



Harmful algal blooms can sometimes look like spilled paint.

BY REBECCA GORNEY AND STEPHANIE JUNE |
PHOTOS PROVIDED BY AUTHORS

For many people, a lake is an oasis. When the weather heats up in summer, folks daydream about spending time at a lake—basking on the beach, swimming in crystal clear waters, or fishing from a dock. But there’s a problem that is affecting hundreds of lakes in New York—harmful algal blooms. Although the word “harmful” is clear, people may not know what a harmful algal bloom, or “HAB” is, and how it might affect their lake and potentially their health. Perhaps the best way to understand it is to go directly to the source.

Who am I?

I am cyanobacteria, an ancient microbe that has been living on the earth in some form for at least 3.5 billion years. Technically speaking, I am a photosynthesizing prokaryotic bacterium; however, you may have heard me called a blue-green algae or HAB (harmful algal bloom). Either name works for me.

Fun facts about me: I am partial to color. Depending on my type, I can appear green, blue-green, yellow, white, brown, purple or even red. I am not usually one to brag, but I am kind of big deal in the ecosystem. I supply usable energy to other organisms around me through photosynthesis, providing oxygen and sometimes serving as a food source for organisms like zooplankton. Those who know me would describe me as crafty or thrifty. I like to be prepared for any sticky, no-nutrient situation, so I store extra phosphorus in my cells, wherever I can find space. I also have this neat way to fix or transform nitrogen from the air, which allows me to eat when and where I want.

Despite being a single-celled organism, I am passionate about travel. Depending on my type and the weather, I can move throughout the water column using gas vacuoles (air pockets inside my cells), which allow me to travel between a lake’s surface and bottom. Or, I may just float, letting the wind push me around. (Take-home message: just because you saw me enjoying the lakeshore early in the morning doesn’t mean I’ll stick around all day.)

What do I look like?

Just like people, all cyanobacteria do not look alike. I come in a variety of colors and forms, and might be part of an overgrown colony that is clearly visible on a lake.

HARMFUL ALGAL BLOOMS

COLORFUL THREATS

Where can you find me?

My relatives and I can be commonly found in low densities in ponds, streams, lakes, marine waters, some soil and even in hot springs. Our main needs include nutrients (such as phosphorus and nitrogen), warm water temperatures, calm weather conditions, and plenty of sunlight.

Lakes or other waterbodies that are rich in nutrients can support excessive plant and algae growth, including cyanobacteria. I'm not particular about where nutrients come from; they may be from wastewater, septic systems, or runoff from agricultural land or urban areas. On occasion, mostly in nutrient-rich environments, I can grow quickly and become very dense. When this occurs, I am called a bloom.

Why are you seeing me more?

Each waterbody is unique, and causes of my blooms vary from lake to lake. My presence—whether or not it's a bloom—can be heavily dependent on local water quality and immediate environmental conditions. This explains, in part, why my abundance in some locations may change from year to year, but in other locations I show up every year.

Climate change has led to more frequent and intense precipitation events, as well as longer periods of dry and warm weather. As my ideal living conditions become common and widely distributed, blooms are occurring more frequently and in more locations. Factors that directly contribute to the appearance of blooms and their impacts are not totally understood by scientists. Though most agree that the increase in nutrient levels in a lake, particularly phosphorus (whether due to increased pollution sources or increased runoff events), plays a major role in bloom conditions, there are lots of factors to consider.

Should you avoid me?

An important reason why you are hearing more about me is because I can produce harmful compounds, called cyanotoxins. Not all cyanobacteria produce toxins, however, and types that are capable of producing toxins don't produce them under all conditions. Scientists still have a lot to learn about why cyanobacteria make these compounds. But one thing is clear: the best way to keep yourself safe is to avoid all contact with visible blooms.

Exposure to any cyanobacteria HABs can cause health effects in people and animals, so it is important to avoid touching or swallowing any water that has blooms, or inhaling any airborne droplets from those waters. This is true regardless of toxin levels. I can cause a lot of nasty symptoms, including diarrhea, nausea or vomiting; skin, eye or throat irritation; and allergic reactions or breathing difficulties.

Read the sidebar "Cyanobacteria and Health: *Know It. Avoid It. Report It.*"

Cyanobacteria and Health: *Know It. Avoid It. Report It.*

NYS's *Know it. Avoid it. Report it.* campaign helps educate New Yorkers about how to recognize blooms, how to reduce exposure, and how to report blooms to state and local agencies.

KNOW IT

- It might be a HAB if you see: strongly-colored surface water (blue-green, green, yellow, white, brown, purple, or red), a paint-like appearance, floating mats, or scums.
- NYS DEC's HABs website (www.dec.ny.gov/chemical/77118.html) has several informative webpages, including a photo gallery of HABs and non-harmful algal blooms, a FAQs page, and a notifications page which includes a map of waterbodies that currently have blooms (www.dec.ny.gov/chemical/83310.html).

AVOID IT

- Always stay away from blooms, scums, and floating mats in surface waters.
- Don't swim, fish, boat, or wade in areas with blooms, and don't eat fish caught from these areas.
- Boiling water does not remove HABs or their toxins. If you are not on public drinking water, bloom or no bloom, never drink, prepare food, cook, or make ice with untreated surface water. During a bloom, don't use untreated surface water for these uses even if you treat the water yourself.
- If you are on public water, your water is treated, disinfected, and monitored for drinking and household uses. Your water supplier will notify you of any issues with the treated water.

