

## Scientists say the toxic blue-green algae will only get worse on Ohio lakes

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**Michael Scott, The Plain Dealer**



Satellite image courtesy of

NOAA Coastwatch-Great Lakes Lake Erie researchers say the summer of 2009 continues to be the worst for heavy blue-green algal growth in decades. This Sept. 4 satellite photo clearly shows the plume of algae spreading out from Toledo's Maumee Bay, past the Lake Erie islands and heading toward the deeper central basin of the lake. Scientists at the Great Lakes Environmental Research Laboratory also noted that the water coming down from the Detroit River, upper left in the photo, cuts into and separates the algae.

The simmering summer of 2010 is coughing up a sickly and unprecedented batch of toxic blue-green algae in western Lake Erie and nearly a dozen of Ohio's shallow, inland lakes.

Many lake scientists are speculating that it's only going to get worse.

"We're going to see a greener and greener lake until changes are made," said John Hageman of **Stone Laboratory**, Ohio State University's water research station on Gibraltar Island in western Lake Erie.

"Everything points to this just getting worse."

That might be hard to imagine.

But it could help to survey the squalid situation at **Grand Lake St. Mary's** -- a large, inland lake in western Ohio. The 13,000-acre lake near Celina grabbed the attention of both the public and health officials all summer long because of its toxic, pea-soup waters and foamy surface.

"Grand Lake St. Mary's has gone green every summer for decades, that's not new," said EPA spokeswoman Dina Pierce. "But this year, it just exploded -- at times it looked like a science fiction landscape, almost turquoise or swimming pool blue with white foam on top.

"People who have lived there their whole lives had never seen anything like it."

But while the Great Lake and the big lake near Celina have grabbed the headlines, in recent weeks it seems as if almost any shallow body of warmer water in Ohio might be at risk from being tainted by a floating, green bloom of algae.

Simply put, the 2010 algae outbreak is breaking the mold.

"This is first year we've seen blooms like this -- all across the state," said Jen House of the Ohio Department of Health, which is working with the EPA and state Department of Natural Resources to coordinate warnings at the various lakes and Lake Erie beaches. "The problem is that this bacteria loves warm, sunny weather and we've had plenty of that."

State officials have posted warnings about the dangers of coming in contact with blue-green algae at sites from West Branch State Park in Portage County (later found to be free of blue-green algae) to East Harbor State Park on the shores of Lake Erie's warm and shallow western basin.

Ohio health and recreation officials have received about 30 complaints linked to human sickness or irritation from exposure to algae -- more than half from Grand Lake St. Mary's, where officials have long known that runoff from animal feeding operations is providing nutrients for the algae to grow.

At least three dogs have also reportedly been killed by exposure to the blue-green algae in the Ohio lake. Those pet deaths followed similar algae-related dog deaths in recent years in Minnesota, Illinois and Indiana.

### **Worst year ever?**

Scientists on Lake Erie, where most of the research takes place, blame high concentrations of phosphorus and high water temperatures for algal blooms on course to be the worst in 30 or 40 years. Most say those same factors are playing a role in the algal blooms on the inland lakes.

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The dissolved phosphorus count -- fertilizer runoff from farms in Ohio, Indiana and Michigan -- flowing out of the Maumee River is the highest since records began in 1975, according to records at Heidelberg University.

Those figures stunned scientists who had been monitoring a decrease in sediment in recent years and believed modern 'no-till' farming methods would decrease total phosphorus.

Some recent studies, however, are suggesting that not turning over the soil leaves more phosphorus on the surface of the fields -- and more easily dissolved into rainwater as it runs off.

Others suggest that other practices, including more frequent wintertime fertilizing (when soil additives are less expensive), may be leading to more phosphorous-filled runoff.

In any case, agricultural experts are scrambling to solve the problem.

"Farmers did respond positively to the first call to change," said Dave Baker, an emeritus professor of biology at Heidelberg who in 1975 began measuring phosphorus leaching into the lake off western Ohio farmlands. "But the question is 'What do we do now?' "

The temperature increase, meanwhile, appears to be merely following a long-term trend that many attribute to a slowly increasing global climate. Water temperatures in Lake Erie and the other Great Lakes have been extraordinarily high since a record warm spring.

Satellite images have shown similar algal growth in each of the last few summers - the largest outbreaks since the blooms reappeared in the mid 1990s, after disappearing for more than 15 years in the wake of the more stringent water quality laws of the early 1970s.

The algae that bloom by midsummer and often stays through September is not only unsightly, but can threaten both fisheries and tourism because the worst strain -- the bacterial microcystin, known as blue-green algae -- can unexpectedly turn toxic about half the time.

