



Harmful Algal Bloom Risk Perception and Community Engagement

Virtual Harmful Algal Bloom Research Symposium

January 9, 2025

Erica Clites, M.S.
Michigan State University Extension
Michigan Sea Grant
Extension Educator

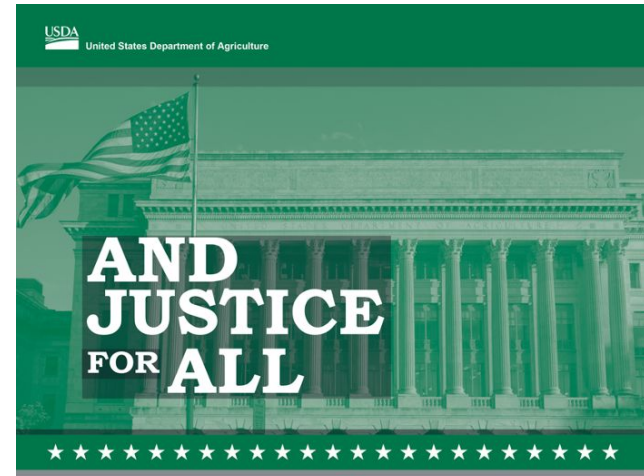
Heather Triezenberg, Ph.D.
Michigan State University Extension
Department of Fisheries and Wildlife
MISG Associate Director and
Extension Program Leader

Diane Doberneck, Ph.D.
Michigan State University
Outreach and Engagement
Office for Public Engagement and Scholarship
Director, Faculty and Professional Development,

Alex Benitez, M.S.
Michigan State University
*Department of Fisheries and Wildlife
Department of Advertising and Public
Relations

With thanks to Jennifer Hunnell and Martha Gerig

MSU is an affirmative-action, equal-opportunity employer. Michigan State University Extension programs and materials are open to all without regard to race, color, national origin, sex, gender, gender identity, religion, age, height, weight, disability, political beliefs, sexual orientation, marital status, family status or veteran status.



In accordance with Federal law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, disability, and reprisal or retaliation for prior civil rights activity. (Not all prohibited bases apply to all programs.)

Program information may be made available in languages other than English. Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, and American Sign Language) should contact the responsible State or local Agency that administers the program or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339.

To file a program discrimination complaint, a complainant should complete a Form AD-3027, USDA Program Discrimination Complaint Form, which can be obtained online, at www.usda.gov/sites/default/files/documents/usda-program-discrimination-complaint-form.pdf, from any USDA office, by calling (866) 632-9992, or by writing a letter addressed to USDA.

The letter must contain the complainant's name, address, telephone number, and a written description of the alleged discriminatory action in sufficient detail to inform the Assistant Secretary for Civil Rights (ASCR) about the nature and date of an alleged civil rights violation. The completed AD-3027 form or letter must be submitted to USDA by:

mail:
U.S. Department of Agriculture
Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW
Washington, D.C. 20250-9410, or
fax:
(833) 256-1665 or (202) 690-7442;

email:
program.intake@usda.gov.
This institution is an equal opportunity provider.

Conforme a la ley federal y las políticas y regulaciones de derechos civiles del Departamento de Agricultura de los Estados Unidos (USDA), esta institución tiene prohibido discriminar por motivos de raza, color, origen nacional, sexo, edad, discapacidad, venganza o represalia por actividades realizadas en el pasado relacionadas con los derechos civiles (no todos los principios de prohibición aplican a todos los programas).

La información del programa puede estar disponible en otros idiomas además del inglés. Las personas con discapacidades que requieran medios de comunicación alternativos para obtener información sobre el programa (por ejemplo, Braille, letra agrandada, grabación de audio y lenguaje de señas americano) deben comunicarse con la agencia estatal o local responsable que administra el programa o con el TARGET Center del USDA al (202) 720-2600 (voz y TTY) o comunicarse con el USDA a través del Servicio Federal de Transmisión de Información al (800) 877-8339.

