



Great Lakes HABs Collaborative

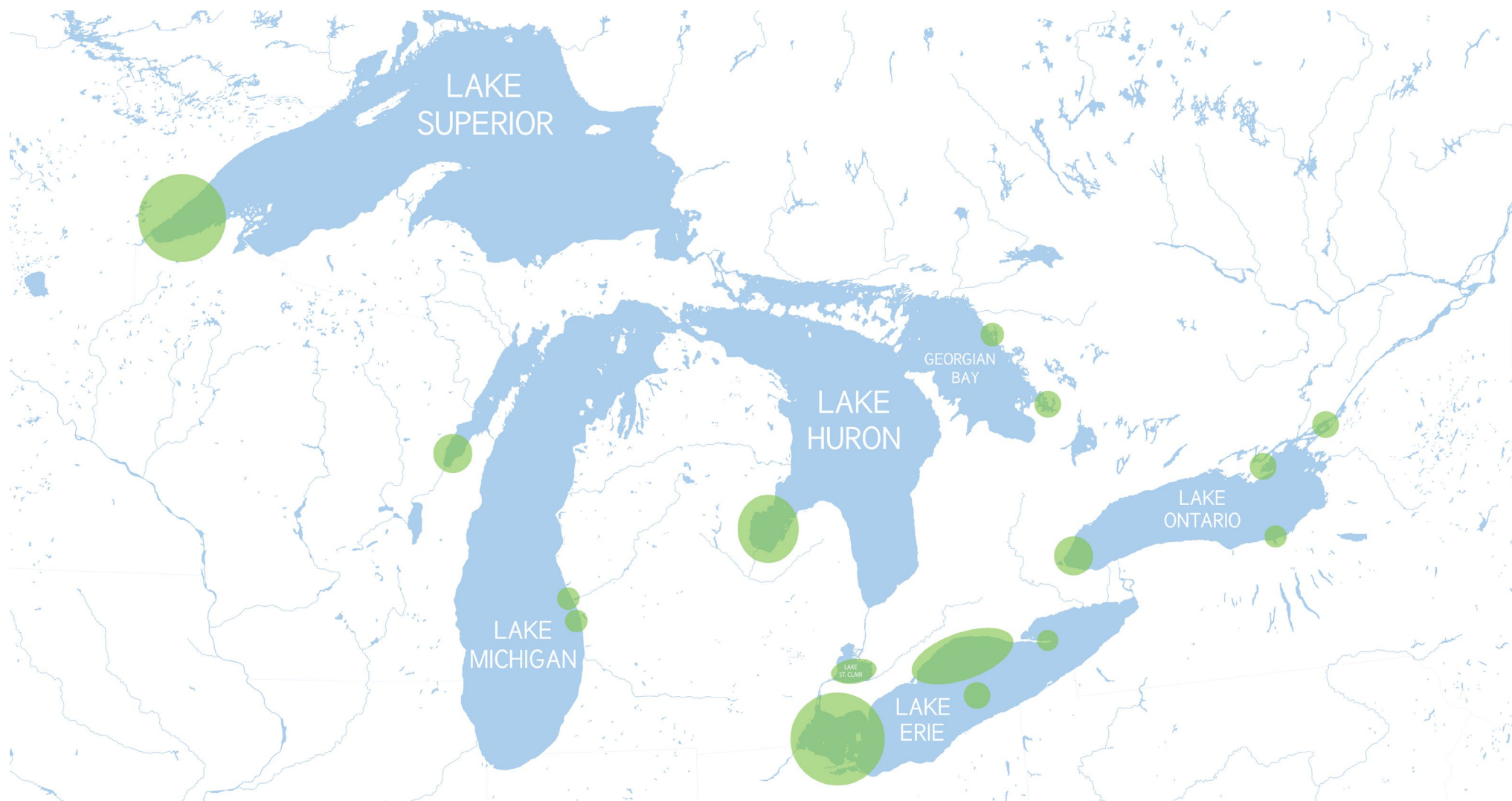
Linking Science and Management
to Reduce Harmful Algal Blooms

