Harmful Algal Blooms (HABs)

Cyanobacteria, often called blue-green algae, are commonly found in Ohio lakes, ponds, and slow-moving rivers. Although many species of blue-green algae do not produce toxins, some species of blue-green algae can cause Harmful Algal Blooms (HABs).

HABs occur when there is a shallow body of fresh water, warm temperatures, sunlight, and excessive amounts of nutrients (phosphorus and nitrogen) in the water. Phosphorus and nitrogen are commonly found in animal and human waste and in fertilizers.

Under the right conditions, the numbers of blue-green algae can dramatically increase or “bloom” in a body of water. Some of these HABs are visible as thick mats or scum on the surface of the water. These mats can vary in color, including bluish-green, bright green, or even red or maroon.
HABs Can Produce Harmful Toxins, Including Microcystin

HABs can produce toxic chemicals in the form of neurotoxins (which affect the nervous system), hepatotoxins (which affect the liver), and dermatotoxins (which affect the skin).

<table>
<thead>
<tr>
<th>Toxin</th>
<th>Type of Toxin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatoxin-a</td>
<td>Neurotoxin</td>
</tr>
<tr>
<td>Anatoxin-a(s)</td>
<td>Neurotoxin</td>
</tr>
<tr>
<td>Cylindrospermopin</td>
<td>Hepatotoxin</td>
</tr>
<tr>
<td>Lyngbyatoxin</td>
<td>Dermatoxin</td>
</tr>
<tr>
<td>Microcystin</td>
<td>Hepatotoxin</td>
</tr>
<tr>
<td>Saxitoxin</td>
<td>Neurotoxin</td>
</tr>
</tbody>
</table>

All of these toxins can potentially impact the health of people who come into contact with water contaminated with them, depending upon the type and levels of toxins in the water, and the type of contact with the contaminated water.

Common Ways for Contact with HABs

The most common ways to come into contact with HABs are:

- **Drinking/Swallowing** – Drinking HABs-contaminated water from a public water system during a drinking water advisory or the incidental/accidental swallowing of contaminated water such as during water-related recreational activities.

- **Skin Contact** – Swimming, skiing, tubing and other recreational activities in HABs-contaminated waters.

- **Inhaling** – Breathing aerosolized water droplets (misting) of HABs-contaminated water from recreational activities such as jet-skiing or power boating.

Other than through water droplets (misting) such as caused by recreational water activities, HABs toxins do not release into the air and pose a health risk.

Some of the blue-green algae produce odor-generating by-products that are not toxic but have a very unpleasant smell which can cause sensitive individuals to become nauseated (upset stomach, vomiting) and develop headaches.
Health Problems Exposure to HABs Can Cause in People & Pets

Drinking/Swallowing HABs-Contaminated Water
- Severe diarrhea and vomiting
- Liver toxicity (abnormal liver function, abdominal pain)
- Kidney toxicity
- Neurotoxicity (weakness, salivation, tingly fingers, numbness, dizziness)
- Difficulty breathing
- Death

Skin Contact with HABs-Contaminated Water
- Rashes
- Hives
- Skin blisters (especially on the lips and under swimsuits)

Inhaling HABs-Contaminated Water
- Runny eyes and nose
- Sore throat
- Asthma-like symptoms
- Allergic reactions

Individuals should seek medical attention if they believe that they have been exposed to algal toxins and are having adverse health effects.

Contact a veterinarian immediately if pets show signs of illness.
Advisories for HABs-Contaminated Drinking Water

Ohio communities and/or public water systems issue three types of Drinking Water Advisories depending upon the level of HABs toxins in the finished drinking water.