Para presentar una queja por discriminación en el programa, el reclamante debe completar un formulario AD-3027, Formulario de queja por discriminación del programa del USDA, que se puede obtener en línea, en

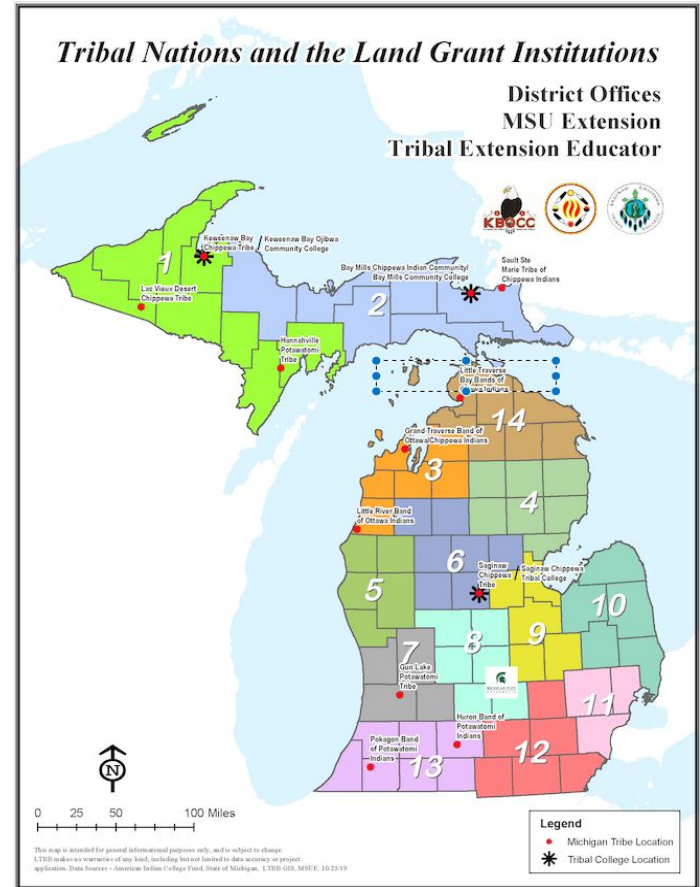
www.usda.gov/sites/default/files/documents/usda-program-discrimination-complaint-form.pdf, en cualquier oficina del USDA, llamando al (866) 632-9992, o escribiendo una carta dirigida al USDA. La carta debe contener el nombre, la dirección y el número de teléfono del reclamante, y una descripción escrita de la supuesta acción discriminatoria con suficiente detalle para informar al Subsecretario de Derechos Civiles (ASCR, por sus siglas en inglés) sobre la naturaleza y la fecha de la presunta violación de los derechos civiles. La carta o el formulario AD-3027 completado debe enviarse al USDA por medio de:

correo postal:
U.S. Department of Agriculture
Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW
Washington, D.C. 20250-9410, o

fax:
(833) 256-1665 o (202) 690-7442;
correo electrónico:
program.intake@usda.gov.

Esta institución ofrece igualdad de oportunidades

MSU collectively acknowledges that its campus and statewide offices occupy the ancestral, traditional, and contemporary Lands of the Anishinaabeg-Three Fires Confederacy of Ojibwe, Odawa, and Potawatomi peoples ceded in multiple historic treaties. We recognize and support the sovereignty of Michigan's twelve federally-recognized Indian nations, and for historic indigenous communities and individuals.



Overview

1. Great Lakes Center for Fresh Waters and Human Health
2. Community Engagement Core Accomplishments
3. Current programming
4. Future directions

Great Lakes Center for Fresh Waters and Human Health

- 2018-2024
- First fresh water Center
- Eleven algal bloom researchers
- Nine universities



Oceans and Human Health Projects

NSF and NIEHS Centers and Projects

[Partners for Great Lakes Center for Fresh Waters and Human Health](#)

■ Centers

■ Projects

[Scripps Institution of Oceanography](#)

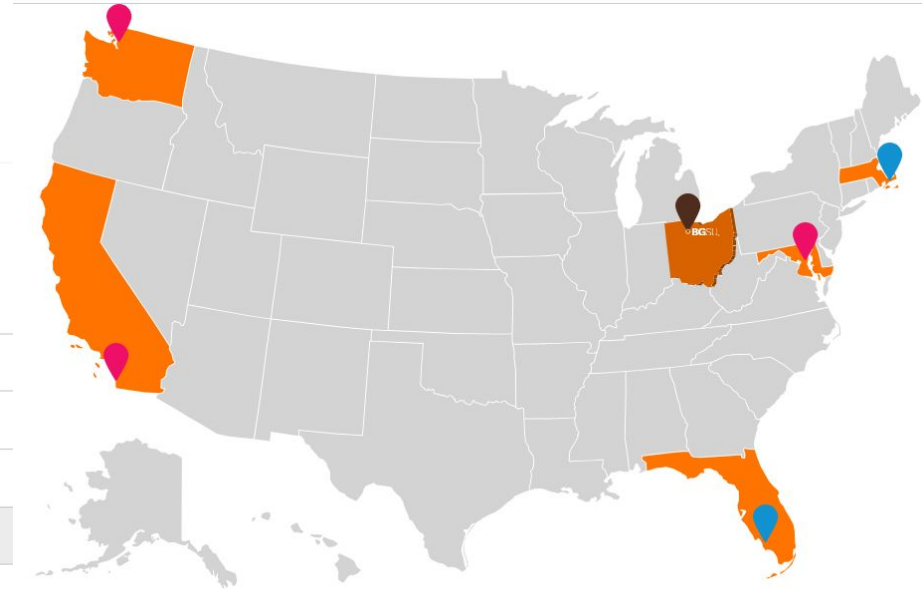
[University of Washington](#)