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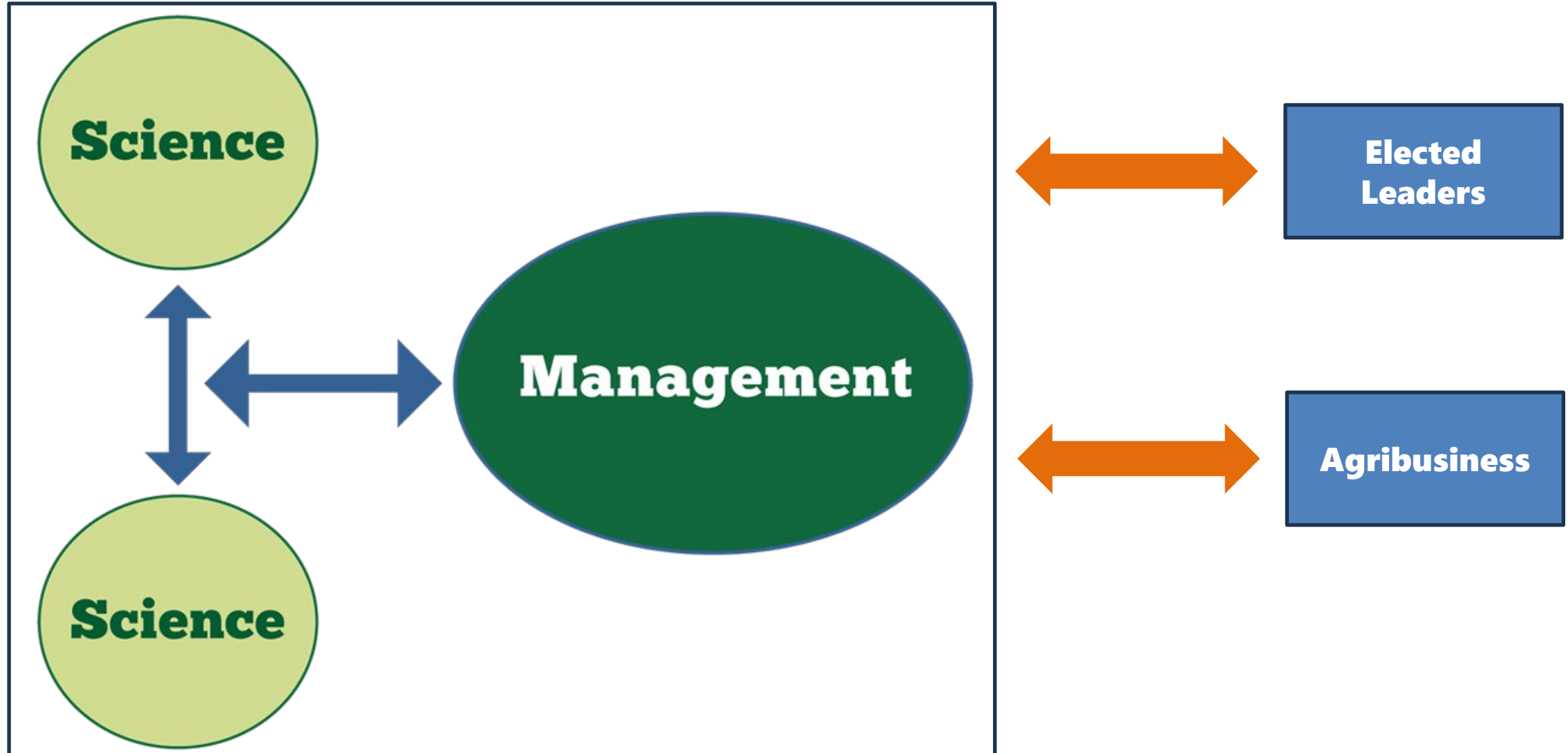
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Program Manager







Who is helping?



Outreach and Communication

Website

www.glc.org/work/habs



The screenshot shows the website for the Great Lakes HABs Collaborative. The top navigation bar is dark blue with the Great Lakes Commission logo on the left, links for 'For Commissioners' and 'For the Media' in the center, and a search box on the right. Below the navigation bar is a large banner image of a green algal bloom in water. The banner contains the title 'HABs Collaborative' and the subtitle 'Linking Science and Management to Reduce Harmful Algal Blooms'. Below the banner is a breadcrumb trail: 'Home / Work / Water Quality / Great Lakes HABs Collaborative'. On the left side of the main content area is the Great Lakes HABs Collaborative logo. To the right of the logo is the section 'About the HABs Collaborative', which contains a paragraph of text and a link to a video.

