WISCONSIN DEPARTMENT of HEALTH SERVICES

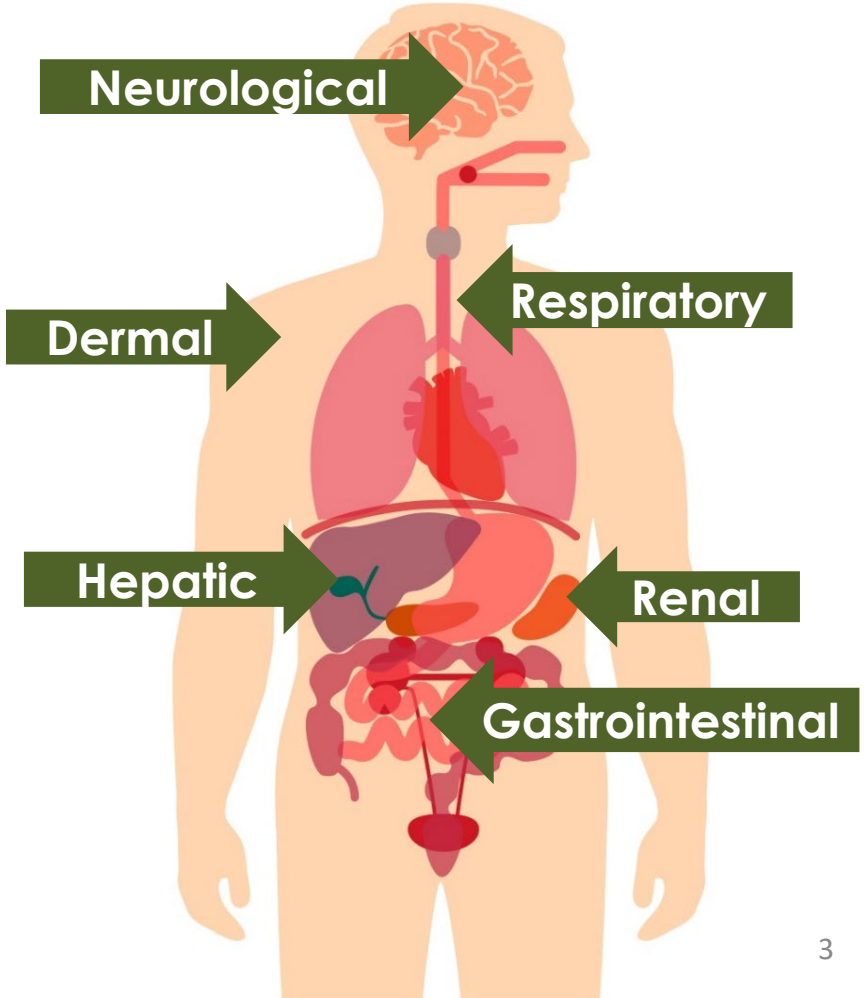
Cyanobacterial Harmful Algal Blooms: A Public Health Issue

January 4, 2023

Jordan Murray, MPH
Harmful Algal Bloom Epidemiologist
Wisconsin Department of Health Services | Division of Public Health
Bureau of Environmental and Occupational Health

Cyanobacteria can be a health hazard.

Cyanotoxins affect body systems and organs



Signs and symptoms depend upon:

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Route(s) of exposure

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Species and toxin type(s)

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Species and toxin type(s)

Cell and toxin concentrations

Signs and symptoms depend upon:

Route(s) of exposure

Species and toxin type(s)

Cell and toxin concentrations

Existing vulnerabilities

Exposure Routes

Ingestion

Ingestion

Gastrointestinal:

- Abdominal pain
- Nausea
- Diarrhea
- Vomiting

Ingestion

Gastrointestinal:
Abdominal pain
Nausea
Diarrhea
Vomiting

Neurologic:
- Dizziness
- Numb lips
- Tingling fingers and toes

Dermal

Dermal

- Rash
- Hives
- Skin blisters

Inhalation

Inhalation

Cold-like symptoms:

- Runny eyes
- Runny nose
- Sore throat
- Cough

Animals

- Their behaviors and smaller size make them vulnerable.

- They serve as sentinels for human illness.

Signs of Illness

- Lethargy
- Drooling
- Weakness
- Seizures
- Vomiting
- Diarrhea
- Difficulty breathing

Chronic Exposure to HAB Toxins

Chronic exposure to HAB toxins may exacerbate pre-existing health conditions

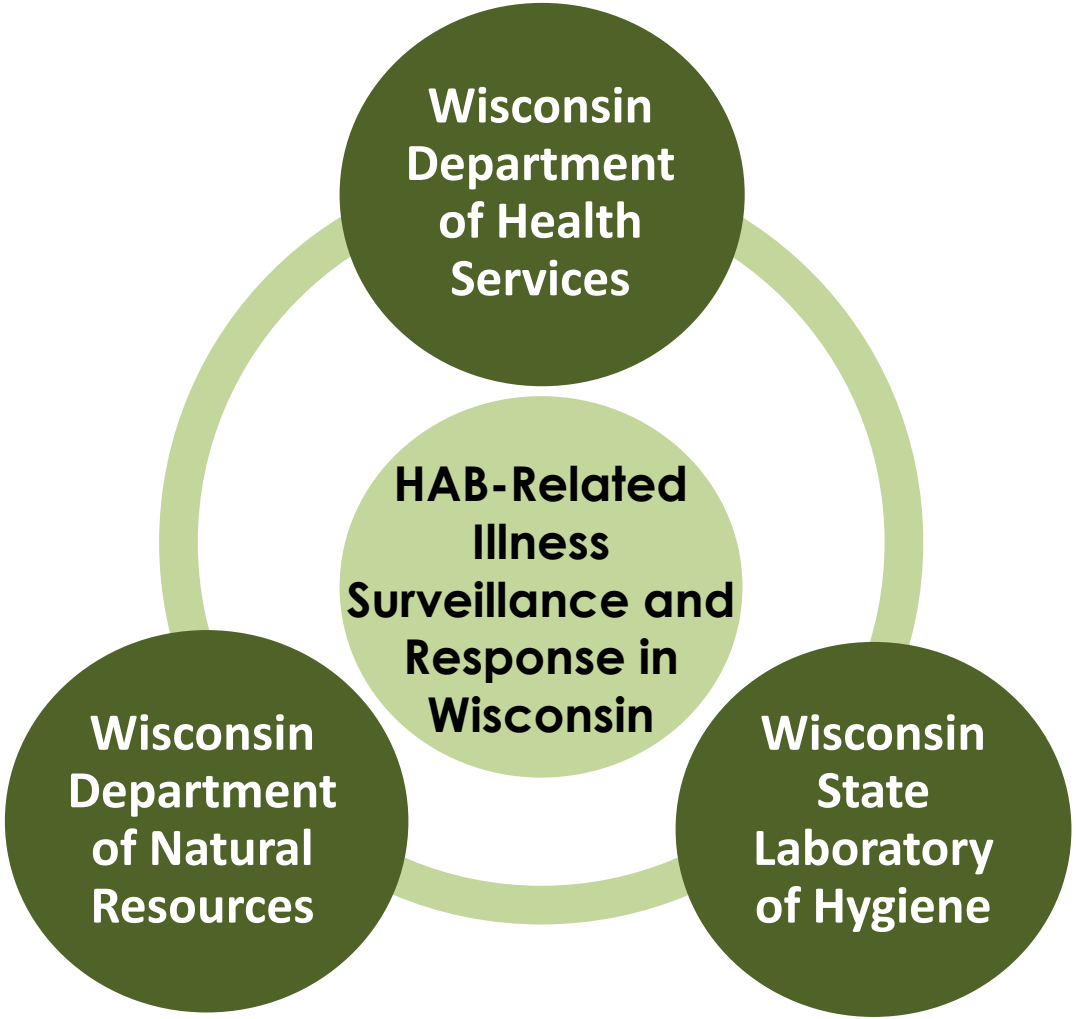
- Non-Alcoholic Fatty Liver Disease
- Non-alcoholic steatohepatitis
- Liver cancer
- Airway and lung inflammation

