Science

Tracking Erie's deadly algae

NASA's new scanner helps keep an eye on a growing problem

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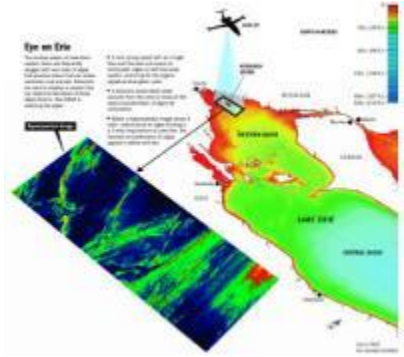
By Spencer Hunt

JOHN KUNTZ | THE (CLEVELAND) PLAIN DEALER

A view from the NASA jet shows the blue-green algae along the Lake Erie shoreline near the Davis-Besse nuclear power plant close to Port Clinton.



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Research engineer John Lekki checks algae-monitoring equipment before a flight over Lake Erie. The jet flies out of the NASA Glenn Research Center in Cleveland.

Dangerous blooms

What is microcystis?

• It is a type of algae that occurs naturally in small concentrations in most lakes. It forms small colonies that look like floating blue-green pollen or sand grains. High concentrations can appear as dense blankets or surface foam.

Why are we seeing more?

• Zebra and quagga mussels eat algae and spit out natural toxins. With competing algae reduced, microcystis grows in greater numbers. Warm water conditions, the lake's levels of phosphorus and other plant nutrients also contribute.

Why is it harmful?

• Microcystis can produce microcystins, which can sicken people and even kill wildlife and pets if enough is ingested. It might also cause liver damage in animals if smaller amounts are eaten over a long period of time. It is also tied to oxygen-starved "dead zones" in Lake Erie.

Sources: Michigan State University, Ohio Sea Grant

10,500 FEET ABOVE LAKE ERIE -- For miles, the calm waters resemble a sheet of gray glass.

Then, just south of Pelee Island in Ontario, you see it -- a dense blue-green shock.

It's microcystis, an algae that can sicken people, kill fish and threaten the lake's $1 billion annual tourism and sport-fishing industry.

Algae blooms such as this have attracted the attention of scientists trying to understand the phenomenon.

Small amounts of microcystis can be found in most lakes, rivers and streams; in summer months it can grow into vast mats that clog Sandusky Bay, Maumee Bay and the lake's shallow western basin.

Every year, algae announce the formation of an oxygen-starved area near Lake Erie's bottom called the "dead zone" because not much can survive there.

Researchers are looking for a connection between the complex formation of the dead zone and the explosion in growth of microcystis and other algae during the hot, sunny days of early summer.

When algae decompose, they fall to the bottom of the lake, where they choke up nearly all the available oxygen.

The situation is a concern in deeper waters to the east, where scientists say it threatens fish and other animals as well as the health of the lake.

The zone begins to form in the west, off Sandusky Bay, in late June and early July in cold water near the lake bottom.

By September, the dead zone expands east to cover most of the lake's central basin, an area of deep water from the Lake Erie Islands to Erie, Pa.

This month, NASA research engineer John Lekki sat in the back of a gutted Lear jet, cradling a laptop computer and staring at data that streamed from an experimental scanner bolted to the bottom of the plane.

It had no trouble detecting the algae near Pelee, about 17 miles north of Sandusky.

The device, called a hyperspectral imager, looks for the algae's specific blue-green hue. The imager splits light reflected from the algae across hundreds of wavelengths in the visible and infrared spectrum. It scans for specific peaks of color that distinguish microcystis from other types of algae and plant chlorophyll.

The technology could be a valuable early-warning system, said George Leshkevich, a researcher with the National Oceanic and Atmospheric Administration.

"You can try to give a heads-up to water-treatment plant managers and to beaches for beach closings," he said.

This algae is no stranger to Erie, but its recent ability to grow into vast, dense mats in the lake's western basin has scientists concerned.

The problem begins with millions of invasive zebra and quagga mussels that have clogged the lake in recent years.

They eat harmless algae but spit out the toxins.

"You end up with microcystis because there isn't anything else," said Jeff Reutter, director of the Ohio Sea Grant program at Ohio State University.

The re-emergence of the dead zone comes 20 years after a huge, expensive effort to reduce pollution in the lake. A lot of attention was devoted to reducing phosphorus, a vital plant nutrient that washes off farmland and into streams and rivers that reach the lake.

Phosphorus fueled explosive increases in algae in the middle of the last century.

By the early 1990s, reducing phosphorus, especially in sewage discharges, was credited with all but eliminating the dead zone.

Then, a decade ago, Canadian scientists noted that the zone was coming back about the same time that high phosphorus levels were being recorded in the Maumee, Sandusky and other rivers that empty into the lake.

Some researchers think the increase could be linked to a huge increase in soybean farming. Scientists, including some at Ohio State, use satellites to track algae blooms, but that technology does not provide as detailed a picture of the problem.

The NASA flights test how accurate the imager is and how it works in different weather conditions.

As the plane flew over the lake's western basin recently, a research vessel plied the waters below. Scientists on the boat drew water samples that will be used to measure concentrations of algae.

NASA has flown over the lake nine times this summer to gather data. A recent flight could be the most crucial, Lekki said, because samples were taken within hours of the plane's scanning runs.

NASA has spent about $240,000 in time, fuel and materials to build and test the imager, said Sallie Keith, an agency spokeswoman.

If the technology proves a success, Lekki said, similar imagers could be installed in space probes and rovers to examine such things as interstellar dust and Mars rocks.

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