

INDEPTH FEATURED

# It's killing dogs and cattle. It's making people sick. It's spreading throughout the country. And answers remain elusive

By Sofia Jeremias | Oct 3, 2019, 10:00pm MDT



In this Sept. 20, 2017, file photo, a catfish appears on the shoreline in the algae-filled waters of North Toledo, Ohio. Long linked to animal deaths, high doses of the toxins in humans can cause liver damage and attack the nervous system. In the largest outbreaks, hundreds have been sickened by blooms in reservoirs and lakes, and officials in some areas now routinely close bodies of water used for recreation and post warnings when blooms occur. | Andy Morrison, The Toledo Blade

**SALT LAKE CITY** — An epidemic is growing. It's compromising drinking water in cities, making people sick. It's killing dogs and cattle, even bats. It's closing down lakes, resulting in economic losses for those reliant on lakeside recreation. And the reasons for its spread remain elusive.

Algae blooms have gripped Utah lakes, and their seasonal spread across the country is on the rise. By the end of August, a record 354 outbreaks had been reported since the beginning of the year, compared to 289 over the same period in 2018, according to the

Environmental Working Group, a nonprofit organization that researches water pollution.

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The onset of fall will give the public a reprieve. But as the nation grapples with changing climate and a longer, warmer season, scientists are working to understand how to control this health threat.

An algal bloom occurs when a combination of heat and nutrients creates conditions for algae and cyanobacteria to thrive. The end of summer is particularly bad, and during August algae blooms plagued small towns and cities across the country, from New York City ponds to a lake in Austin, Texas, and the Russian River in California.

One study led by an EPA scientist in 2016 found that an increase of phosphorus, one of the nutrients that algal blooms thrive on, was widespread across the United States. The last National Lakes Assessment results released in 2012 found 40% of lakes tested had excess phosphorus.

One of the most high-profile algae blooms in the U.S. is in Lake Erie, a water source for several municipalities, where a growth covered 620 miles at the last measurement in mid-August. The lake has been coping with algal blooms since the 1990s, and in 2015, the nearby city of Toledo, Ohio, had to switch to bottled water when bacteria overwhelmed the local water treatment plant. The state has invested hundreds of millions of dollars over the past decade toward treating the blooms and helping affected communities, according to Ohio EPA spokesperson Dina Pierce.

### **What exactly is a harmful algal bloom?**

Of the algal blooms that worry health and water departments, most are not actually algae, but cyanobacteria — which, as the name suggests, are bacteria that resemble algae.

One of the more common strains of cyanobacteria is microcystis, a strain that frequently releases toxins that make humans and animals sick. Although not all harmful algal blooms produce toxins, some of them become so dense that they consume all the available oxygen and suffocate fish.



This Wednesday, June 29, 2016, aerial photo shows blue-green algae in an area along the St. Lucie River in Stuart, Fla. In 2016, Florida's governor declared a state of emergency and beaches were closed when algae blooms spread from Lake Okeechobee to nearby estuaries. | Greg Lovett, The Palm Beach Post

Salem, Oregon, city officials had to issue multiple drinking water advisories in 2018, when they detected cyanotoxins on the surface of the Detroit Reservoir, which provides water for the city. Stores started running out of bottled water, the governor of Oregon declared a state of emergency, and “clean water stations” were set up.

Oregon quickly passed legislation mandating regular testing of the Detroit Reservoir and started developing a program to use activated carbon to combat the cyanotoxins.

Algal blooms are still present across the state, explained Jonathan Modie, spokesperson for Oregon Health Authority. “We expect that every year we will have harmful algal blooms in Oregon,” and they are here to stay, said Modie.

### **What causes the blooms?**

Scientists are wary of pointing to a single cause of the blooms. They know that increases in certain nutrients, namely phosphorus and nitrogen, are a major factor. Excess nutrients make their way into lakes and reservoirs from farms and wastewater treatment plants, and warm weather and low lake levels can result in a higher concentration, compounding the problem. One of the most effective ways to combat algae blooms is to reduce these nutrient loads.

Changes in climate also seem to be a factor. Researchers are seeing evidence that the season for harmful algal blooms is starting earlier and lasting longer.

Carly Hansen, a water resource engineer at the Oak Ridge National Lab in Tennessee, conducted research using satellite imagery and found evidence that blooms have been occurring increasingly earlier in the summer during the past 32 years. Temperatures are warmer, and algal blooms tend to be more extreme when it is hotter, although Hansen cautioned there is still more research required to directly link the earlier, warmer weather to the timing of the blooms. She also found increased variability in the size and toxicity in algal blooms.

“When things are bad, they are really bad,” said Hansen.

Other scientists are measuring the increase of algae blooms in remote locations.

“We don’t typically see algal blooms in mountain lakes, although we are starting to see more and more,” said Janice Brahney, a professor at Utah State University.

Brahney looked at nutrient levels in pristine alpine lakes in Colorado and Wyoming that are not naturally high in either phosphorus or nitrogen. She measured the phosphorus concentration in dust and compared lakes that received the dust to lakes that didn’t. Her research suggests that dust traveling through the atmosphere could add enough phosphorus to change a lake.

“We like to think of our mountain lakes as really pristine and untouched by humans, but because we disturbed the landscape even pretty far away from the lakes, that can have an impact on them,” said Brahney.



A sign warning visitors of dangerous algae in the water at Wheeler Historic farm in Murray, Utah, on Tuesday, Aug. 28, 2018. | Scott G Winterton, Deseret News

## Human health

The long-term health effects of exposure to harmful algal blooms are another question mark. There are two strains of cyanobacteria produced by algal blooms that scientists are particularly worried about: microcystin and cylindrospermopsin.

The most serious exposure occurred in 1988, when dozens of people died in Brazil due to exposure to cyanotoxins, according to the World Health Organization. The victims were patients undergoing dialysis, and the water used for treatment came from a local reservoir that was contaminated with microcystin.

But death from exposure to cyanobacteria is rare, and other, less extreme cases are far more frequent.

One strain can cause liver damage in people. A small percentage of cyanobacteria strains produce neurotoxins, which harm the nervous system. Other effects can range from stomach problems to muscle cramps.

When the EPA and CDC conducted a study of harmful algal bloom-related illness, 57 cases of illness due to exposure to the blooms were reported by states from 2007 to

2011. There is no definitive estimate of how many people have been exposed, in part because many of the symptoms look like other illnesses.

“A lot of times the public just wants to know, is it safe for themselves, for their friends, family and for their pets? Perfectly understandable questions,” said Nathan LaCross, an epidemiologist at the Utah Department of Health. He and his colleagues are trying to answer that question, but the answer isn’t simple, and he wants “to avoid the idea that some of these water bodies are inherently unsafe, always, because that’s just not true.”

States like Utah are working to collect samples, but testing every body of water is a colossal task. The Utah Department of Water Quality has its hands full just testing the reservoirs and lakes that are deemed high priority — i.e., those in which people swim, boat, fish or drink the water.

Algal blooms have a serious economic cost for businesses based on lake recreation, as well as for national and state parks that rely on people visiting during the hot summer months. Farms that rely on reservoirs to water their crops also suffer from the effects of algae blooms. As researchers probe for answers to algal blooms, they hope solutions will come into focus.

You don’t go to a doctor until you’re sick, explained Ann St. Amand, president of PhycoTech. Similarly, state and local governments often don’t ask for help with their water quality until it’s beyond the point of no return. “I would love to catch water before it gets to the point of no return.”