Wisconsin Department of Health Services

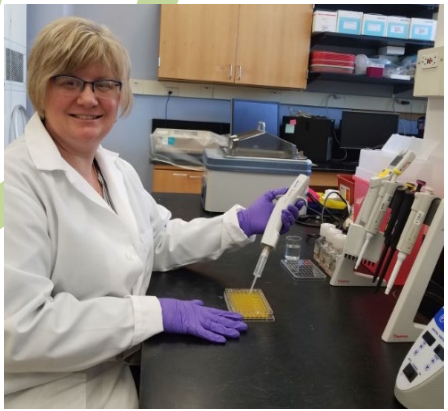
Harmful Algal Bloom Surveillance Program

Our Goal

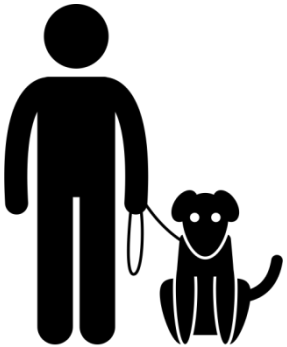
Prevent and manage HAB-related illnesses in Wisconsin through surveillance, outreach, and research


Wisconsin Department of Health Services
HAB-Related Illness Surveillance and Response in Wisconsin
Wisconsin Department of Natural Resources
Wisconsin State Laboratory of Hygiene

HAB-Related Illness Surveillance and Response in Wisconsin



Conduct surveillance of health effects related to HAB exposure



Investigate reports of human and animal illnesses

Coordinate water sampling and analysis

Help local public health issue health advisories and beach closures

Provide education and outreach

DHS's Illness Investigation Process

Step 1.

Receive an illness complaint and interview complainant.

WISCONSIN DEPARTMENT of HEALTH SERVICES

Search Wisconsin DHS

About DHS | Data & Statistics | Diseases & Conditions | Health Care & Coverage | Long-Term Care & Support | Prevention & Healthy Living | Partners & Providers | Certification, Licenses & Permits

Topics A-Z: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Prevention & Healthy Living > Environmental Health > Water > Blue-Green Algae

- Blue-Green Algae Home
- Understanding Algae
- Health Concerns
- Algal Bloom Photos
- Keeping our Lakes Clean
- For Health Professionals
- Resources and Links
- Contact Us

Blue-Green Algae

The Wisconsin Department of Health Services, Division of Public Health (DPH) collects information about human and animal illness resulting from exposure to blue-green algae. Tracking illness information will help DPH measure the problem of blue-green algae in our lakes and rivers.

If you get sick after swimming in a Wisconsin lake or river, please report possible algae-related illness. This program does not provide medical treatment, so if you are experiencing severe symptoms seek medical attention immediately.

When in doubt, stay out!

NEW!

For healthcare providers: beginning 7/1/2018, report any suspected human cases of Cyanobacteria and Cyanotoxin Poisoning electronically through WEDSS or by mailing or faxing a completed Acute and Communicable Disease Case Report, F-44151 to the address on the form.

For members of the general public and veterinarians: call 608-266-1120 or complete the online form Harmful Algae Bloom (HAB) Illness or Sighting Survey, F-02152 (Web Survey) to report any blue-green algae blooms and related human or animal illnesses to the Wisconsin Harmful Algal Blooms Program.

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Case classification:
☐ Confirmed case
☐ Probable case
☐ Suspect case
☐ Not a case

Human HAB-Related Illness Interview Form

CDC Case ID: _____
CDC HAB Report ID: _____

WI Case ID: _____
WI HAB Report ID: _____
Date of interview: ___/___/_____ Time ___:___ ☐ AM ☐ PM
DPH Staff interviewer name: _____
Interview completed with: ☐ Patient ☐ Surrogate (specify): _____

INTERVIEW ATTEMPTS

Date attempted	Time	Outcome (e.g. left message with household member, left voicemail, no answer, wrong number, refused interview)	DPH Staff Member

DEMOGRAPHIC INFORMATION

☐ Anonymous complaint

Name of patient: _____
Name of parent/guardian (if child): _____
Home address: _____ State: _____ Zip code: _____
City: _____
Phone number: _____ Home / Mobile / Work
Alternate phone: _____ Home / Mobile / Work
Date of Birth: ___/___/_____ Age (years): ____ Sex: ☐ M ☐ F

With which racial group do you most closely identify?
☐ White
☐ Black/African American
☐ Asian
☐ Native Hawaiian/other Pacific Islander
☐ Native American/Alaskan
☐ Mixed race
☐ Other
☐ Unknown/refused

Are you of Hispanic ethnicity?
☐ Yes
☐ No

Case classification:
☐ Confirmed case
☐ Probable case
☐ Suspect case
☐ Not a case

Animal Illness Interview Form

CDC Case ID: _____
CDC HAB Report ID: _____

WI Case ID: _____
WI HAB Report ID: _____
Date of interview: ___/___/_____ Time ___:___ ☐ AM ☐ PM
DPH staff interviewer name: _____

Please identify who reported this case to DPH (Point of Contact):
☐ Citizen
☐ Health Care Provider
☐ State Agency
☐ County Agency
☐ Poison Control
☐ Other agency: _____
☐ Media

Case reporting method:
☐ Online form
☐ Phone
☐ Email
☐ Other
☐ Automatic notification (WPC)
☐ During patient interview (case finding)

Name of point of contact: _____
Agency name (if any): _____
Phone number: (___) ___-____ ext. _____
Email: _____
POC's relationship to ill animal(s): _____
How did the POC hear about this program? _____

OWNER INFORMATION

☐ Anonymous complaint

Name of owner: _____
Home address: _____
City: _____
Phone number: _____ State: _____ Zip code: _____
Alternate phone: _____ Home / Mobile / Work
_____ Home / Mobile / Work

DESCRIPTIVE INFORMATION

How many animals are ill? _____
☐ Single animal
☐ Multiple animals in same household (*complete a separate interview for each animal*)
☐ Group of animals (e.g. herd, flock, school of fish)

Step 1.

Receive an illness complaint and interview complainant.

Step 2.

Assess complaint and coordinate sampling.

Is the water representative of environmental conditions at the time of the exposure?