[BGSU Great Lakes Center for Fresh Waters and Human Health](#)

[University of Maryland College Park](#)

[Woods Hole Oceanographic Institution](#)

[Florida Gulf Coast University](#)



2018-2024 Great Lakes Center for Freshwaters and Human Health Community Engagement Core Objectives

- Conduct community engaged scholarship training for scientists associated with the Center,
- Create a community-engaged scholarship training for practitioners or community members associated with the Center,
- Evaluate the short-term impacts of the two community-engaged training workshops,
- Engage in a stakeholder needs assessment for Great Lakes and environmental health literacy to inform general outreach information needs,
- Conduct a vulnerable population needs assessment to inform targeted health communication campaign and its efficacy evaluation



Photo: Todd Marsee, Michigan Sea Grant

Accomplishments

- Community-Engaged Scholarship Institute - May 2019, n=21
- Hunnell, J., Triezenberg, H. A., & Doberneck, D. (2020) Training early career Great Lakes scientists for Effective Engagement and Impact. [*Journal of Contemporary Water Research and Education*, volume 170, 19-34.](#)

Harmful Algal Bloom Community Health Project



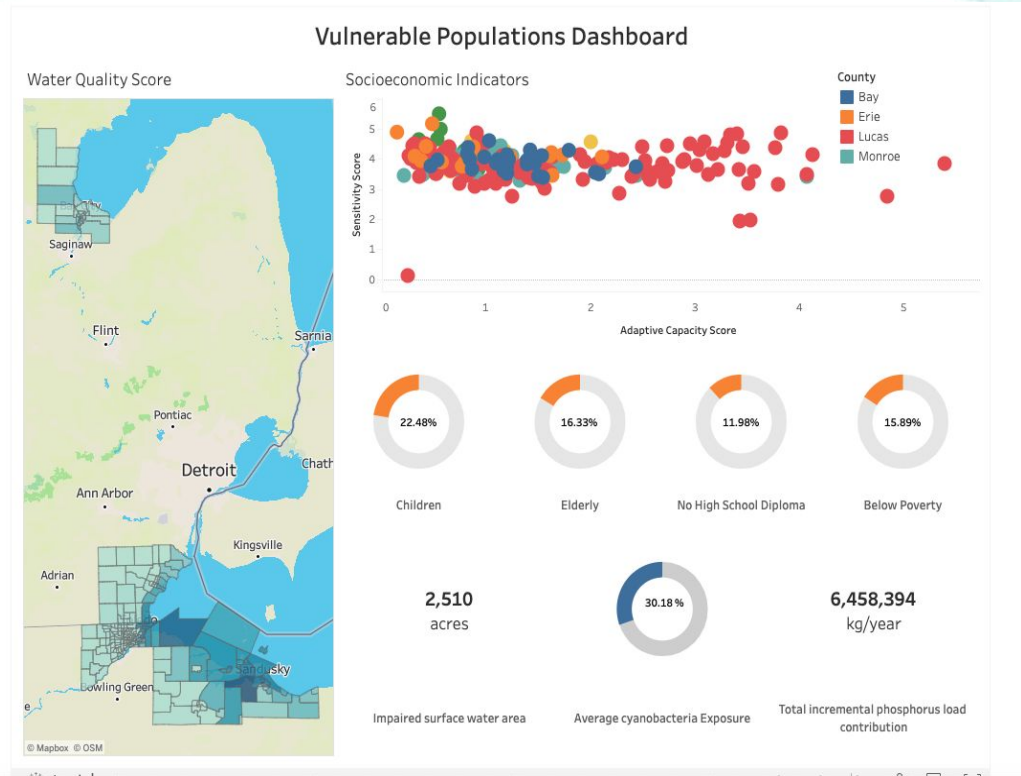
Algal blooms are prevalent in Western Lake Erie, creating nuisance conditions and public health concerns for consumption, direct contact, and aerosolization of this water source by humans. When cyanotoxins, such as microcystin, are present in the blooms, they are commonly referred to as harmful algal blooms or HABs.

