

Harmful Algal Bloom

Information for Beach Managers



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Purpose

The Minnesota Department of Health (MDH) has developed this guide to explain:

- Identifying Harmful Algal Bloom (HAB) characteristics
- Understanding health effects
- Testing options
- Posting and communicating advisories
- Reporting human and animal illness

This toolkit is intended as a general framework:

Harmful Algal Blooms

What are harmful algal blooms?

Harmful algal blooms (HABs), or blue-green algae are not algae at all but types of bacteria called cyanobacteria that are normally present in many lakes. This type of bacteria thrives in warm, nutrient-rich water. When conditions are right, the bacteria can grow quickly, forming “blooms.”

HABs can be found throughout in Minnesota but thrive in warm, shallow, nutrient-rich lakes. Blooms usually occur during summer and early fall but can occur other times of the year if conditions are right.

Blue-green algal blooms are considered harmful when they produce cyanotoxins that can make people and animals sick. In general, algae are not harmful.



What HABs Look Like

HABs often look like pea soup or spilled green paint.



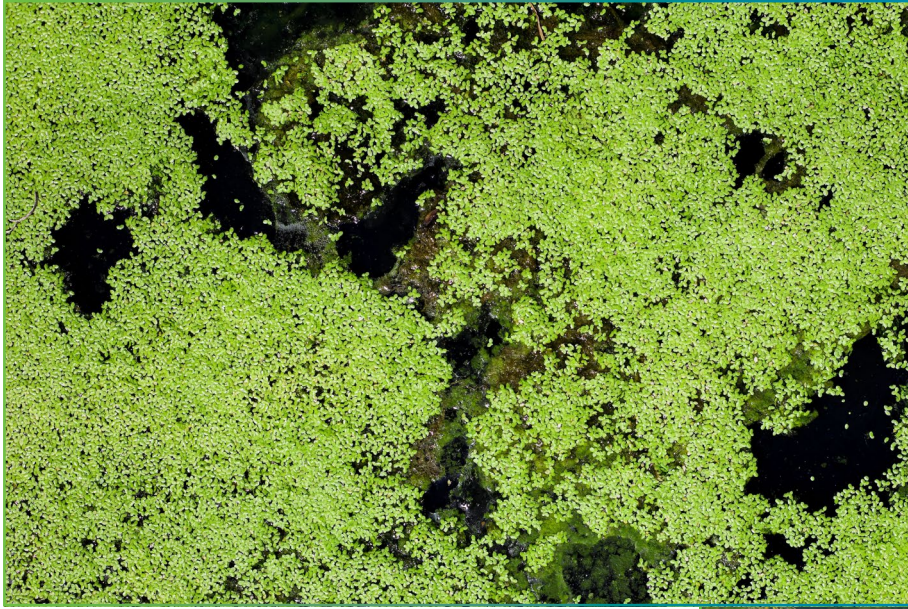
Blooms are not always large and dense and can sometimes cover small portions of the lake with little visible algae present.



Blooms can also produce a swampy odor as cells break down.



These are Not HABs



Duckweed:
non-toxic aquatic plant.

Chara:
form of filamentous algae
often found in lakes with
good water clarity.



Filamentous green algae:
non-toxic form of
algae that can create
recreational nuisances.

Health Effects of HABs

People

People can become sick if they swallow, have skin contact with, or breathe in water droplets that contain algal toxins.

Common symptoms include:

- Vomiting
- Diarrhea
- Rash
- Eye irritation
- Cough
- Sore throat
- Headache

Symptoms generally begin hours to 2 days after exposure.



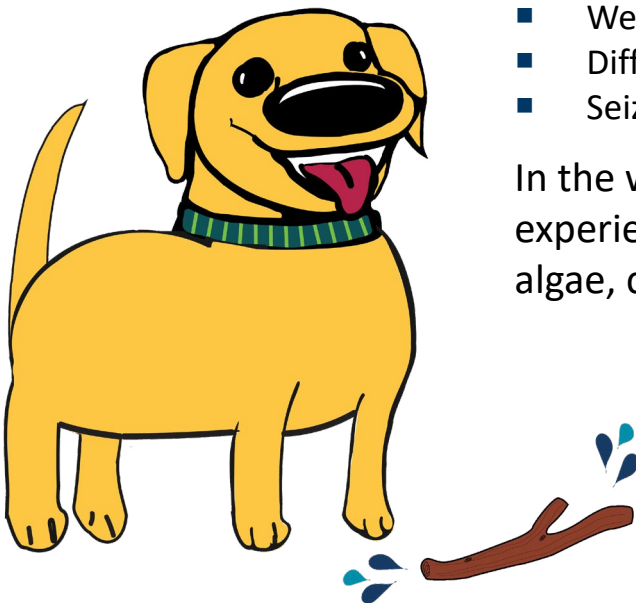
Pets

Pets, especially dogs, are susceptible to harmful algae because they may swim in or drink green, smelly water.