- What does the water look like now?
- How many days have passed since the person or animal was exposed?
- Have significant environmental events caused or are they suspected to cause changes to the bloom before sampling?

Harmful Algal Bloom Surveillance Program
Field Staff Sampling Protocol

Wisconsin Division of Public Health
Wisconsin Department of Natural Resources

2018 Update

When to use this kit:
For Response Monitoring by DNR staff when these three criteria are met:

- illnesses suspected to be related to HAB exposure are reported;
- DHS Division of Public Health partners determine the case histories, symptoms, and environmental conditions are consistent with HAB exposure;
- full cyanobacterial identification and enumeration, cyanotoxin analysis, water chemistry, and coliform bacteria testing are required.

Use may be warranted in other situations with public health impact but consult with the Statewide Blue-green Algae Coordinator before using the kit.

When NOT to use this kit:

- Confirmation of bloom presence only.
- Cyanobacterial identification and/or enumeration without requirement for cyanotoxin analysis, water chemistry, or E. coli testing.

Consult with the Statewide Blue-green Algae Coordinator for photo identification, or seek identification and enumeration services from the Wisconsin State Laboratory of Hygiene (WSLH).

If non-DNR entities (county staff, homeowners) are seeking cyanobacterial testing, please refer them to the Statewide Blue-green Algae Coordinator. They can seek services from WSLH, but if testing results are going to be used for beach monitoring or other public health issues, the coordinator needs to brief them on availability of messaging resources and the need to work with local public health officials.

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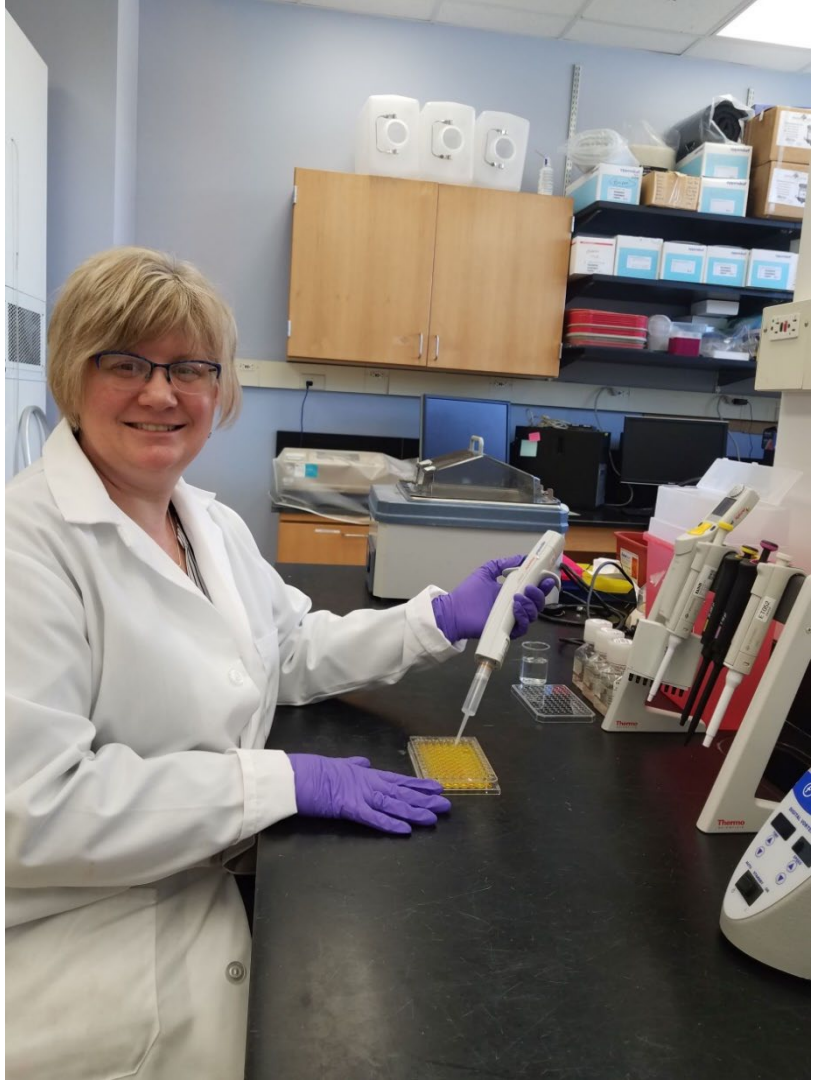


Step 1.

Receive an illness complaint and interview complainant.

Step 2.

Assess complaint and coordinate sampling.

Step 3.

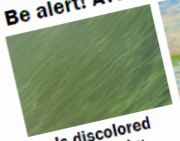
Interpret health risk and make recommendations to protect public health.

CAUTION

BLUE-GREEN ALGAE (CYANOBACTERIA) BLOOM MAY BE PRESENT IN THE WATER

Blue-green algae can produce toxins that can make people and animals sick.

Be alert! Avoid water that:



Is discolored or streaky

Looks like spilled paint or pea soup

Has floating scum, globs, or mats

Has small green dots floating in it

- ✓ **Do not swallow lake water or touch foam, scum, or algal mats.**
- ✓ **Do not let pets swim in scummy water or lick algae off their fur.**
- ✓ **Rinse fish with fresh, clean water and throw away guts before cooking and eating.**
- ✓ **Do not swim in areas where you cannot see your feet in knee-deep water.**

Call your doctor, the Wisconsin Poison Center, or your veterinarian if you or your animals have sudden sickness or signs of poisoning.

Wisconsin Poison Center: 800-222-1222

For questions or to report a blue-green algae-related illness, call:

To learn more about blue-green algae, visit www.dhs.wi.gov and search "algae"

WISCONSIN DEPARTMENT OF HEALTH SERVICES | DIVISION OF PUBLIC HEALTH
BUREAU OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH | P-02421A (05/2019)

ADAMS COUNTY HEALTH & HUMAN SERVICES DEPARTMENT
108 East North Street
Friendship, Wisconsin 53934-9443
Phone • 608-339-4505 Fax • 608-339-4585 e-mail • adamshhsd@co.adams.wi.us

Confirmed Blue-Green Algae Press Release: 8/8/2016

For Immediate Release

When in Doubt, Stay Out!

The Wisconsin Department of Natural Resources has confirmed the presence of blue-green algae in Lake Petenwell, Castle Rock Lake, Lake Sherwood, Lake Camelot, and Lake Arrowhead in Adams County. Illnesses in humans and animals potentially related to blue-green algae in these lakes have been reported as well.

"Swimming in or swallowing water with high levels of blue-green algae presents health risks to individuals," says Sarah Grossmesch, Adams County Health Officer. "Awareness and common sense is the key. People and their pets should avoid swimming where water looks like pea soup or smells foul." All recreation swimmers and boaters are warned to avoid direct contact with the affected lake areas.

Algae blooms take on many different appearances and colors. They can look like pea soup or spilled paint on the surface of the water. Although the color is usually blue-green the algae blooms can range from blue to red in color. There is currently no treatment for blue-green algae blooms so it is best to stay out of the water until the bloom dissipates on its own. Although many adults will avoid swimming in such conditions, children and pets are less conscious of where they chose to swim. It is important to protect children and pets from the threat of blue-green algae by making sure they avoid contaminated waters.