REPORT IT

- Report blooms to HABsInfo@dec.ny.gov, your local health department (contact info at www.health.ny.gov/EnvironmentalContacts), or harmfulalgae@health.ny.gov.
- Report HAB-related health symptoms to your local health department or harmfulalgae@health.ny.gov.
- Consider visiting a healthcare provider if you, your family, or animals are experiencing symptoms that may be related to contact with HABs.

What is NYS doing about me?

Under Governor Cuomo's direction, DEC, in close cooperation with the State Health Department, oversees one of the most comprehensive HABs monitoring programs in the country. Through coordination with citizen scientists, local health departments, and other concerned lake water advocates, DEC collects information on HABs from all regions of the state. More than 300 lakes are monitored each summer and hundreds of additional lakes with regulated swimming areas are inspected regularly. More information about DEC's HABs Program can be found on DEC's HABs website (see sidebar on previous page), including the Notifications Page, which has a map of current bloom locations around the state that is updated weekly. The Archive page provides historical data about previous year's notifications. You can also sign up through GovDelivery to receive free, weekly updates on HABs and other water-related issues through *MakingWaves*, DEC's Division of Water e-newsletter.

Several strategies can be used to try to control cyanobacterial blooms. Through the Governor's HABS initiative, the state has developed 12 action plans to address the causes of HABs in certain waterbodies. Both nutrient reduction and in-lake management strategies have been demonstrated to successfully mitigate the recurrence of blooms, and New York has a network of statewide water quality programs and laws that help control pollution and keep nutrients from entering surface waters. In addition, funding is available to municipalities, soil and water conservation districts and non-profit organizations for projects that reduce nutrient runoff. Visit DEC's one-stop HABS Funding webpage at www.dec.ny.gov/chemical/113733.html for more information on the \$65 million available to combat HABs.

See you on the water?

I have been here for billions of years, and will continue to live here for many years to come. The next time you are enjoying your favorite lake, pond, or stream, keep an eye out for me in the water. If you see me hanging around somewhere new, snap a photo, fill out a Suspicious Algae Bloom Report (found on DEC's website), and send an email to DEC at HABsInfo@dec.ny.gov or call DEC at (518) 402-8179.

I may be ancient, but I'm in the prime of my existence and ready to enjoy the water! So, if you want to enjoy the water and stay healthy—keep your distance.

Rebecca Gorney and **Stephanie June** work in DEC's Division of Water in Albany.



HABs and Pets

Keep pets away from discolored water or areas of water with floating mats, scums or blooms. Animal exposure to cyanobacteria cells or toxins can occur through swimming or wading, drinking water, grooming fur after swimming or wading, or eating or chewing shoreline debris when a bloom is present. In case of exposure, rinse your pet with clean water as soon as possible to remove algae from fur, and seek veterinary medical assistance if the animal shows any symptoms. Learn more about HAB-associated animal illness symptoms and prevention at www.cdc.gov/habs/pdf/habsveterinarian_card.pdf.

Report a HAB-associated animal illness to one of the following agencies:

- Local health department www.health.ny.gov/environmental/water/drinking/doh_pub_contacts_map.htm
- NYS DOH—harmfulalgae@health.ny.gov or
- NYS DEC—HABsInfo@dec.ny.gov





A drone captures images of an algal bloom on Owasco Lake.

STAFF SPOTLIGHT



Scott Kishbaugh: Lake Protector

Scott Kishbaugh spent his childhood splashing around in a small stream near Philadelphia, and, not surprisingly, was a huge Philadelphia Phillies fan. At a high school career day, he met a former Phillies meteorologist who was also a civil engineer and volunteer aquatic ecologist. Fueled further by his love of citizen science, this “Eureka” moment set Scott’s career path. He earned two degrees from Cornell and landed his dream job at DEC fresh out of college—32 years ago.

Scott has run DEC’s Citizens Statewide Lake Assessment Program (CSLAP) since it began in 1985, working with the New York Federation of Lake Associations to oversee a community of citizen scientist volunteers who help monitor and protect state lakes. The program has expanded from monitoring 25 lakes its first year to more than 160 lakes this year.

Scott was named Chief of the Division of Water’s Lake Monitoring and Assessment Section in 2009, and initiated DEC’s efforts to monitor and control harmful algal blooms. He is the senior author of both editions of *Diet for a Small Lake: The Expanded Guide to New York State Lake and Watershed Management*. He is an unflagging supporter of lake study, and a crucial resource for DEC, based on his understanding of aquatic plants and encyclopedic knowledge of most New York lakes.

Scott loves working with colleagues to solve problems, or answering questions of a third-generation lake resident. A “good” day for him is not unusual; at the end of most days, he is proud to think he “did okay today.”

The young boy who splashed around in a Philadelphia tributary now samples “some of the most beautiful lakes in the world.” When he thinks back to his motivation for what he does, he recalls sampling a small lake with serious water quality problems. A local family who swam in the lake was advised that DEC was working on the problem, but residents should stay out of the water because it could make them sick. As Scott and his colleagues drove away, he glanced in the rearview mirror and saw the family going back into the water. It was a stark reminder of the importance of DEC’s work to ensure clean and healthy lakes.