"This is a Lake Erie-wide issue, at least," said Gail Hesse of the Ohio EPA's Division of Surface Water and head of the Ohio Lake Erie Phosphorous Task Force. "This lake is water resource for all of Ohio, so we should all have be concerned because the algae can be a public health concern when it goes toxic."

And costs associated with algae are significant: Various government entities and universities are spending hundreds of thousands of dollars in research money to figure out why the algal masses are blooming so big and how to best stop them.

Meanwhile, Hesse said the city of Toledo will spend up to an extra \$4,000 a day for water treatment when blue-green algal blooms are sited.

Cities further east like Cleveland don't have those concerns because the algae die off and sink to the bottom before it reaches their water intakes. But that leads to another problem.

"The dying algal blooms are related to the anoxia (low oxygen) and that can affect fish populations," said Heidelberg's Baker.

### **Potentially poisonous bacteria**

An algal bloom isn't just a natural wonder and contributor to the dead zone. It's potentially fatal.

Blue-green algae -- actually the peptides secreted by certain blue-green algae known as microcystin -- is a known neurotoxin, meaning that at high concentrations it can severely damage the nervous system, including the brain. That makes it especially dangerous to small children or those with weak immune systems.

While there are currently no official health standards for microcystin, state officials are posting warnings based on those recommended by the World Health Organization: No more than 20 parts per billion for recreational water and 1 part per billion for drinking water.

Grand Lake St. Mary's blew those standards out of the water.

"Last year microcystin was already sky high at 84 parts per billion," Hesse said. "Then, early this year, we had readings over 2,000 -- that's on a whole different scale, unimaginable until now."

Pierce and health officials, however, are quick to point out that not a single drinking water quality test -- not even in Celina, which draws its water from Grand Lake St. Mary's -- has indicated that any toxins survived the chlorination and carbon filtering of even the most basic water treatment plant.

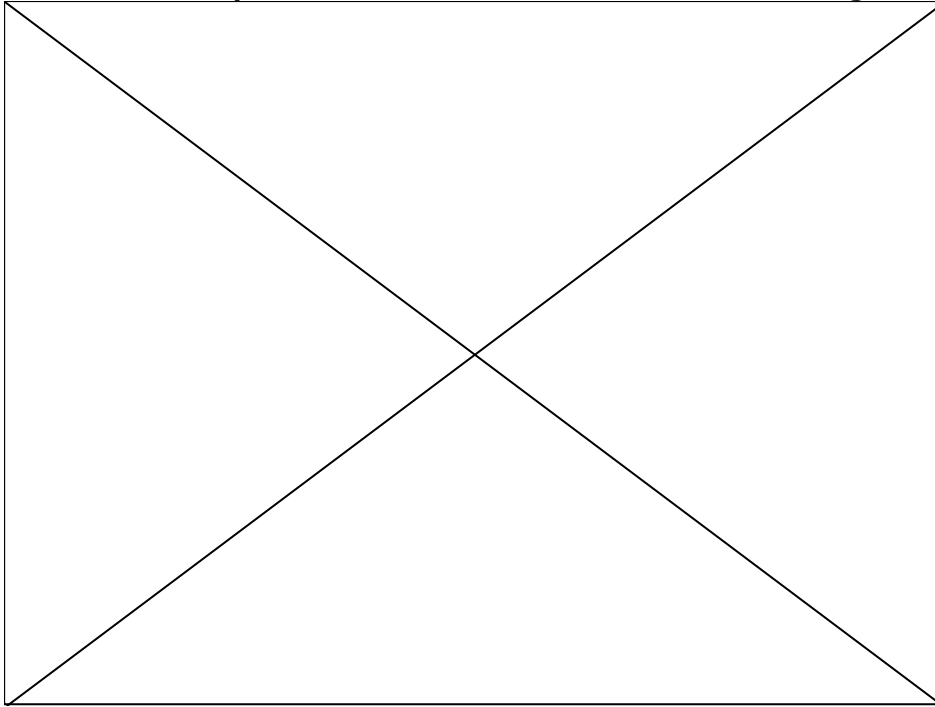
Health officials are more worried about swimmers or boaters who swallow toxic water -- which may not even appear green at the surface after wind and waves have mixed the algae into the water column.

"This is really an emerging health issue," House said. "We can't prick someone's finger, run a test and say 'You've been poisoned by microcystin.' They can have some of the same symptoms - diarrhea, nausea, dizziness -- and it could be e. coli in the water or even a foodborne outbreak."