According to the U.S. Center for Disease Control and Prevention (CDC), adverse human health effects include difficulty breathing, stomach and intestinal issues such as vomiting and diarrhea, skin irritation, loss of appetite, nausea, or numbness or tingling of the hands and/or feet. These symptoms can show up minutes to hours after exposure. Pets, especially dogs, can experience symptoms such as fatigue, difficulty breathing, vomiting, convulsions, and even death following exposure to blue-green algae. Health officials recommend if you or your pets have been exposed to blue-green algae and are experiencing any of these symptoms to seek medical or veterinary attention.

The Wisconsin Department of Natural Resources offers tips to protect you and your family:

- Do not swim in water that looks like "pea soup", green or blue paint, or that has a scum layer or puffy blobs floating on the surface
- Do not boat, water ski, etc. over such water (people can be exposed through inhalation of aerosolized water droplets)
- Do not let children play with scum layers, even from shore
- Do not let pets or livestock swim in, or drink, waters experiencing blue-green algae blooms
- Do not treat surface waters that are experiencing blue-green algae blooms with any herbicide or algaecide-- toxins are released into the water when blue-green algae cells die

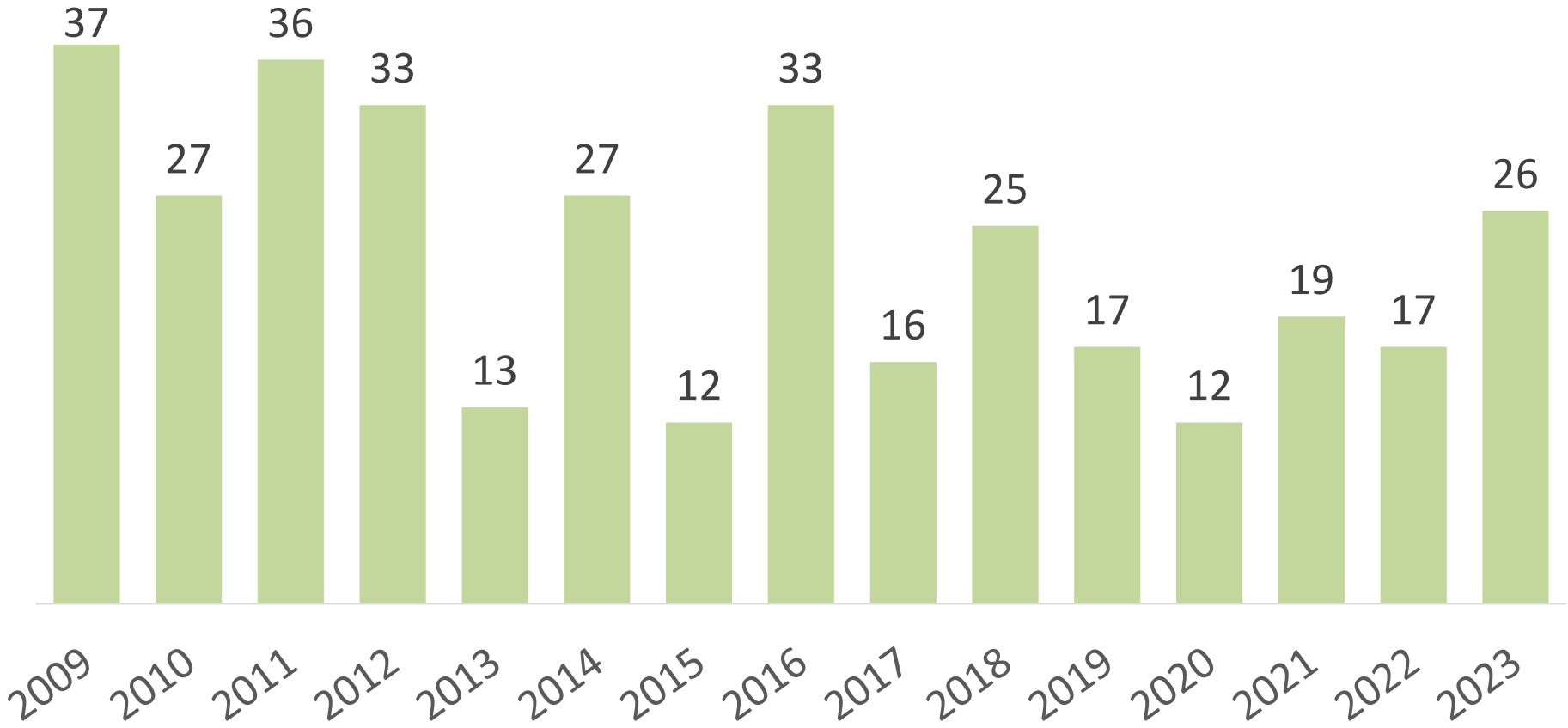
Preserving and strengthening individuals, family and community

Recreational Guidance Values

Agency	Microcystin	Cylindrospermopsin	Anatoxin-a	Saxitoxin
EPA	8 µg/L	15 µg/L	N/A	N/A
WHO	24 µg/L	6 µg/L	60 µg/L	30 µg/L

No testing? Visual observation of bloom conditions is sufficient to warrant beach closure.

Annual HAB Health Complaints, 2009–2023



HAB-Related Illness Outbreak Case Study

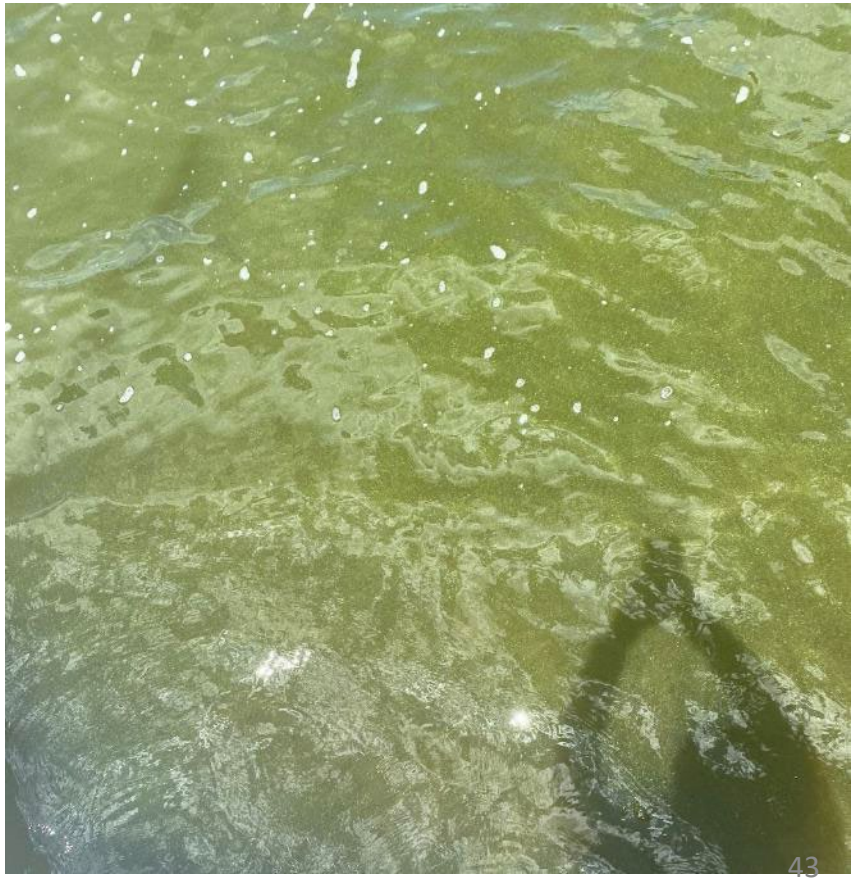
Background

- In June 2022, DHS received a survey via our online illness/bloom reporting form regarding three human illnesses.

