Cyanobacteria
Blue-Green Algae

Harmful Algal Blooms (HABs) in Ohio Waters in 2010

May 2013 US EPA Webinar

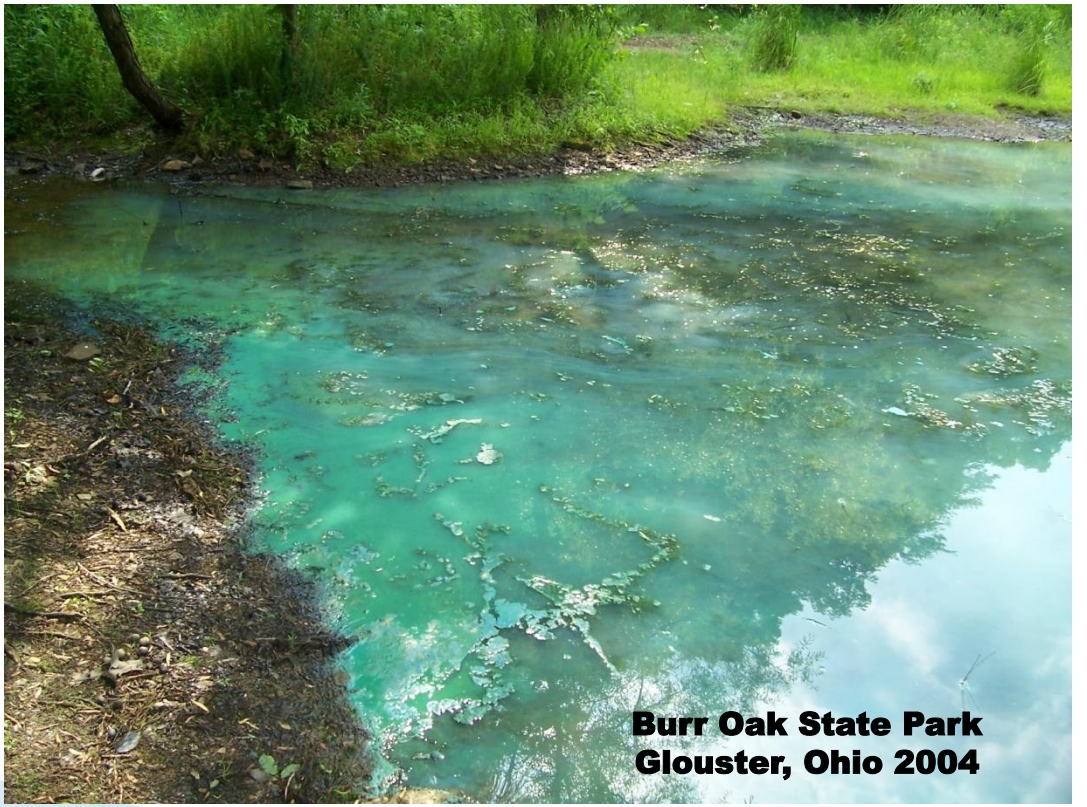
OHIO DEPARTMENT OF HEALTH
ODH
To protect and improve the health of all Ohioans

Photo: Grand Lake St. Marys
St. Marys, Ohio 2010

Cyanobacteria
"Blue-Green Algae"

Cyanobacteria, often called blue-green algae, are not algae but singled-celled bacteria that photo-synthesize like a plant.

Naturally found in Ohio lakes, ponds, and slow-moving streams. Also found in brackish and Marine waters.



“Algal Blooms”

Individual microscopic bacteria can sometime form visible colonies or bundles of filaments in clusters of cells that can form mat-like layers.

Harmful Algal Blooms (HABs)
Examples of Cyanobacteria (Blue-Green Algae)

Cyanobacteria “Blue-Green Algae” Harmful Algal Blooms (HABs)

Although not all species of cyanobacteria produce toxins, massive growth of some species of blue-green algae can result in Harmful Algal Blooms (HABs).

Cyanobacteria can produce neurotoxins (which affect the nervous system) and hepatotoxins (which affect the liver) and dermal toxins (which affect the skin).

Scientists do not fully understand what causes the same species of algae to trigger toxin production during one bloom and not produce toxin during the next.

Cyanotoxins

Freshwater Cyanotoxins	Type of Toxin	Causative organism	Vector
Anatoxin-a	Neurotoxin	*Anabaena* spp. *Aphanizomenon* spp. *Planktothrix* spp.	Contaminated fresh water
Anatoxin-a(s)	Neurotoxin	*Anabaena flos-aquae*	Contaminated fresh water
Cylindrospermopsin	Hepatotoxin	*Cylindrospermopsis raciborskii, Aphanizomenon ovalisporum*	Contaminated fresh water and possibly fish
Lyngbyatoxin	Dermal toxin	*Lyngbya* spp.	Contaminated fresh or marine waters
Microcystins	Hepatotoxin	*M. aeruginosa* *Anabaena* spp. *Planktothrix* spp.	Contaminated fresh water
Saxitoxins	Neurotoxin	*Anabaena circinalis* *Lyngbya wollei*	Contaminated fresh water

Safe Levels:

WHO established a safe level of microcystin in drinking water at 1.0 ppb and 20.0 ppb for recreational waters.