Symptoms they might experience include:

- Vomiting
- Diarrhea
- Weakness
- Difficulty breathing
- Seizures

Symptoms can begin within minutes of exposure to the toxins.



In the worst cases, animals have died. If a pet experiences these symptoms after exposure to algae, contact a veterinarian as soon as possible.

Types of HABs Testing

Field based

Visual inspection

Overview of test

- Uses the naked eye to evaluate water conditions.
- Best done daily or at a pre-determined frequency.
- Best done by trained individuals.

Advantages & disadvantages

- No method to determine if an algal bloom is toxic.
- Benthic blooms would not be visible since they occur below the water line.

Test strip kits

Overview of test

- Rapid tests designed to detect the presence of cyanotoxins.
- Commercially available for microcystins, anatoxin-a, and cylindrospermopsin.
- Results typically provided in less than one hour.

Advantages & disadvantages

- Field-friendly.
- No laboratory experience needed.
- Results are interpreted in ranges.
- Positive results should be confirmed with more reliable methods.

Remote based

CyanWeb App

Overview of test

- A free, web-based application that provides timely satellite data to assess cyanobacteria concentrations.
- May be used to monitor daily or weekly changes of cyanobacteria concentrations. Notable changes may prompt beach managers to collect water samples or visually inspect water body.

Advantages & disadvantages

- Contains over 400 Minnesota lakes in monitoring program. See the website for detailed lists of lake included.
- Low cost and time investment.

Types of HABs Testing

Laboratory based

Microscopic enumeration

Overview of test

- Fluorescence microscopy identifies algal species and counts algal cells.
- Water is concentrated, and the algal cells are examined under a microscope, counted and species identified by a lab technician using a specialized chamber slide.
- Flow cytometry is an automated instrument that uses a camera to capture images in a water stream running through the instrument, count the images and process each image for identification.

Advantages & disadvantages

- Requires laboratory equipment and trained staff.
- Can be time consuming.
- Flow cytometry instruments are expensive and require time to create a reference library but can save staff time and effort once set up.
- Flow cytometry can process a high volume of samples quickly once set up.

ELISA toxin testing

Overview of test

- Specialized laboratory method.
- Toxins are detected based on their interaction with specific antibodies and testing substrate.
- Binding of toxin, antibody, and substrate produces a color which can be used to quantify and calculate the concentration of toxins.

Advantages & disadvantages

- Requires laboratory equipment and trained staff.
- Test kits available for purchase.
- Results may give more specific toxin concentration than rapid test strips.

Chromatography Methods

Overview of test

- Laboratory gold standard for qualification and quantification of cyanotoxins.
- EPA has approved methods for measuring specific cyanotoxins.

Advantages & Disadvantages

- Requires specialized laboratory equipment and trained staff.
- High cost.
- Length of time for sample preparation and analysis may vary.
- Accurate toxin concentration results.

Advisory Guidelines

Cyanotoxin levels for swimming advisories

The Minnesota Pollution Control Agency (MPCA) recommends testing for microcystin and anatoxin-a because they are the two cyanotoxins commonly

Swimming advisory (ug/L)*		
Cyanotoxin Type	MDH	U.S. EPA
Microcystin	6	8
Cylindrospermopsin	15**	15**
Anatoxin-A	7	-

Toxin testing results can be used to inform decisions about managing beaches.

However, water conditions may change rapidly, and the results only reflect the water conditions at time of sample collection.

*Recommended recreational swimming advisories should not be exceeded on any given day at beaches or other recreational water bodies. Advisories based on Minnesota Department of Health values and U.S. EPA exposure parameters.

**Based on U.S. EPA draft recommendation



Issuing an advisory

When a beach manager has determined an advisory is needed, they may choose to post an advisory sign or recommend the beach be temporarily closed.

An advisory notification is typically triggered by:

- A visible blue green algae bloom.
- A toxin test result at or above the advisory guidelines.