Great Lakes Commission
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HABs Collaborative

Linking Science and Management to Reduce Harmful Algal Blooms

[Home](#) / [Work](#) / [Water Quality](#) / [Great Lakes HABs Collaborative](#)



Great Lakes HABs Collaborative

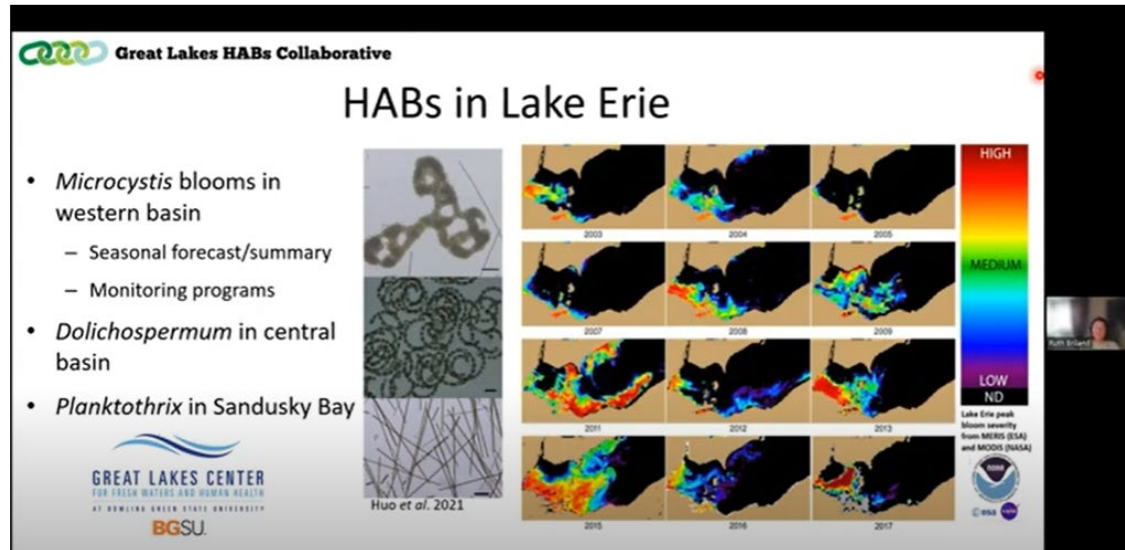
[Overview](#)

About the HABs Collaborative

The Great Lakes HABs Collaborative seeks to improve communication among scientists, and between scientists and decision-makers, on issues related to Harmful Algal Blooms (HABs) in the Great Lakes. Launched in 2015 by the GLC and the U.S. Geological Survey- Great Lakes Science Center, the HABs Collaborative is working to establish a common agenda on science and management needs to help the region work together to prevent and manage HABs.

[Watch our video to learn more about the HABs Collaborative.](#)

Webinars



- Started in 2016
- Presentations on various research/projects
- Recordings available on website:
<https://www.glc.org/work/habs/webinars>
- Upcoming series January 2024
HAB formation beyond nutrients and temperature

Example Topics:

- *Great Lakes HABs Modeling*
- *Role of Dreissenid Mussels in Nutrient Cycling*
- *Lakewide Management, GLWQA, and HABs*
- *Current and Emerging Technology in the Great Lakes*

Newsletter

- 3-4 newsletters for HABs community
- Sections:
 - Feature article
 - Canadian Corner
 - HABs Calendar
 - Member Spotlight
 - News from the Co-Chairs
- Issues available on the Collab website

<https://www.glc.org/work/habs/news>

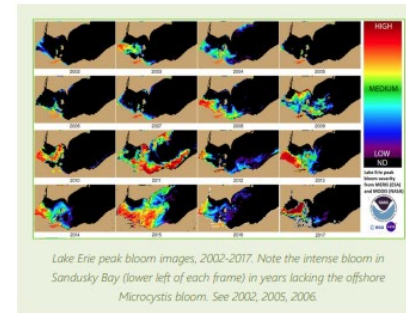


What's happening with the HABs Collaborative?

Sandusky Bay Tells a Different Story than Western Lake Erie

George S. Bullerjahn, Emeritus professor and Director of the Great Lakes Center for Fresh Waters and Human Health, Bowling Green State University

Every July, the Lake Erie Algal Bloom Forecast is released, providing a useful prediction of the western Lake Erie cyanobacterial bloom season to come. It is now well known that the intensity of the western basin's offshore *Microcystis* bloom in mid to late summer is predicted by springtime nutrient load from the Maumee River. However, a mere one-hour drive east, toxic cyanobacterial blooms in Sandusky Bay defy such predictions. I'm pleased to share my teams' observations of differences in bloom characteristics and recent surprises in the Bay.