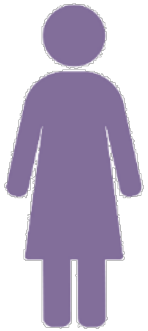
- Three recreational camp staff members (A,B,C) developed respiratory and dermal symptoms after swimming in the camp beach for ~15 minutes.

Environmental conditions

The water was "green, with a thick layer of little floating blobs" at the site and time of exposure.



Signs and Symptoms

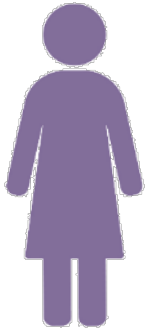


Staff Member A

- Time-to-symptom onset: 3 hours
- Headache, eye irritation/itchiness, nasal congestion
- History of autoimmune disease and seasonal allergies

➡ ***Probable Case***

Signs and Symptoms

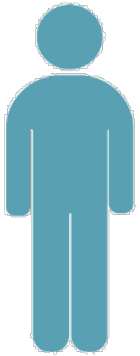


Staff Member B

- Time-to-symptom onset: 3.5 hours
- Headache, abdominal pain, eye irritation/itchiness, nasal congestion, rash/redness under eyes
- History of eczema and seasonal allergies

➡ ***Probable Case***

Signs and Symptoms



Staff [illegible]er C

- Severe [illegible]on"
- Unable to s[illegible]th illness complainant

Nearby Impacted Swim Area

A public beach was located next to and downstream from the camp.

Public Health Response

- Reported illnesses to state disease surveillance system (required) system (voluntary) and national outbreak reporting system.
- Notified local health departments
- Sent water samples to the WSLH and assisted with interpretation of test results.

Testing Results from the WSLH

- The cyanobacteria identified were Microcystis aeruginosa and Aphanizomenon flos-aquae.
- Microcystin toxin was detected at a low concentration of 3.2 ug/L.

Key takeaway: Microcystin toxin can be produced by this bloom.

Public Health Response

DHS and DNR provided assistance with

- Health advisory and beach closure signage.

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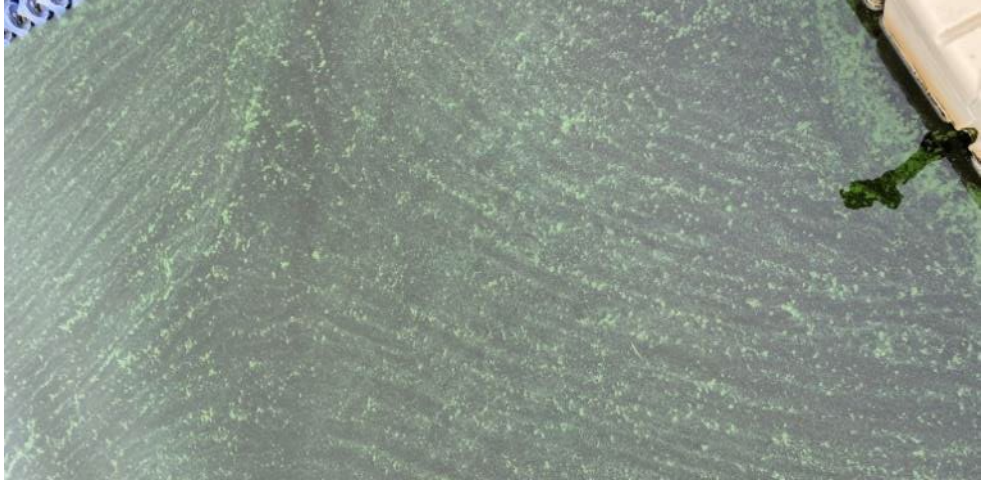
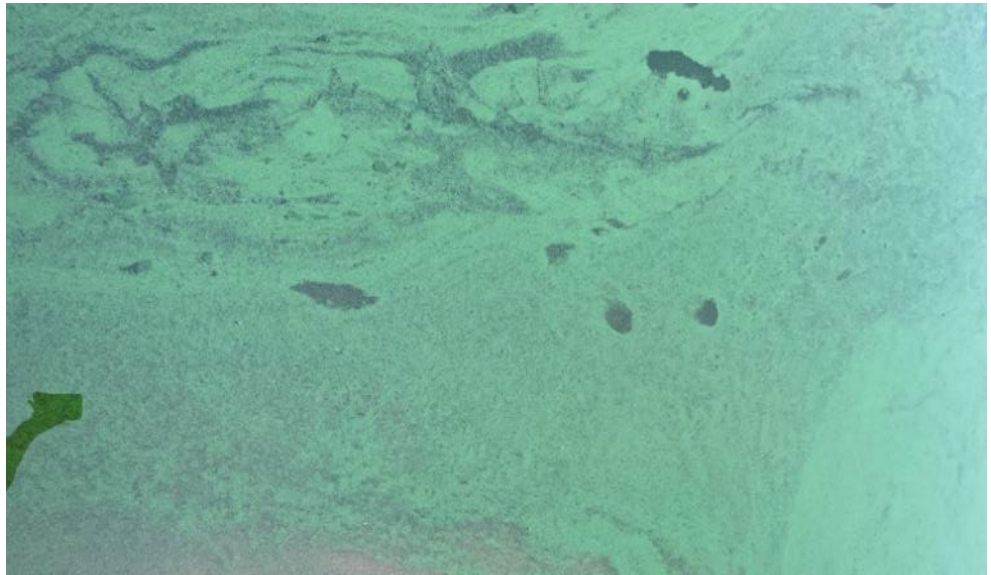
- Visual assessment and feedback of photos.