So the specter of a future human death in Lake Erie or an inland lake someday being blamed on to microcystin and the potential for losing tourism money because of decreased fish size or decimated populations is driving researchers to nail down the cause -- and the solution -- for algal blooms.

"There doesn't appear to be a magic bullet, but we don't want things to get worse," said Baker. "None of this is good for farmers or fisherman or boaters. No one wants to kayak through pea soup."

**VIDEO: University of Toledo scientist studies 2008 Lake Erie algal bloom**



**Scientists, private companies working to figure out algae problem**

We may be losing the war on algae so far -- but scientists and private entrepreneurs are ramping up for battle on the technological front.

Government-funded researchers, scientists, forecasters and most recently a private company in Bowling Green are crisscrossing the western basin of Lake Erie with boats, planes and satellites to better understand and plan for defense against the growing scourge of microcystin.

An Army-sponsored blimp -- tethered to a barge off Maumee Bay -- and **NASA jets have recorded** for several years the reflective signature of microcystin over the western basin of Lake Erie.

Their goal: Match the distinct reflectivity of blue-green algae with water samples taken by lake scientists below -- from the precise coordinates photographed by the blimp or plane -- to figure out where and when the toxic algae is emerging and which way it is heading.

In 2009, the **Center of Excellence for Great Lakes and Human Health**, a federal research lab in Ann Arbor, Mich., began a program using satellite imagery to track algae blooms. The center then tests the water in areas where it appears **algae has bloomed** and sends out warnings to water treatment plants, recreation sites and others along the Lake Erie shoreline.

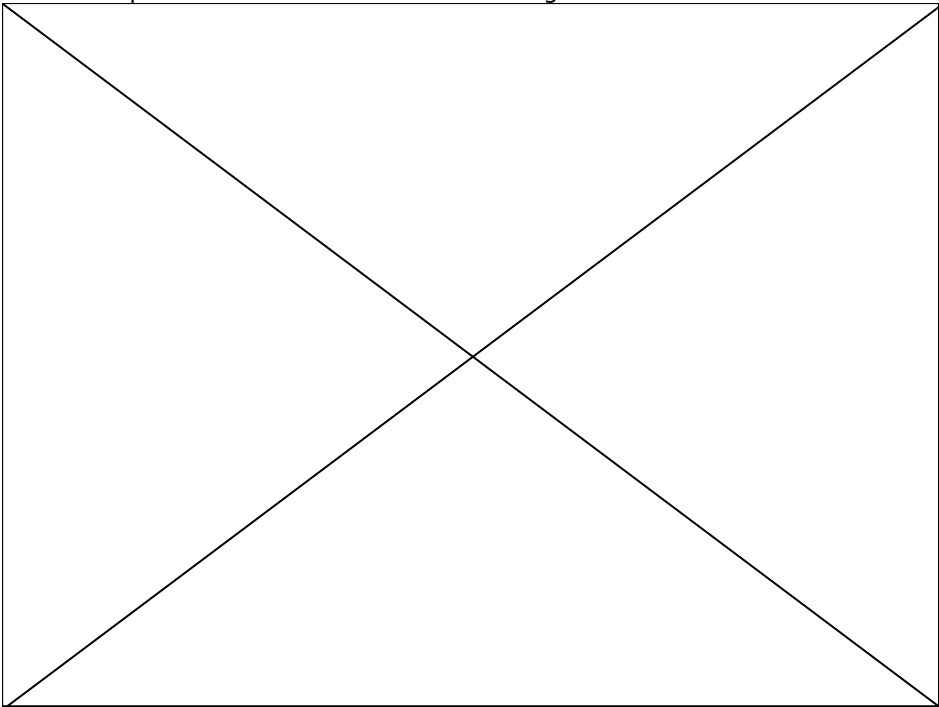
The newest player is **Blue Water Satellite Inc.**, a company founded in 2009 by businessman Milt Baker and Bowling Green biology professor Robert Vincent. The company earlier this year pitched a plan to the state to do a spectral reading of all of Ohio's inland lakes to find algal growths. It was turned down by state officials.

Baker said his company uses Landsat images of Lake Erie and the other lakes and then scans them with a patented process -- looking for the specific reflectivity of blue-green algae, similar to NASA's project -- to determine where a bloom is occurring. He said the scans can read for phosphorous on both water and land.

"We can tell you what's going on in an entire water body, not just in the locations where samples are taken," Baker said. "The technology is now in place to do something about algae and phosphorus."



VIDEO: Experimental aerostat starts scanning lake in summer of 2009



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