The composition of the toxic cyanobacterial bloom biomass in Sandusky Bay has been fundamentally different from that observed in open water of the western Lake Erie basin. In 2003 and 2004, Johanna Rinta-Kanto and Steve Wilhelm first observed that *Planktothrix* was the dominant microcystin-producing cyanobacterium in the Bay, with *Microcystis* virtually absent. Using Ohio-funded surveys from 2013-2019, my students have since shown that *Planktothrix* blooms appeared earlier and persisted later in the season than the offshore *Microcystis* blooms, in part due to the capability of *Planktothrix* to grow in cooler temperatures. Of particular interest was the observation that bloom intensity could not be predicted by the spring nutrient load from the Sandusky River. Most years,

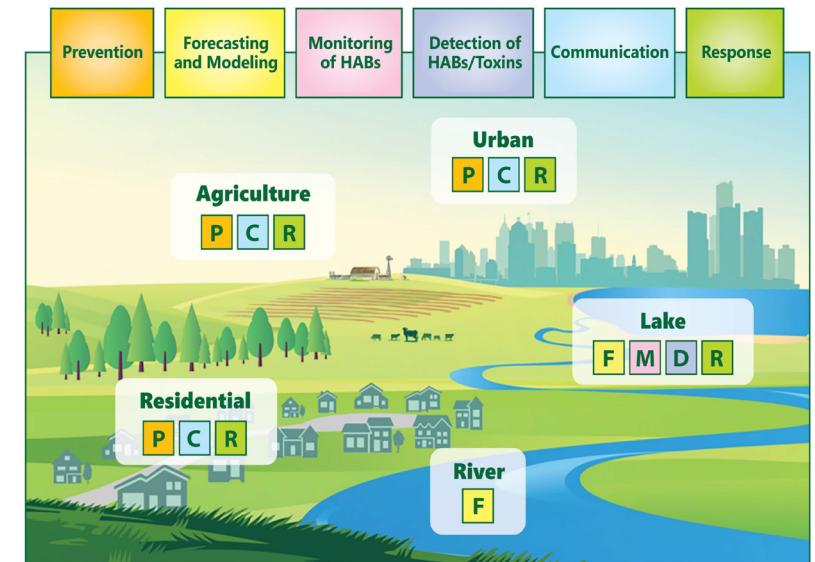
Fact Sheets

Accessible information on topics of interest to the management community, including policy makers and the public

- Chronic Long-Term Health Effects of HAB Toxins (5/24/2022)
- Health Effects Associated with Exposure to HAB Toxins through Aerosolization (5/24/2022)
- **Great Lakes Harmful Algal Blooms: Current Knowledge Gaps** (5/11/2021)
- Who Does What? A Guide to Agencies' Roles in HABs (2/19/2021)
- How Does Nitrogen Affect Harmful Algal Blooms? (10/9/2017)
- Phosphorus (P) and HABs: Sources of P from the Maumee River (9/12/2017)

Who Does What? A Guide to Agencies' Roles in HABs

Harmful algal blooms (HABs) in the Great Lakes have impaired drinking water, threatened public health, and hurt the regional economy. Management is a complex, regional challenge that cannot be addressed by one jurisdiction or single agency. This factsheet seeks to provide a brief overview of agency roles in a spectrum of activities from HABs prevention to response. The graphic below is intended to depict spatially where activities occur in a landscape, with agencies listed under their primary activities.



Prevention: Efforts to minimize the export of nutrients from watershed sources to waterways

Forecasting and Modeling: Efforts to understand nutrient delivery from the land to rivers and implications for HABs occurrence (or non-occurrence)