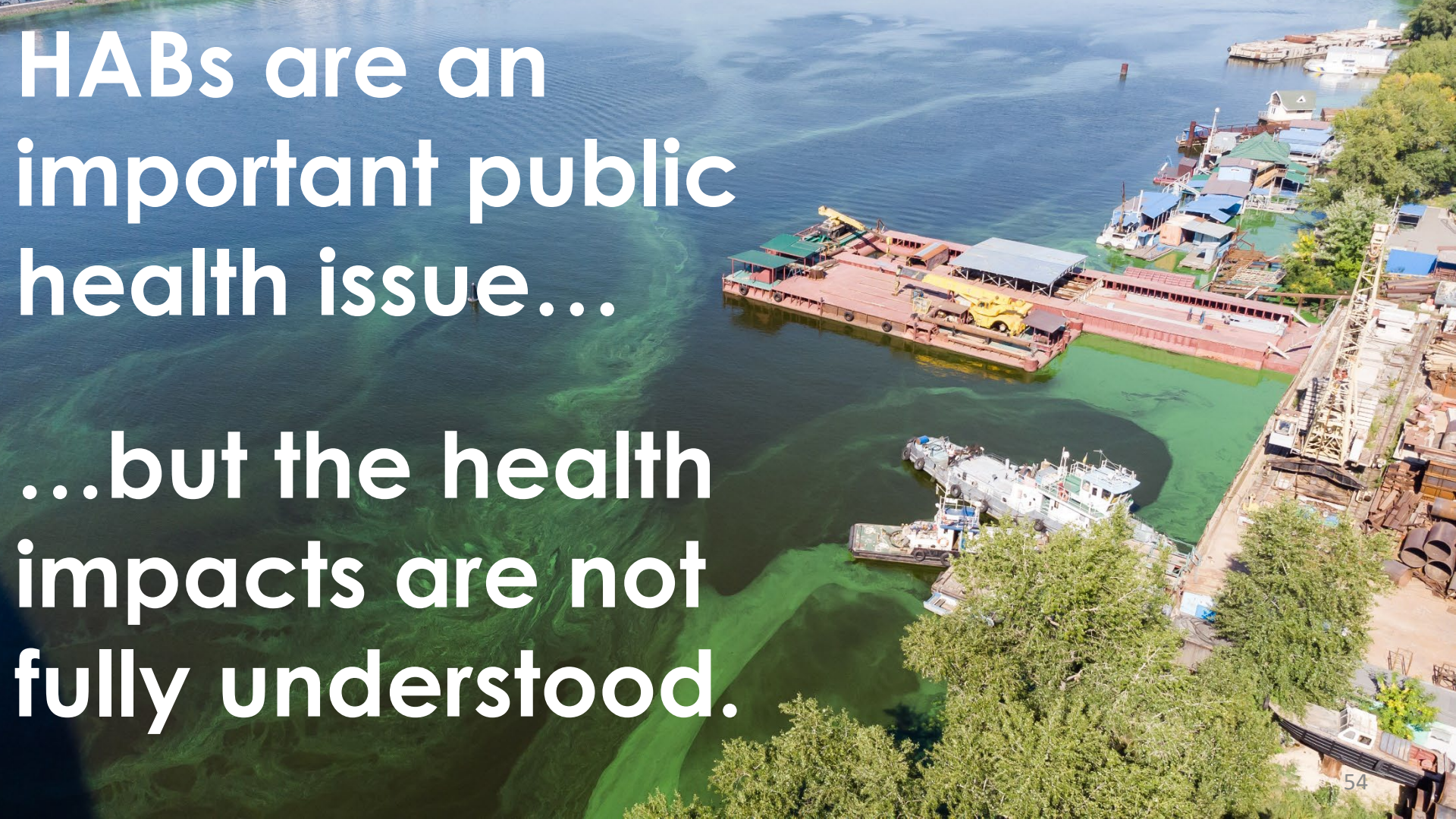
Public Health Response

DHS and DNR assisted with

- Health advisory and beach closure signage.
- Visual assessment and feedback of photos.
- Public health messaging
  - Fact sheets
  - Social media messages
  - Press release
  - HAB content for local health department website

HABs are an important public health issue…

…but the health impacts are not fully understood.



Public Health Challenges

- Poor recognition of cases
- Failure to associate illness with algal bloom exposure
- Challenging to diagnose

Wisconsin's Approach to Understanding HAB Illnesses

New Research!

Contents lists available at ScienceDirect

International Journal of Hygiene and Environmental Health

journal homepage: www.elsevier.com/locate/ijheh

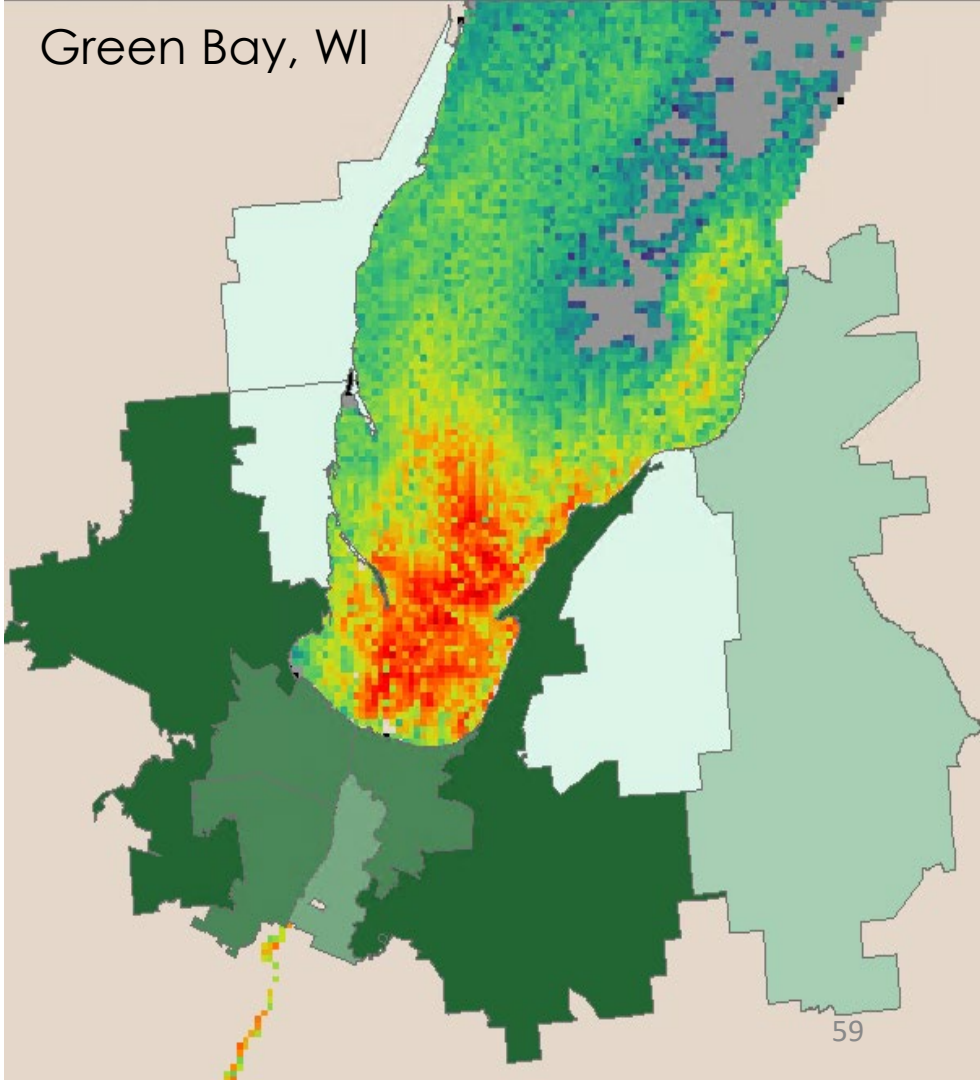
Check for updates

Assessing the relationship between cyanobacterial blooms and respiratory-related hospital visits: Green bay, Wisconsin 2017–2019