Posting an advisory

Advisory signs should be posted at multiple, highly visible public water access points including but not limited to:

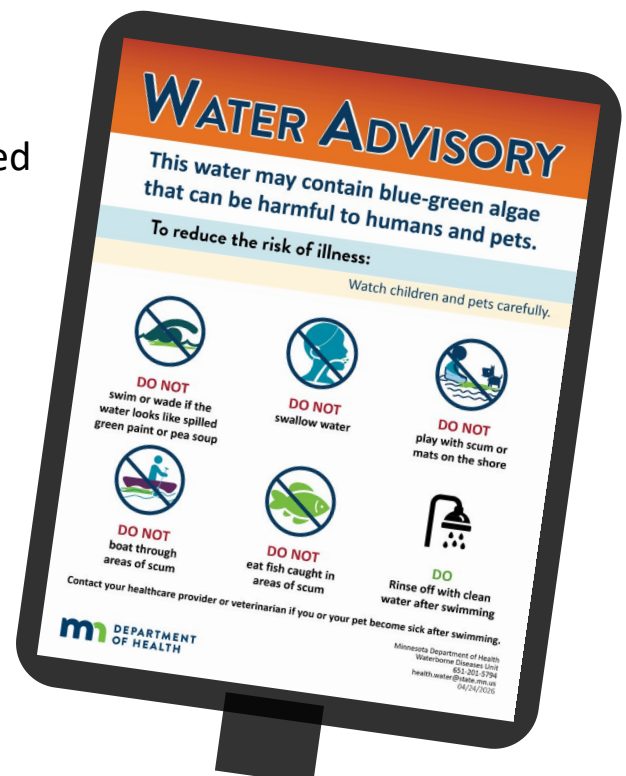
- Beaches
- Marinas
- Boat ramps
- Canoe launch sites

Scope of posting locations may be dependent on size of bloom and area of body of water impacted.

Communicating an advisory

Once issued, an advisory should be communicated in a way that will reach the people using the beach or lake.

- Add advisories on your website to make them easily accessible to beach users.
- Share the advisory on social media channels.
- Maintain an email or text listserve, where the public can sign up to receive alerts.
- Reach out to lake associations and other lake user groups.



Removing an advisory

Removing an advisory is at the discretion of the entity responsible for the beach, which may be a park board, health department, or other local authority. Guidance to consider when removing an advisory:

- Visible scum is gone.
- Conditions suggest the bloom is not likely to return right away.
- Test results indicate toxin levels have fallen below recreational guidelines.