HABs caused the 2014 Toledo drinking water crisis, drawing increased media attention to this critical environmental issue. As the prevalence of algal blooms increases in other areas of the Great Lakes (e.g., Lake

The online data dashboard displays data in three categories: sensitivity due to underlying health status, adaptive capacity if exposure to a HAB occurs, and exposure to water quality impairments. The results of

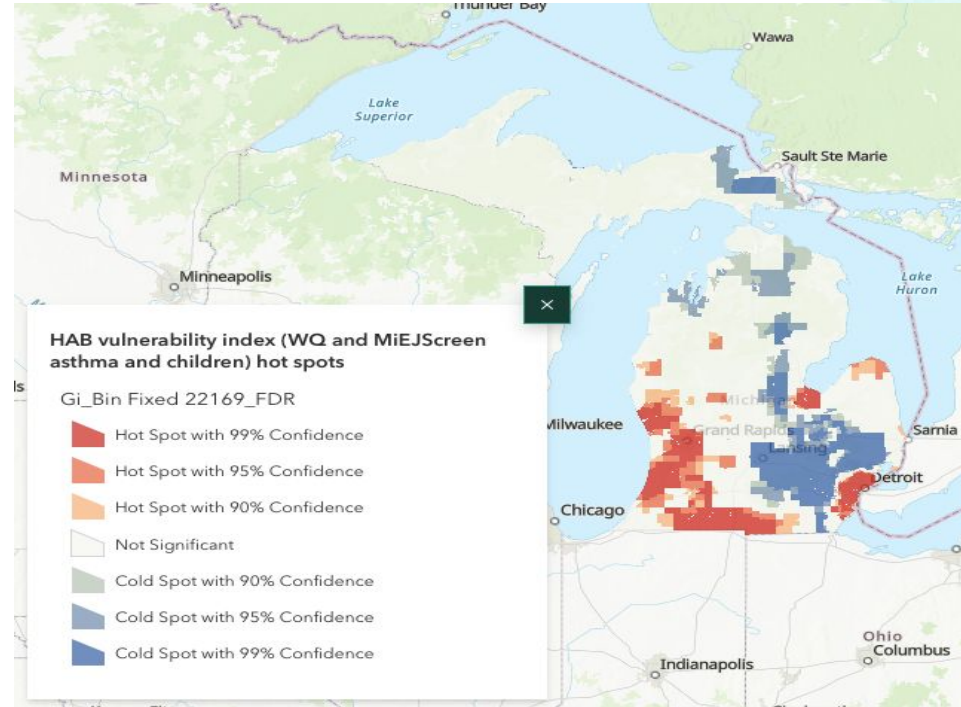
Accomplishments

- GIS analysis of vulnerable population needs assessment
 - 3-factor model:
 - i. underlying health conditions,
 - ii. adaptive capacity,
 - iii. water quality conditions
 - Tableau Dashboard
- HABs and community health fact sheet



Accomplishments

- GIS analysis of vulnerable population needs assessment for Michigan's inland waters
 - Socio-economic and Health data - Environmental Justice Screening Tool
 - Watershed scale USGS SPARROW model
 - Average weekly cyanobacteria loading EPA's CyanApp
 - i. Major risk factors:
 1. High cyanobacteria loads
 2. High % of children <5 years
 3. High asthma likelihood
 4. High nutrient loads from WWTPs
 - [Top 10 risk areas available MSUE news](#)



Complementary project with MSU Institute of Water Research (USGS funding)



Online tool identifies areas where people in Michigan are at greatest risk from harmful algal blooms (HABs)

Heather Triezenberg, Michigan Sea Grant, MSU Extension; and Glenn O'Neil, MSU Institute of Water Research - June 20, 2023

Algae are tiny, microscopic plants or cyanobacteria that live in most waterbodies, and when they grow to a size that can be seen, this is called an algal bloom. Some algal blooms contain toxins that can be harmful to animals or humans. When that occurs, it is called a harmful algal bloom or HAB. [Michigan State University \(MSU\) Institute of Water Research](#), [MSU Extension](#), and [Michigan Sea Grant](#) developed a tool (<https://bit.ly/MichiganHABs>) to identify locations where HABs in Michigan may pose the greatest risk to humans.