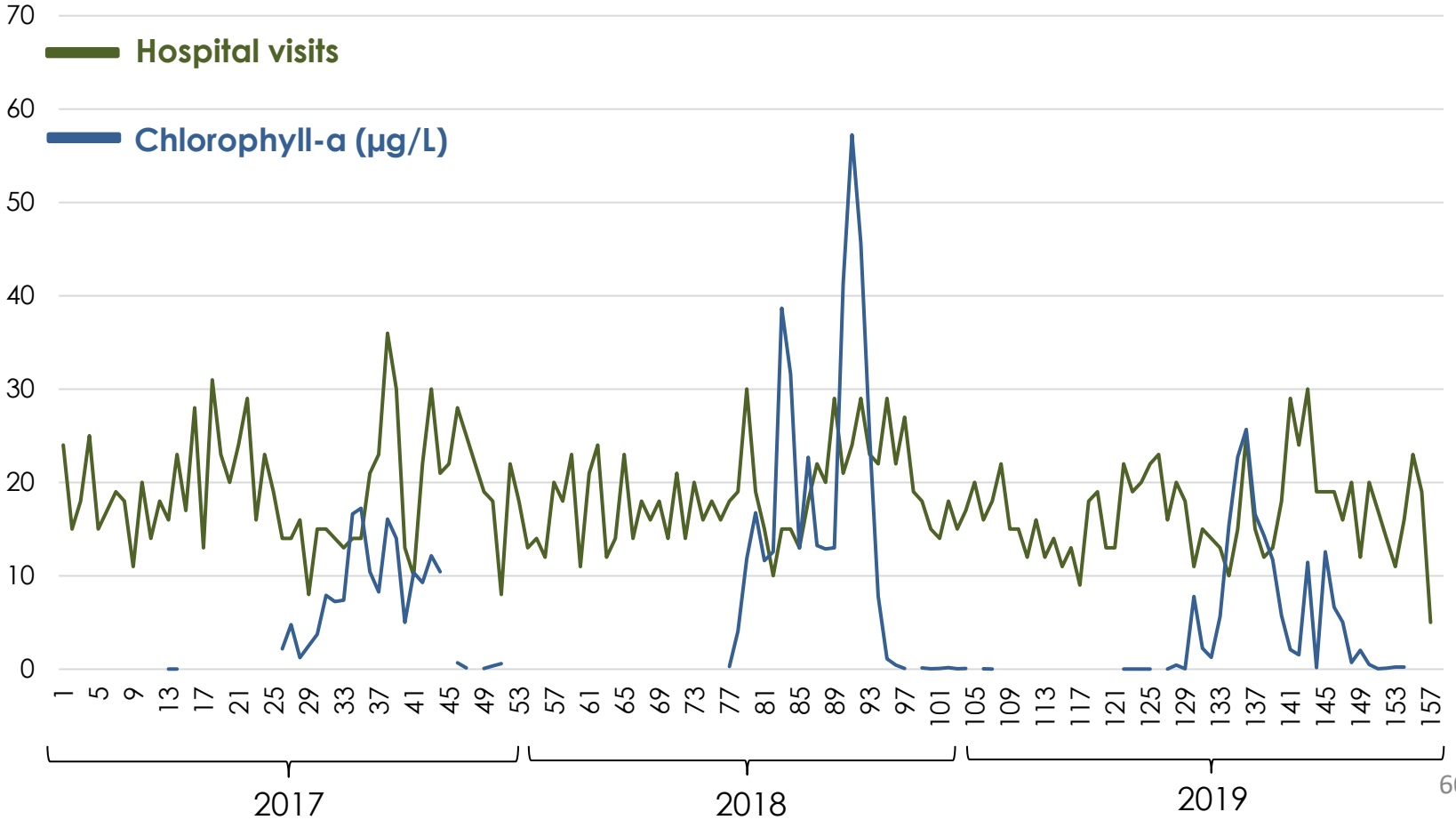
Jordan F. Murray [a,b,*], Amy M. Lavery [c], Blake A. Schaeffer [d], Bridget N. Seegers [e,f], Audrey F. Pennington [c], Elizabeth D. Hilborn [d], Savannah Boerger [g], Jennifer D. Runkle [h,l], Keith Loftin [i], Jennifer Graham [j], Richard Stumpf [k], Amanda Koch [b], Lorraine Backer [c]

Our Data

- Cyanobacteria satellite data (EPA's CyAN)
- Respiratory-related electronic health records



Comparing Weekly Hospital Visits to Chlorophyll-a Values



Conclusion

Our analyses were limited by…

- A small sample size
- Low power
- Confounders (temperature and dew point)

Conclusion

The good news is…

- This is the first study to model the relationship between cyanoHABs and population health using CyAN data and EHRs.

- We are doing this again!

Resources

Blue-Green Algae and Dog Safety

Blue-green algae are photosynthetic bacteria known as *cyanobacteria* and are a natural part of water bodies. With enough sunlight and nutrients, cyanobacteria can grow quickly and form a blue-green algae *bloom*. Blooms often look like spilled paint or pea soup and can change the color of the water to green, blue, turquoise, brown, purple, or white. Some blooms form a layer of scum or mats on the surface of the water. **Blue-green algae can produce toxins which can make people and animals sick** after they drink, breathe in, or have contact with the water. Many dogs have become sick and some have even died after drinking water with an algae bloom. Learn how to keep your dog safe!

Why are blue-green algae especially harmful to dogs?

- Dogs can't tell whether water is safe to swim or play in.
- When dogs swim and play in water, they tend to swallow water.
- Because dogs have smaller bodies, they can get sick after swallowing just a little bit of unsafe water.

How can I keep my dog safe?

- Choose clear water without noticeable discoloration or surface scum, foam, and algal mats.
- Do not let your dog swim in places where beach closure and water quality notices are posted.
- Supervise your dog at all times. Do not let your dog eat algal scum or mats or lick algae off its fur.
- Always offer fresh, clean water for your dog to drink instead of lake, river, or pond water.
- If you have any doubt about what is in

What should I do if my dog goes

- Immediately wash your dog and yourse
- Keep an eye on your dog for sudden sig
  - Vomiting
  - Diarr
  - Weakness
  - Seizu
- If your dog develops any symptoms, tak
- Report any blue-green algae related illn
  608-266-1120 or completing an online

BUREAU OF E
Harmful Algal Blooms P
Wisconsin Depa

P-00089 (08/2018)

PROTECTING YOUR FAMILY FROM HARMFUL ALGAL BLOOMS

Stay healthy around harmful algae with these simple steps!

THE HARMFUL ALGAE AND HEALTH CONNECTION

Wisconsin has more than 15,000 lakes and rivers that are home to many organisms, including algae.

In Wisconsin, algal blooms usually happen between mid-June and mid-September.

Take these important steps to protect your health and that of your family if you come across a harmful algal bloom.

WAYS TO PROTECT YOURSELF

- **Know what an algal bloom looks like.** Blue-green algae blooms can appear overnight. They can be fluorescent blue, green, white, red, or brown, and may look like thick paint or pea soup floating on the water.
- **Look for beach notices.** Be sure to check beach postings and water quality notices before you or your pet go swimming. You can be exposed while swimming by inhaling water spray or just being near a bloom.
- **Watch where your pets play.** If your pet does come into contact with blue-green algae, immediately wash them off with clean water—don't let them lick it off their fur.
- **When in doubt, stay out!** If you wade into water up to your knees and cannot see your feet, the amount of algae could be unsafe.