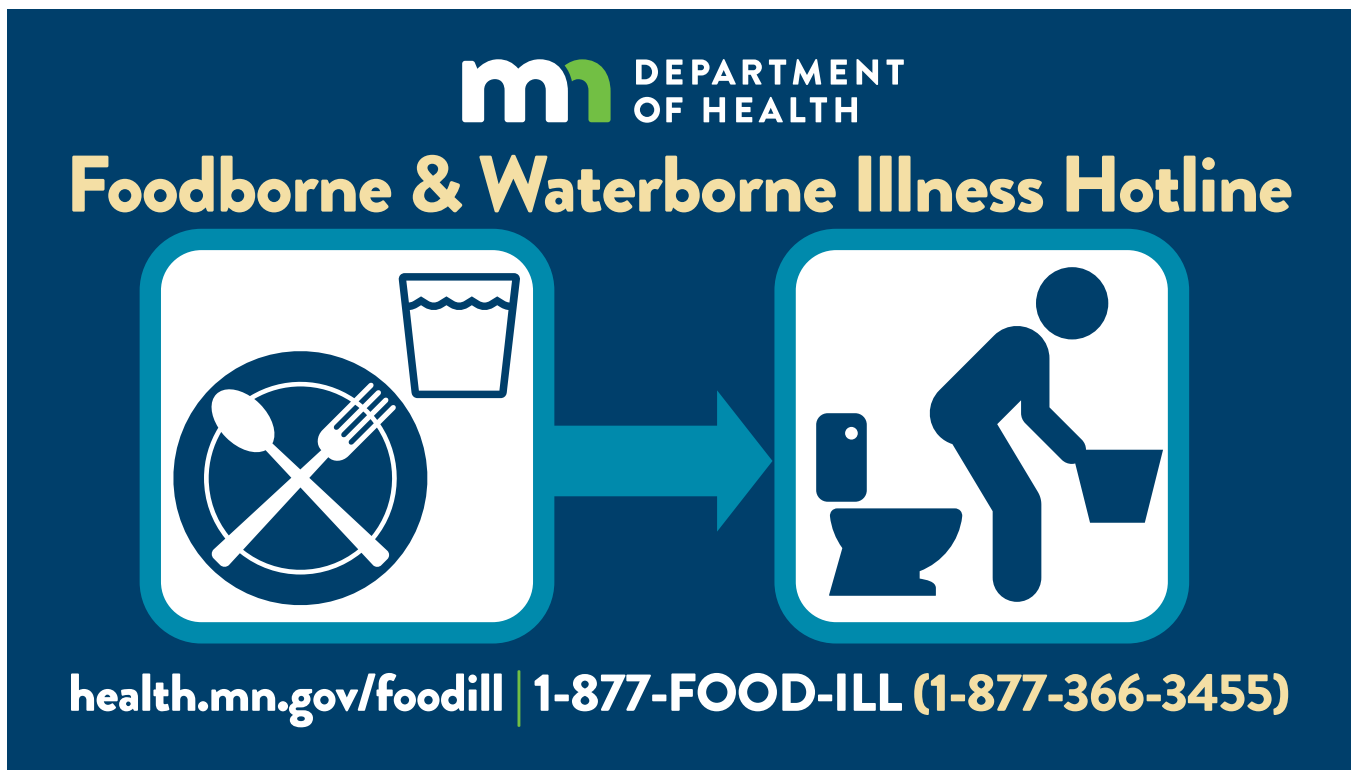
Illness Reporting

How to report illnesses

All reports of suspected human or animal illness related to HABs should immediately be sent to the MDH Waterborne Diseases Unit by email at health.foodill@state.mn.us or phone at **1-877-366-3455** for follow-up.

Whenever possible, reports should include:

- Individual's name
- Contact information (phone and email preferred)
- Body of water illness is suspected to be associated with
- Any additional information known about the event



The graphic features the Minnesota Department of Health logo at the top. Below it, the title "Foodborne & Waterborne Illness Hotline" is displayed in large, bold, yellow text. The central part of the graphic contains two white rounded squares with blue borders. The left square shows a blue plate with a crossed spoon and fork, and a glass of water above it. A large blue arrow points from this square to the right square. The right square shows a blue silhouette of a person sitting on a toilet, with a bucket nearby. At the bottom, the contact information "health.mn.gov/foodill | 1-877-FOOD-ILL (1-877-366-3455)" is written in white and yellow text.

mn DEPARTMENT OF HEALTH

Foodborne & Waterborne Illness Hotline

health.mn.gov/foodill | 1-877-FOOD-ILL (1-877-366-3455)

Additional Resources

[MDH Harmful Algal Blooms \(HABs\) \(health.state.mn.us/diseases/hab/index.html\)](http://health.state.mn.us/diseases/hab/index.html)

[MDH Harmful Algal Blooms \(HABs\) Fact Sheet \(health.state.mn.us/diseases/hab/hab.html\)](http://health.state.mn.us/diseases/hab/hab.html)

[MDH Tools for Local Government Agencies: Harmful Algal Bloom-Related Illness \(health.state.mn.us/diseases/hab/tools.html\)](http://health.state.mn.us/diseases/hab/tools.html)

[MPCA Blue-green algae and harmful algal blooms \(pca.state.mn.us/air-water-land-climate/blue-green-algae-and-harmful-algal-blooms\)](http://pca.state.mn.us/air-water-land-climate/blue-green-algae-and-harmful-algal-blooms)

[MPCA Harmful algae blooms: Water recreation advisories \(pca.state.mn.us/business-with-us/harmful-algae-blooms-water-recreation-advisories\)](http://pca.state.mn.us/business-with-us/harmful-algae-blooms-water-recreation-advisories)

[EPA bloomWatch \(epa.gov/habs/bloomwatch\)](http://epa.gov/habs/bloomwatch)

[Cyanobacteria Assessment Network Application: epa.gov/water-research/cyanobacteria-assessment-network-application-cyan-app.](http://epa.gov/water-research/cyanobacteria-assessment-network-application-cyan-app)

[EPA Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin \(epa.gov/sites/default/files/2019-05/documents/hh-rec-criteria-habs-document-2019.pdf\)](http://epa.gov/sites/default/files/2019-05/documents/hh-rec-criteria-habs-document-2019.pdf)

[CDC Harmful Algal Blooms and Your Health\(cdc.gov/harmful-algal-blooms/about/index.html\)](http://cdc.gov/harmful-algal-blooms/about/index.html)

[CDC Preventing Illnesses Caused by Harmful Algal Blooms \(cdc.gov/harmful-algal-blooms/prevention/index.html\)](http://cdc.gov/harmful-algal-blooms/prevention/index.html)

WATER ADVISORY

This water may contain blue-green algae that can be harmful to humans and pets.

To reduce the risk of illness:

Watch children and pets carefully.



DO NOT

swim or wade if the water looks like spilled green paint or pea soup



DO NOT

swallow water



DO NOT

play with scum or mats on the shore



DO NOT

boat through areas of scum



DO NOT

eat fish caught in areas of scum



DO

Rinse off with clean water after swimming

Contact your healthcare provider or veterinarian if you or your pet become sick after swimming.



SUSPECT ILLNESS IS DUE TO HARMFUL ALGAE?

Contact us for testing
and reporting!

651-201-5794 | health.water@state.mn.us



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