Monitoring of HABs: Monitoring & Tracking of blooms

Detection of HABs/Toxins: Efforts to understand the toxicity of a HAB

Communication: Messaging of HABs occurrences and associated risks to the public

Response: Management of HABs and associated impacts



Government Actor and General Description of HAB-Related Efforts

	Prevention	Forecasting and Modeling	Monitoring of HABs	Detection of HABs/Toxins	Communication	Response
State/provincial/tribal environment, natural resource and health These agencies work across the entire spectrum of HABs to help coordinate a response. Major work includes planning to reduce nutrients, limiting point sources, monitoring water quality, and relaying advisories to the public.	✓	✓	✓	✓	✓	✓
State/provincial agricultural departments and ministries These agencies raise awareness and increase the adoption of environmental farm planning and beneficial management practices by providing tools, educational and demonstration opportunities, technical advice, and funding.	✓	✓				
U.S. Environmental Protection Agency Great Lakes programs provide funding to reduce nutrient losses to waterways and improve nearshore health in the lakes and support binational cooperation enabled by the Great Lakes Water Quality Agreement (GLWQA).	✓		✓	✓	✓	✓
Environment and Climate Change Canada ECCC collaborates with the province, through the Canada-Ontario Agreement, to prevent nutrient losses to waterways from wastewater treatment plants and other sources.	✓	✓	✓			
U.S. Department of Agriculture USDA administers U.S. Farm Bill programs to accelerate adoption of nutrient reducing practices on agricultural land and assesses the effects of conservation in watersheds to document outcomes and evaluate additional conservation needs.	✓	✓				
Agriculture and Agri-Food Canada AAFC researches innovative approaches to understand and improve nutrient, soil and water management on agricultural land and funds programs to accelerate the adoption of practices to reduce nutrient losses.	✓					
U.S. Geological Survey USGS conducts a variety of water quality monitoring and research on beaches, agricultural land, watersheds, streams, and lakes.	✓	✓	✓	✓		
National Oceanic and Atmospheric Administration NOAA conducts water quality sampling and forecasting in Western Basin of Lake Erie and Saginaw Bay (Lake Huron) during bloom season using tools such as buoys, sensors and remote sensing (satellite and hyperspectral imaging).		✓	✓	✓	✓	



Great Lakes HABs Collaborative
Linking Science and Management to Reduce Harmful Algal Blooms

Harmful Algal Bloom Toxins in the Air

Freshwater harmful algal blooms (HABs) are an annual occurrence during the summer and fall in the nearshore areas of the Great Lakes, as well as in inland waterbodies. These HABs are largely made up of one or more species of cyanobacteria, also known as blue-green algae (e.g., *Microcystis* and *Dolichospermum*). HABs have the potential to disrupt ecosystems, impact water and air quality, and deter recreation. They can also produce toxins (e.g., microcystin, anatoxin – collectively referred to as HAB toxins) that can be harmful to human health. A series of fact sheets, including this one, are designed to **share emerging science with water managers** and assist elected officials and the public in **understanding the impacts of HABs on human health**.

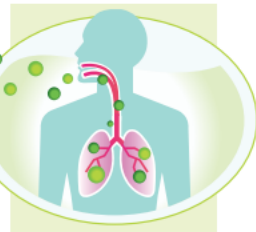


Harmful Algal Blooms are found across the Great Lakes and inland waters within the Great Lakes basin. In addition to **exposure through skin contact and consumption**, humans can also **risk exposure to toxic blooms through the inhalation of aerosols** generated from freshwater HABs (1).

Many people first learned about aerosols during the COVID-19 pandemic. **Aerosols are very small particles or droplets that can become suspended in the air.** When a HAB is agitated (by waves, wind, or boat traffic), it may release these particles into the air (1). The presence of HAB toxins in aerosols is the focus of emerging science on how HABs may affect people.

To fully understand the risk of HAB aerosols to people, we need **additional testing in the natural environment and laboratory**. This fact sheet summarizes existing science and future implications as the science tackles these issues (2).

The best way to avoid exposure to the toxins created by HABs is to **not recreate in water with an algal scum or opaque green appearance**. It is particularly important to not engage in activities that agitate the water surface like boating, jet-skiing, and even swimming when local or state agencies have closed beaches due to HABs (3). **When in doubt, stay out** (that includes pets!) The potential effects on human health are linked to the amount and duration of exposure, frequency of exposure, and personal health conditions (4).

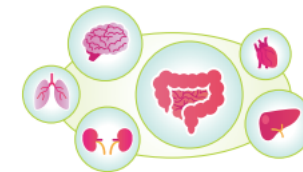
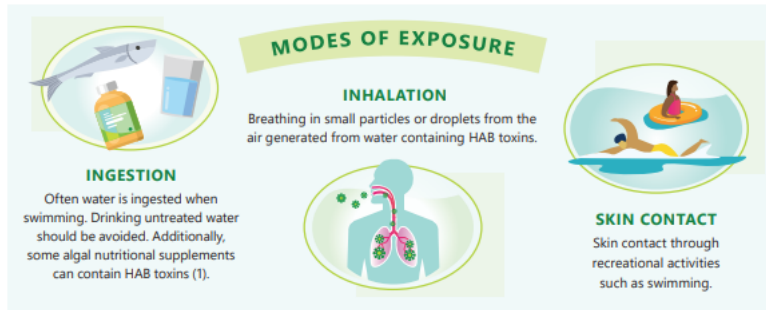


