death.

They're also testing for dolichospermum, which also produces hepatotoxins, derma (skin) toxins and neurotoxins. Sometimes people develop a skin rash.

"There can be a cyanobacteria bloom and it not be toxic," said Dr. Julie Hambrook Berkman, project director for the APCC's Pond and Cyanobacteria programs. "The microcystin toxin is a liver toxin so if dogs drink the water they can be sickened."

On Cape Cod pets are most likely to be affected by toxins when they lap up water and splash around in ponds.

Hambrook-Berkman noted that there was a case in Brazil where 16 people died from ingesting microcystin while on dialysis from contaminated water.

“It has to be ingested,” she said. “So it isn’t a problem unless you drink quite a bit. But dogs like to drink pond water. There are cases of dogs getting sick and some also died.”

Another concern is anatoxin from dolichospermum.

“That’s a neurotoxin,” she said. “Very bad business. If it is present in sufficient quantities it binds in the blood and as a result you don’t get enough oxygen. For anatoxin there is no antidote. It is not a stable toxin.”

But the toxin does degrade in the sunlight, she said. That’s good because as the day progresses the toxin can disappear from the water. However, that makes it difficult to test for. The actual tests are done in the Barnstable County lab. The county can only test for anatoxin monthly due to the cost. This year the APCC is conducting a pilot study to test anatoxin sampling and analysis. Since it breaks down in the sunlight ,samples are only taken in the morning with a preservative added if there is a potential for concern. That’s determined by calculating a pigment value for the sample.

“We collect samples of scum and look at them under the microscope to see the dominant species. Then it is frozen and defrosted to look at the fluorescence of the pigments,” Hambropok Berkman said. “So we collect, look at the algae and each species that is there and do the fluorometry and then put together a report, make an assessment and send that to the Massachusetts Department of Health and send a sample to the lab in Barnstable. When they get the result they send it to us and the town where the pond is in.”

Much of the collecting work is done by volunteers, often members of pond associations.

In Brewster, 20 ponds are monitored by the Brewster ponds Coalition. Six are sampled every two weeks in Chatham by the Friends of Chatham Waterways, one monthly and two to evaluate for funding for next year. Ten are sampled in Harwich and seven in Orleans by the Orleans Pond Coalition. Some ponds, like Baker’s Pond, are sampled by two towns (Orleans and Brewster). Twenty-eight ponds in Barnstable are sampled while in Dennis just four are monitored.

“About half [of the samples] are collected by volunteers,” Hambrook Berkman said. “The other half are by interns and staff. They stand in the water next to the shore, get the temperature, field conditions, get a net sample and a whole lake sample (with an integration tube of PVC that integrates the whole water column). The toxin sample is in an amber glass, you put your arm into the water two feet down, then you’ve got to freeze the bottle for the anatoxin sample, put the preservative in and take a scum sample (if there is a scum).“

Fifty years ago scientists didn’t talk about cyanobacteria; they were classed as blue-green algae. But even then they were considered more closely related to bacteria as they lack a nucleus or other cellular organelles. They’re also not that blue-green. Other pigments cast them in shades of yellow, red and green. Cyanobacteria have a gelatinous covering, some have filaments that give them mobility while others form clumps or agglomerations that can create the scum on the pond surface. The Red Sea derives its name from the prevalence of crimson tinted cyanobacteria. Cyanobacteria pigments are free floating in the cell rather than contained in an internal body like a plastid. They reproduce by cloning,

basically splitting in half. Cyanobacteria can live almost anywhere: inside potted plant pots, on cement, in boiling hot springs and the ocean.

Algal (or bacterial) blooms are caused by excess nutrients, warmer water and sunlight. Pond water becomes cloudy or a scum of bacteria forms on the surface as cell numbers rise and the algae float to the surface.

Hambrook Berkman said Barnstable County began testing for anatoxin in 2022 and has put together a predictive table to determine that if there is a certain level of dolichospermum, there is likely a certain level of anatoxin present.

“We use that to determine what to send to the Barnstable lab,” she said.

The town then determines whether to post a health advisory. The state department of health has to have two clean samples before an advisory is lifted.