Many factors can influence the occurrence of HABs, including land uses and nutrients entering a waterbody. Some people, such as children 5 years and younger or adults 65 years and older, or people with asthma, other underlying health conditions, or a weakened immune system may be more sensitive to the risks of HABs. Therefore, the tool spatially displays:

Concerned about harmful algal blooms (HABs)?

Online tool helps identify areas where people in Michigan are at greatest risk from HABs.



- The tool includes data from:
- 2022 Michigan Department of Environment, Great Lakes, and Energy's Environmental Justice Screening Tool;
 - 2012 U.S. Geological Survey 2012 SPARROW nutrient model; and
 - 2016-2022 U.S. Environmental Protection Agency CyanApp average weekly cyanobacteria loading.

Accomplishments

- Interviews Great Lakes Center scientists and stakeholders (lake associations, agencies, and public health officials). Themes:
 - Desire to communicate results to public is high, but prioritizing time to do so is difficult among other research priorities.
 - Many scientists communicate regularly with particular stakeholders, often do not deviate from a single communication format.
 - Collaboration with the CEC is desired for the generation of effective communication products and the facilitation of in-person outreach events.
 - Members of the general public desire compiled, easily understood information to disseminate to their networks via either written (i.e. newsletters) or electronic (i.e. social media) correspondence.
- Clites, E., Triezenberg, H.A., and Doberneck, D. (2024). Aligning Audience Needs with Scientists' Information in the Complex Harmful Algal Bloom Outreach to Engagement Continuum. *Journal of Contemporary Water Research & Education*, 181(1), 1-10.
<https://doi.org/10.1111/j.1936-704X.2024.3408.x>

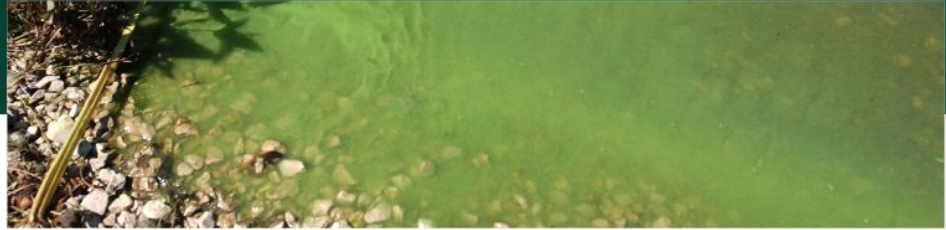


Photo: Todd Marsee, Michigan Sea Grant

Accomplishments

- Hosted three-day October 2021 Joint Center Annual Meeting that included:
 - A panel discussion titled “Bridging the gap between research and clinical practice” with professionals from the human health field.

OCEANS, FRESH WATERS, AND HUMAN HEALTH: BRIDGING THE RESEARCH AND CLINICAL PRACTICE GAP PANEL SUMMARY



Background

The Great Lakes Center for Fresh Waters and Human Health Community Engagement Core proposed to conduct a community public health-focused engagement workshop to complement the [community-engaged scholarship workshop for center scientists conducted in 2019](https://tinyurl.com/yf25mbkm) (tinyurl.com/yf25mbkm). Instead of planning, hosting, and evaluating a community engagement workshop for public health practitioners at the beginning months of the global COVID-19 pandemic, we focused on facilitating virtual collaborations and meetings, including the joint [Oceans and Human Health Center annual meeting held October 4-6, 2021](https://tinyurl.com/y26y82dr) (tinyurl.com/y26y82dr) that had 202 registered attendees.

The meeting included two plenary speakers on the topics of microplastics and climate change. It had five topic-based sessions consisting of 26 oral presentations, seven speed talks, and 21 poster presentations, as well as pre-recorded updates from five Oceans and Human Health centers or National Institute of Health independent research R01 grants. The meeting also had a roundtable discussion with National Institute of Environmental Health Sciences and National Science Foundation program officers and leaders about the future of the Oceans and Human Health portfolio. The moderated panel discussion focused on bridging the gap between research and clinical practice in oceans and human health. Below is a summary of the panel as a guide for future directions.