IE IN CONTACT WITH A BLOOM

Get

Pro tip: If
your livesto
by algae

www.dhs.wisconsin.g

Staying Safe and Healthy in Wisconsin's Lakes

What You Need to Know about Blue-Green Algae

With over 15,000 lakes, Wisconsin is a prime destination for summer fun. Learn what you can do to keep your lake visit safe and healthy by protecting yourself and your family from the harmful effects of blue-green algae.

What are blue-green algae?

- Blue-green algae are photosynthetic bacteria known as *cyanobacteria* and are a natural part of water bodies.
- With enough sunlight and nutrients, cyanobacteria can grow to high levels and form a blue-green algae *bloom*.
- Blooms are often smelly, look like spilled paint or pea soup, and can change the color of the water to green, blue, turquoise, purple, tan, or white. Some blooms form a layer of scum or mats on the surface of the water.
- While some blooms can stay in the same location for a long time, others can quickly come and go with changing currents and wind patterns. Blooms usually form during the summer months in Wisconsin, or May–September.
- **Blue-green algae blooms can produce toxins that can make people and animals sick after they swallow, breathe in, or have contact with the water.**

How can I keep myself, my family, and my pets safe at the lake?

- When searching for a spot to swim, choose the clearest water possible. Avoid water that:

Looks like spilled latex paint

Looks like green pea soup

Is discolored or streaky

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CAUTION

BLUE-GREEN ALGAE (CYANOBACTERIA) BLOOM MAY BE PRESENT IN THE WATER

Blue-green algae can produce toxins that can make people and animals sick.

Be alert! Avoid water that:

Is discolored or streaky

Looks like spilled paint or pea soup

Has floating scum, globs, or mats

Has small green dots floating in it

- ✓ **Do not swallow lake water or touch foam, scum, or algal mats.**
- ✓ **Do not let pets swim in scummy water or lick algae off their fur.**
- ✓ **Rinse fish with fresh, clean water and throw away guts before cooking and eating.**
- ✓ **Do not swim in areas where you cannot see your feet in knee-deep water.**

Call your doctor, the Wisconsin Poison Center, or your veterinarian if you or your animals have sudden sickness or signs of poisoning.

Wisconsin Poison Center: 800-222-1222

For questions or to report a blue-green algae-related illness, call:

To learn more about blue-green algae, visit www.dhs.wi.gov and search "algae"

WISCONSIN DEPARTMENT OF HEALTH SERVICES | DIVISION OF PUBLIC HEALTH
BUREAU OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH | P-02421A (05/2019)

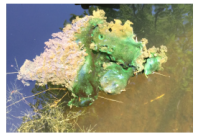
SCAN before you SWIM

A blue-green algae bloom may be present. Blue-green algae can produce toxins that can make people and animals sick.

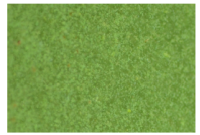
Be alert! Avoid water that:

Is discolored or streaky

Looks like spilled paint or pea soup



Has floating scum, globs, or mats



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For questions, call _____

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PROTECT YOUR PETS

Look out for blue-green algae (cyanobacteria), which can grow in any lake, pond, or river. Blue-green algae can produce toxins that can make people and their pets sick.

- ✓ Rinse yourself and your pets off with clean water if there is contact with blue-green algae scum, globs, or discolored water.
- ✗ Don't let pets swim in or drink from discolored water or where you see foam, scum, or floating globs of blue-green algae.
- ✓ Offer fresh, clean water for pets to drink instead of lake water.
- ✗ Don't let pets eat or play with globs of blue-green algae or lick scum from their fur.

Seek veterinary care right away if you think your pet may have been poisoned by blue-green algae. Symptoms may include: drooling, weakness, vomiting, staggering, or convulsions.

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Wisconsin Department of Health Services
Division of Public Health
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P-02358 | 01/2022

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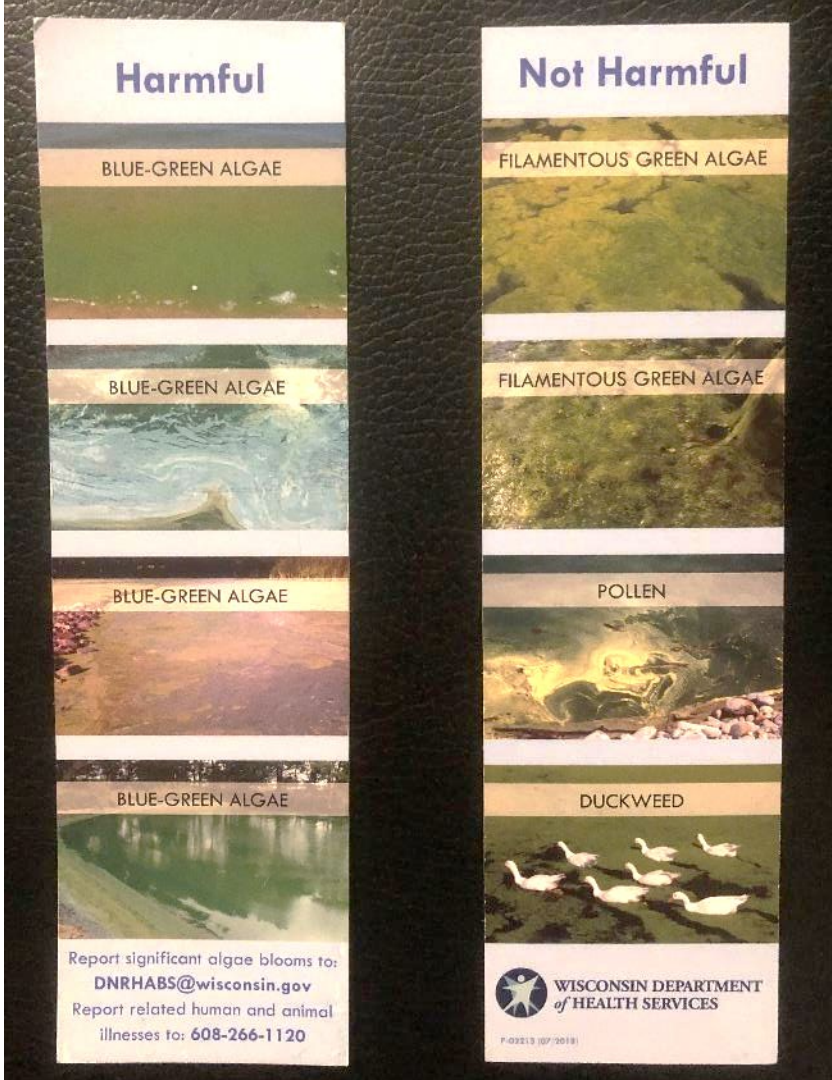

THANK YOU!

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WISCONSIN DEPARTMENT of HEALTH SERVICES

Sea Grant University of Wisconsin

CDC Centers for Disease Control and Prevention

WRI University of Wisconsin