Great Lakes HABs Collaborative
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Harmful Algal Blooms and Human Health Effects

Freshwater harmful algal blooms (HABs) are an annual occurrence during the summer and fall in the nearshore areas of the Great Lakes, as well as in inland waterbodies. These HABs are largely made up of one or more species of cyanobacteria, also known as blue-green algae (e.g., *Microcystis* and *Dolichospermum*). HABs have the potential to disrupt ecosystems, impact water and air quality, and deter recreation. They can also produce toxins (e.g., microcystin, anatoxin — collectively referred to as HAB toxins) that can be harmful to human health. A series of fact sheets, including this one, are designed to **share emerging science with water managers** and assist elected officials and the public in **understanding the impacts of HABs on human health**.

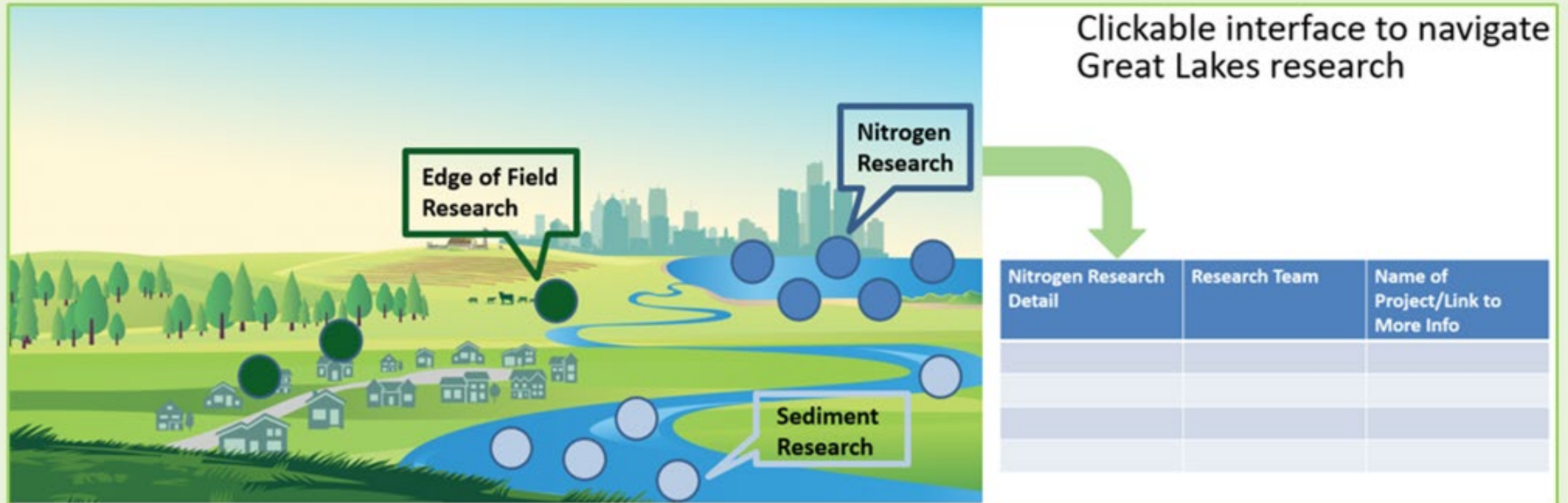
As suggested by their name, toxins produced by HABs can be harmful to humans and animals. Government health agencies are the ideal source of information on potential health effects. This fact sheet summarizes what is generally known about potential near-term or acute effects, and emerging science on potential long-term or chronic effects. If you or someone you know are exposed to a HAB through one of the **modes of exposure** discussed below and feel unwell or otherwise show symptoms of exposure, you should seek medical attention. Avoid exposure by being aware of your surroundings and not recreating in or around water with a scum or a dark green appearance. When in doubt, stay out – and that includes pets! Risks of health effects increase with amount and duration of exposure, frequency of exposure, and personal health conditions.