Panelists

- Dr. Philip Landrigan (Boston College), Moderator
- Dr. Lorrie Backer (National Center

Needs

- Improve the link between basic environmental research on oceans and freshwaters, and clinical health practice, and the health of human populations.



Accomplishments

- Understanding risk perception and health risk communication message testing related to harmful algal blooms (HABs) in Michigan Lakes (Benitez Gonzalez, 2022, M.S. Thesis)
- Key findings:
 - Local newspapers, word of mouth, social media (i.e., Facebook groups)
 - Few aware of HABs and causes; Many unaware of health effects; uncertain if safe to consume fish with HAB presence
 - Vulnerable population respondents expressed lack of trust
 - Generally, the public is learning about HABS effects to direct and personal experiences
 - Attitudes are important (Theory of Planned Behavior)!
 - T-test result indicated emotional message had higher risk perception than cognitive message.

Freshwater Harmful algal blooms (HABs) :
Health risks & Vulnerable populations

"I would give anything to have one more day with them..."

"...My dogs contracted blue green algae poisoning in the lake and there was nothing they could do. I wish I could do today over. We are gutted."

-Melissa Martin posted on Twitter after losing her two dogs after ingesting blue-green algae blooms

Loved ones that have higher health risks if exposed to HABs:

- Dogs
- Children under the age of 6
- Pregnant & nursing women
- Pre-existing liver or kidney conditions
- Those receiving dialysis treatment
- Elderly or sensitive populations

Routes of exposure:

- Swallowing:** contaminated water or seafood contaminated with
- Breathing:** aerosolized toxins
- Touching:** contaminated water when swimming or boating

Emotional

Protect your family, think before you swim!

Freshwater Harmful algal blooms (HABs) :
Health risks & Vulnerable populations

What are Harmful Algal Blooms (HABs)?

Blue-green algae are a natural part of lakes, rivers, and ponds, under specific conditions, they can grow out of control and produce poisonous substances – such as *Cyanotoxins* or *Microcystin* – causing harmful effects on people, fish, dogs, and other aquatic mammals.

Who are considered part of the 'vulnerable populations' ?

- Dogs
- Children under the age of 6
- Pregnant & nursing women
- Pre-existing liver or kidney conditions
- Those receiving dialysis treatment
- Elderly or sensitive populations

"If it's green, don't go in!"

Routes of exposure:

- Ingestion:** swallowing contaminated water or eating seafood contaminated with toxins
- Inhalation:** breathing in aerosolized toxins
- Contact:** direct contact with contaminated water when swimming or

Cognitive

Health Risks Associated with Beach Contaminants

Do's and Don'ts with HABs in the lake

- Do avoid contact with water when blue-green algae is visible
- Don't drink untreated surface water when blooms are present
- Do rinse yourself and your pet after swimming in any lake, regardless of presence of visible algal blooms
- Don't allow children or pets to play in or drink water when scum is present

Reported signs and symptoms after HABs exposure:

- Skin contact:** severe rash, dermatitis, blisters
- Neurological:** headache & dizziness
- Eye exposure:** swelling, conjunctivitis, lacrimation
- Ingestion:** stomach pain, nausea, vomiting, diarrhea, liver damage
- Respiratory / Inhalation:** atypical pneumonia, rhinitis, sore throat, bronchospasm, pneumonia

If exposed, what should I do about it?

- To report suspicious-looking algae:
 - Call EGLE & the Environmental Assistance Center at 1-800-662-9278
 - Send an e-mail to: AlgaeBloom@Michigan.gov
- To learn about illnesses caused by cyanobacteria
 - Call poison control center external icon hotline at 1-800-222-1222

Health Risks Associated with blue-green algae:

Do's and Don'ts with blooms in the lake

- Do avoid contact with water when blue-green algae is visible
- Don't drink untreated surface water when blooms are present
- Do rinse yourself and your pet after swimming in any lake, regardless of presence of visible algal blooms
- Don't allow children or pets to play in or drink water when scum is present

Reported signs and symptoms after blue-green algae blooms exposure:

- Skin contact:** severe rash, dermatitis, blisters
- Neurological:** headache & dizziness
- Eye exposure:** swelling, conjunctivitis, lacrimation
- Ingestion:** stomach pain, nausea, vomiting, diarrhea, liver damage
- Respiratory / Inhalation:** atypical pneumonia, rhinitis, sore throat, bronchospasm, pneumonia

If exposed, what should I do about it?