<table>
<thead>
<tr>
<th>Type of Advisory</th>
<th>Microcystin</th>
<th>Anatoxin-a</th>
<th>Cylindrospermopsin</th>
<th>Saxitoxin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do Not Drink Advisory for children under six and sensitive populations including:</td>
<td>0.3 μg/L</td>
<td>20 μg/L</td>
<td>0.7 μg/L</td>
<td>0.3 μg/L</td>
</tr>
<tr>
<td>• Bottle-fed infants and children younger than school age</td>
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<tr>
<td>• Pregnant women</td>
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<td></td>
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<tr>
<td>• Nursing mothers</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Individuals with pre-existing liver conditions</td>
<td></td>
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<tr>
<td>• Individuals receiving dialysis treatment</td>
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<tr>
<td>As a precautionary measure, the elderly and individuals with compromised immune systems may want to consider using an alternate water source as well</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Do Not Drink Advisory for children and adults, including pets and livestock.</td>
<td>1.6 μg/L</td>
<td>20 μg/L</td>
<td>3 μg/L</td>
<td>1.6 μg/L</td>
</tr>
<tr>
<td>Do Not Use Advisory*</td>
<td>20 μg/L</td>
<td>300 μg/L</td>
<td>20 μg/L</td>
<td>3 μg/L</td>
</tr>
</tbody>
</table>

Note that values are reported in μg/L (microgram per cubic liter), which is equal to one (1) part per billion (ppb).

* The Drinking Water ‘Do Not Use’ thresholds are based on the Elevated Recreational Public Health Advisory Thresholds.

During a drinking water advisory for children under six and sensitive populations, an alternative water source, such as bottled water, should be used for drinking, preparing food, making infant formula, brushing teeth, and making ice.

- Children five years and younger should be supervised when bathing to prevent accidental ingestion.
- Skin irritation, such as a rash may occur from exposure when washing hands and bathing.
- Providing a final rinse of skin with uncontaminated water is recommended, especially for items that go into the mouths of infants and children under the age of six years (i.e., teething rings, nipples, bottles, toys, silverware).

During a drinking water advisory for children and adults, alternative water should be used for drinking, making infant formula, making ice, brushing teeth and preparing food.

- The cautions listed for children under six and sensitive populations listed above still apply.
- During a drinking water advisory, healthy individuals may continue to use the water for washing hands, bathing, washing dishes, and doing laundry.

During a do not use advisory, alternative water should be used for drinking (including pets), making infant formula, making ice, brushing teeth, preparing food, bathing/showering, washing hands, washing dishes or doing laundry.

- If an alternate source of water is not available for washing dishes or doing laundry, providing a final rinse with uncontaminated water is recommended.
- If people or pets come into contact with water, promptly shower or rinse off in uncontaminated water.
- Skin irritation, such as a rash may occur from exposure when washing hands and bathing.

For all advisories:

- Do not boil the water. Boiling the water will not remove the toxins.
- You may use water for flushing toilets.
Advisories for HABs-Contaminated Recreational Waters

Managers of public and private water bodies issue two types of Recreational Water Advisories depending upon the level of HABs toxins in such waters.

<table>
<thead>
<tr>
<th>Type of Advisory</th>
<th>Microcystin</th>
<th>Anatoxin-a</th>
<th>Cylindrospermopsin</th>
<th>Saxitoxin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreational Public Health Advisory — A sign is posted on beaches when toxin levels exceed the recommended threshold, warning that swimming and wading are not recommended for children, pregnant or nursing women, those with certain medical conditions, and pets</td>
<td>6 μg/L</td>
<td>80 μg/L</td>
<td>5 μg/L</td>
<td>0.8 μg/L</td>
</tr>
<tr>
<td>Elevated Recreational Public Health Advisory — A sign is posted on beaches when toxin levels exceed the recommended threshold warning stating that algal toxins have been detected, and to avoid all contact with the water</td>
<td>20 μg/L</td>
<td>300 μg/L</td>
<td>20 μg/L</td>
<td>3 μg/L</td>
</tr>
</tbody>
</table>

Note that values are reported in μg/L (microgram per cubic liter), which is equal to one (1) part per billion (ppb).