Acute symptoms of toxin exposure

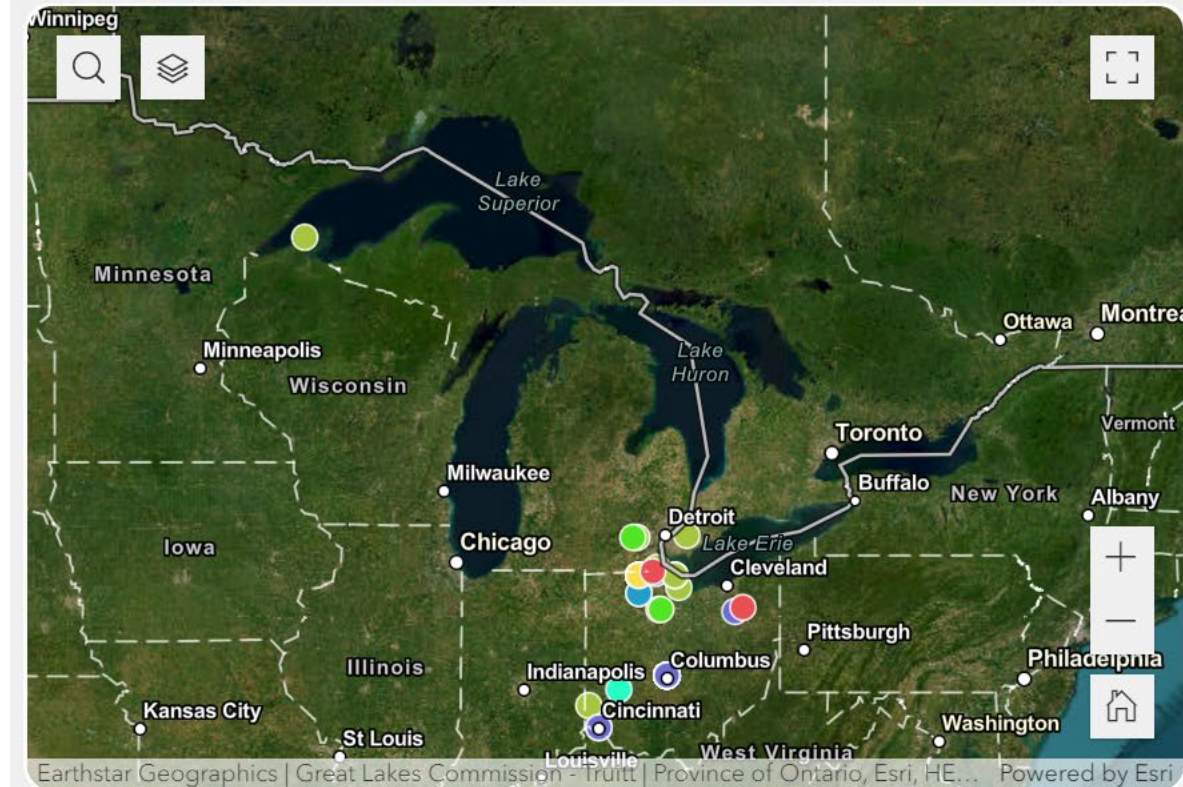
People can be exposed to these toxins either through **ingestion, inhalation or skin contact** (2). Common symptoms of HAB toxicity include gastrointestinal symptoms like nausea, vomiting, abdominal pain and diarrhea, neurologic symptoms, headache, fever, rash/skin irritation (2-4). **Symptoms can start within hours and last for a few days.** In severe cases, exposure can lead to organ damage and lasting health effects (2,4).

Research Mapper





HABs Collaborative Research Mapper

[How to Use](#)[+ Add Project Point](#)

Drivers of Lake Superior cyanobacterial blooms

[Details →](#)

Persistence of Planktothrix blooms in Sandusky Bay, Lake Erie

[Details →](#)

Great Lakes Integrated Cladophora Assessment

[Details →](#)

Investigating factors driving cHABs in the fluvial-lacustrine continuum

[Details →](#)

Decision support tools to link P reductions to harmful algal blooms and source water protection

[Details →](#)

Evaluating multiscale water quality benefits of H2Ohio practices in the Maumee River Watershed

[Details →](#)

Regional Events

- Summit with the Cooperative Institute for Great Lakes Research (CIGLR), focused on disturbance ecology
 - September 2023 workshop
 - January 2024 webinar series
 - Communications
- April 2024 Science & Policy Workshop with the Great Lakes-St. Lawrence Legislative Caucus
- Great Lakes Research Summary, Summer 2024
 - Sponsored sessions at regional meetings