- To report suspicious-looking algae:
 - Call EGLE & the Environmental Assistance Center at 1-800-662-9278
 - Send an e-mail to: AlgaeBloom@Michigan.gov
- To learn about illnesses caused by cyanobacteria
 - Call poison control center external icon hotline at 1-800-222-1222

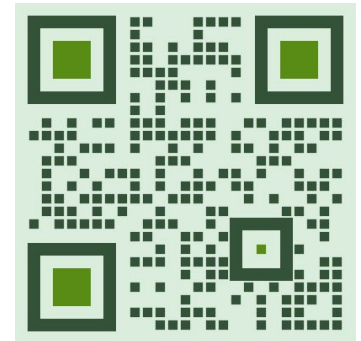


Accomplishments

- March 2024
 - Harmful algal blooms 101 (Erica Clites, Michigan Sea Grant)
 - Algae (Julianne Heinlein, Great Lakes Environmental Center)
 - HABs response (Alex Rafalaski, MI Department of Health & Human Services)
 - HABs prevention (Erick Elgin, MSU Extension)



Recording available!



Harmful Algal Blooms (HABs) 101 Resources



Compiled by: Michigan Sea Grant, MSU Extension, Michigan Department of Health and Human Services and other partners around the state.

Featured resources

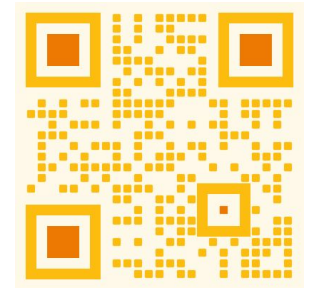
- Is it a HAB?
 - [Michigan Harmful Algal Bloom Picture Guide](#) (slideshow PDF; EGLE, MDHHS)
 - [EGLE Classroom - Identifying Harmful Algal Blooms/Cyanobacteria](#) (YouTube video; EGLE)
- [Harmful Algal Blooms: FAQs](#) (PDF; MDHHS, MDARD, EGLE)
- [Harmful Algal Blooms: Pets and livestock](#) (PDF; MDARD)

Accomplishments

- July 2024
 - Algal ecology - Julianne Heinlein, Great Lakes Environmental Center
 - Filamentous algae/Cladophora - Marcella Domka, Tip of the Mitt Watershed Council
 - Didymo - Jordyn Stoll, Trout Unlimited
 - Golden brown algae - R. Jan Stevenson, MSU Emeritus



Recording
available!



MYTH: All algae blooms contain toxins

REALITY: Most types of algae (like the green, stringy algae common in Michigan lakes and streams) do not make toxins. Cyanobacteria are photosynthetic bacteria and can produce toxins.

Photo Julianne Heinlein

MYTH: This is a harmful algal bloom

REALITY: Algae is vital in aquatic habitats!

Algae are simple, photosynthetic organisms adapted to a wide range of environments. They form the foundation of most aquatic ecosystems. Very few in the Great Lakes produce toxins that harm humans or animals.

Photo Julianne Heinlein

MYTH: All algae blooms look the same

REALITY: Blooms can look like spilled paint, pea soup, floating scums, mats, sheens, clumps or streaks.

Photo Michigan Sea Grant

MYTH: This is a harmful algal bloom

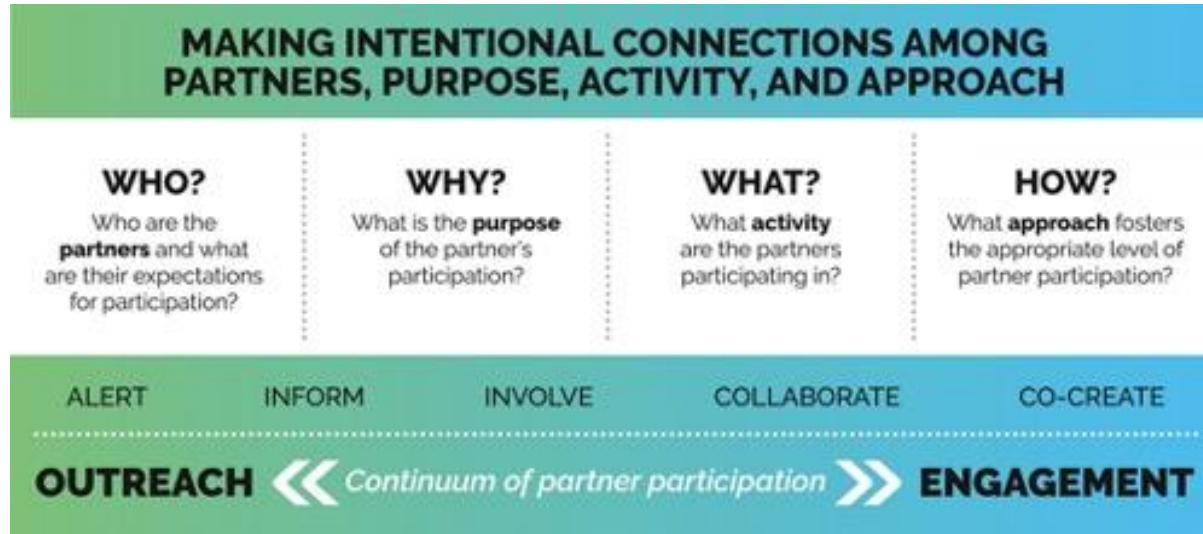
REALITY: From a distance, aquatic plants like duckweed and watermeal can look like a HAB. Up close, they are clearly individual plants.