Public Health Guidance in Specific Settings During Drinking Water Advisories

ODH offers public health guidance for specific settings after a community and/or its public water system issues a drinking water advisory. For information about any current drinking water advisories, go to ohioalgaeinfo.com.

ODH offers this guidance in the following settings on its website at odh.ohio.gov under “Harmful Algal Blooms” in the A-Z Index:

- Ambulatory Surgical Facilities
- Birthing Centers
- Campgrounds/Resident Camps
- Daycare/Day Camp/Preschool Facilities
- Dental Offices/Clinics
- Dialysis Centers
- In-Home Dialysis
- Fire Departments
- Food and Beverage Manufacturing
- Food Service Operations
- Retail Food Establishments
- Home Health
- Hospice
- Hospitals
How to Treat People and Pets Exposed to HABs Toxins

If you come into contact with HABs-contaminated water, rinse off with clean, fresh water as soon as possible.

Thoroughly rinse off your pets with clean, fresh water. Pets that have been in HABs-contaminated water may ingest toxins by drinking the water and/or licking their fur afterward.

Seek immediate medical attention if you think that you, your pet or your livestock might have been poisoned by HABs toxins.

As a resource for healthcare providers, a HABs Physician Reference is posted on ODH’s website at odh.ohio.gov under “Harmful Algal Blooms” in the A-Z Index.

As a resource for veterinarians, a HABs Disease in Animals fact sheet is posted on ODH’s website at odh.ohio.gov under “Harmful Algal Blooms” in the A-Z Index.
Eating Fish Caught in HABs-Contaminated Waters

The Ohio Department of Natural Resources Division of Wildlife works closely with the Ohio Environmental Protection Agency and ODH to monitor fish tissue.

Preliminary fish tissue monitoring and research indicates that fish caught in areas affected by HABs should be safe to eat as long as the Ohio Sport Fish Health and Consumption Advisory guidelines are followed. The guidelines are posted on the Ohio EPA’s website at epa.ohio.gov.

There is minimal evidence in scientific literature suggesting the accumulation of microcystin toxins in fish fillets with transmission to people who eat them. Fish appear to metabolize microcystin toxins relatively quickly, although evidence suggests that the toxins may concentrate in fish livers.

It is recommended that fish and fish fillets be rinsed with clean water before consumption as a precaution. Do not eat internal organs since microcystin toxins and other contaminants have the potential to concentrate in them.

How to Report a Suspected HABs Illness to ODH

Individuals who are concerned that they may be experiencing HABs illness symptoms after exposure to contaminated water should contact their healthcare provider. Healthcare providers who rule out other potential causes of the symptoms and suspect a HABs illness, should notify their local health district.

Local health districts should complete forms for reports of human illnesses associated with either recreational or public water system exposure to HABs toxins. Both forms are posted on ODH’s website at odh.ohio.gov under “Harmful Algal Blooms” in the A-Z Index. Completed forms should be faxed to the ODH Bureau of Environmental Health and Radiation Protection secure fax: 614-466-4556.

Pet and livestock owners who are concerned that their animal may be experiencing HABs illness symptoms after exposure to contaminated water should contact their veterinarian. Veterinarians who rule out other potential causes of the symptoms and suspect a HABs illness, should complete an animal illness report form which is also posted on the ODH website. Completed forms should be faxed to the ODH Zoonotic Disease Program secure fax: 614-564-2437.
References and Additional Information

Ohio Department of Health Harmful Algal Blooms webpages,  
http://www.odh.ohio.gov/odhprograms/eh/HABs/algalblooms.aspx

Ohio Environmental Protection Agency Harmful Algal Blooms webpages,  
Ohioalgaeinfo.com

CDC Environmental Hazards & Health Effects, Harmful Algal Blooms,  
http://www.cdc.gov/nceh/hsb/hab/default.htm

U.S. Environmental Protection Agency, 2015 Drinking Water Health Advisories for Two Cyano-bacterial Toxins, Office of Water 820F15003, June 2015,  