Accelerating efforts through additional federal funding

- Supporting the next generation of science and policy leaders through fellowships
- Coordinated “HABs Grab” events, protocol for the Great Lakes basin
- Knowledge transfer on mitigation techniques
- Building a “Common Agenda” or roadmap for how the research and management community will work together toward progress

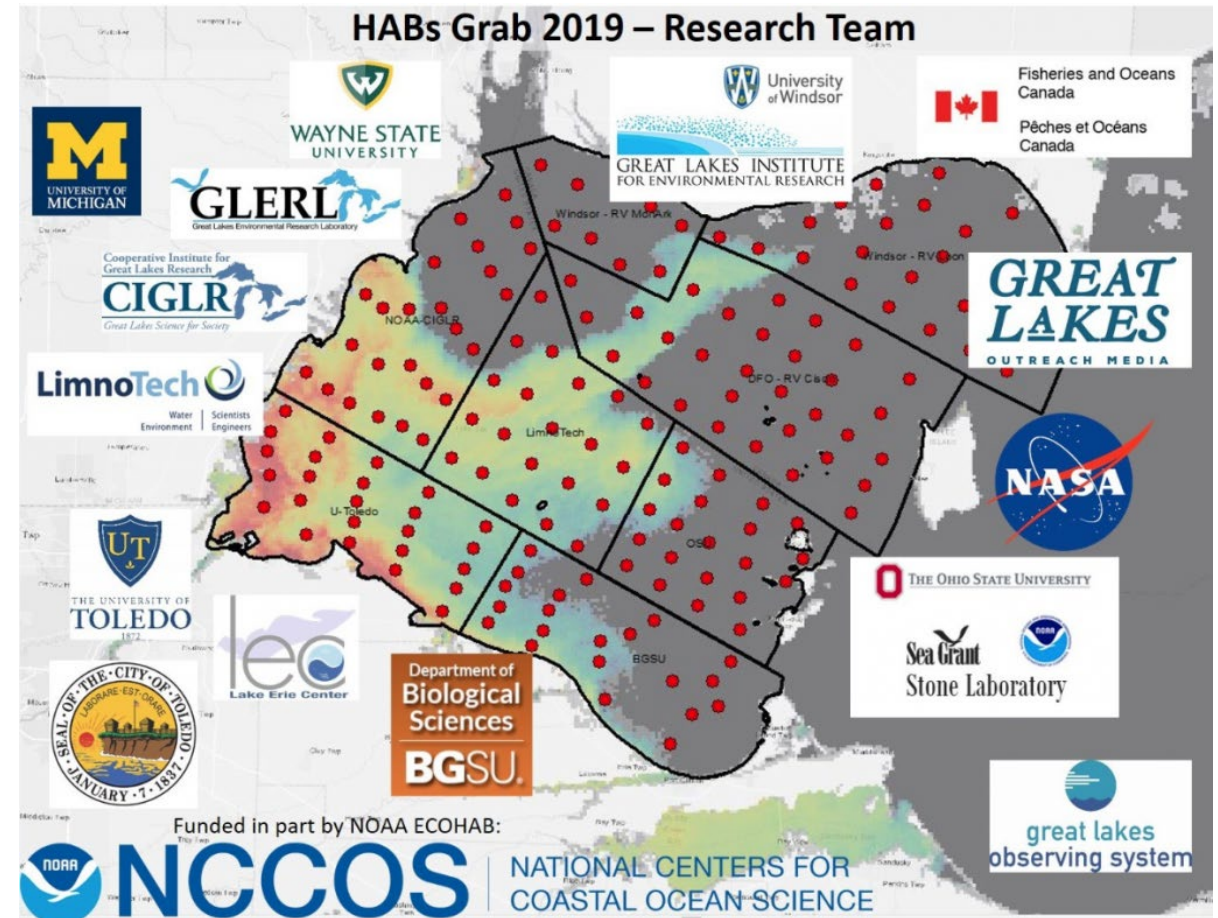


Image courtesy of NOAA NCCOS

Thank you!

For more HABs work from the Great Lakes Commission, check out Blue Accounting's Lake Erie Algae Issue:

<https://www.blueaccounting.org/issue/eriestat/>

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True color photo of the harmful algae bloom in western Lake Erie, collected on August 14, 2017 as part of the NOAA Great Lakes Environmental Research Laboratory's HABs research program. Photo credit: Aerial Associates Photography, Inc. by Zachary Haslick