Photo EGLE



A Strategic Framework for Community Engagement in Oceans and Human Health

A Strategic Framework for Community Engagement in Oceans and Human Health



Strategic Framework for Oceans and Human Health Community Outreach and Engagement modified from the International Association for Public Participation (IAP2) spectrum of public participation (International Association for Public Participation, 2018). See www.iap2.org and https://cdn.ymaws.com/www.iap2.org/resource/resmgr/pillars/Spectrum_8.5x11_Print.pdf.

Carson, M. A., Doberneck, D. M., Hart, Z., Kelsey, H., Pierce, J. Y. Porter, D. E., Richlen, M. L., Schandera, L. and Triezenberg, H. A. (2022). A strategic framework for community engagement in oceans and human health. *Community Science*, 1(1), <https://doi.org/10.1029/2022CSJ000001>

	Alert	Inform	Involve	Collaborate	Co-create
Who?	Health risk prevention	Non scientists	Non researchers	Researchers and partners	Researchers and partners
Why?	Urgent	Urgent	Consultative or advisory		
What?	Multi-layered messaging; time sensitive;	Convey scientific knowledge	Invite input, ideas, perspectives. Seek to understand perspectives, but researchers retain authority and control of decisions		Sharing equally in goal-setting, information-sharing, decision-making power, leadership, other aspects
How?	One-way flow of information	One-way flow of information	One-way flow of information	Two-way exchange of information	Two-way exchange of information

Being purposeful among “*partners, purpose, activities, and community engagement approaches intentionally in their work with communities*”

- Clear distinctions and discussions upfront can prevent misunderstandings and miscommunications.
- Any activity along O-E continuum is legitimate; one side not preferable to other
- Desired outcomes inform the intentionality and alignment.
- Misalignment may result in: failing to achieve outcomes, wasting time/resources, erode public trust, and future efforts more difficult.



Acknowledgements



We thank the participants for sharing their perspectives, as well as institutional partners. Funding was from funding from the NIH (1Po1ES028939-01) and the NSF (1840715) to the Bowling Green State University Great Lakes Center for Fresh Waters and Human Health, and the National Oceanic and Atmospheric Administration, U.S. Department of Commerce through the Regents of the University of Michigan (awards NA180AR4170102 and NA22OAR4170084). The statements, findings, conclusions, and recommendations are solely the responsibility of the author(s) and do not necessarily reflect the views of the National Institutes of Health, National Science Foundation, National Oceanic and Atmospheric Administration, the Department of Commerce, or the Regents of the University of Michigan.

Great Lakes Center for Fresh Waters and Human Health (2024-2029)

- Co-Directors: Greg Dick, David Kennedy
- 28 faculty researchers
- 11 universities

GREAT LAKES CENTER FOR FRESH WATERS AND HUMAN HEALTH

[HOME](#) [PEOPLE](#) [RESEARCH](#) + [PUBLICATIONS](#) [NEWS & EVENTS](#) [ENGAGEMENT](#) + 



Great Lakes Center for Fresh Waters and Human Health

Transitions - 2024-2029 Community Engagement Core team



Chris Winslow, PhD



Sara Guiher, MS

<https://sites.lsa.umich.edu/greatlakeshumanhealth/>



Thank you

Heather Triezenberg - vanden64@msu.edu

Diane Doberneck - connordm@msu.edu

Erica Clites - clitese1@msu.edu

Alex Benitez - benite18@msu.edu