Note: There are currently no drinking water or recreational safe level standards for the other cyanotoxins listed in the above chart (Nov 2010)

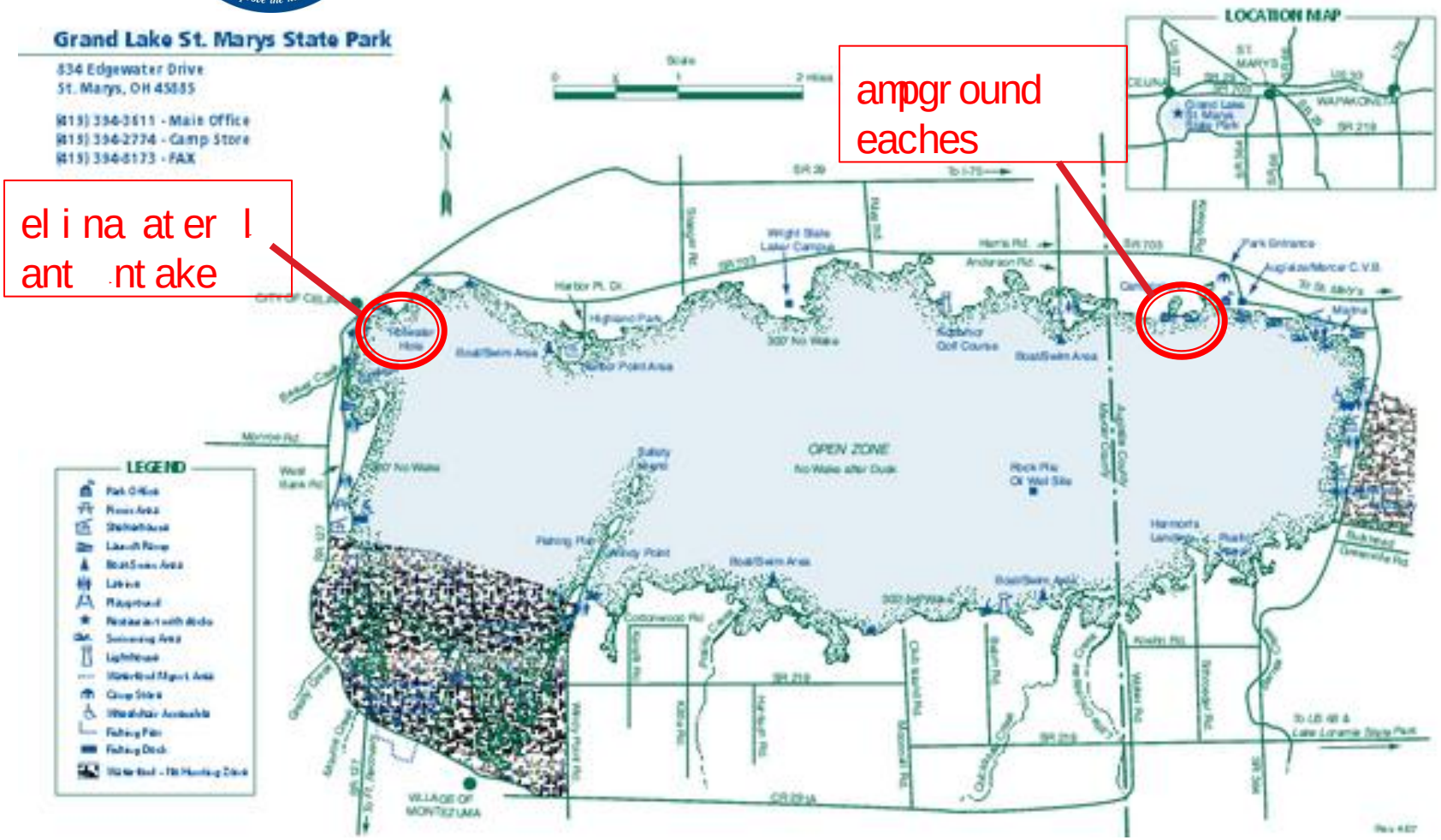
Cyanotoxins
Route, Symptoms/Onset

Exposure and Clinical Presentation:

Route of Exposure	Symptoms/Signs	Time to symptom onset*	Differential Diagnosis
Swallowing water contaminated with cyanobacteria or toxins	**Hepatotoxins** (microcystins, cylindrospermopsin) Elevated AST/ALT, GGT Gastroenteritis Acute hepatitis Kidney damage Malaise Headache Anorexia	Minutes to hours	Other hepatotoxin poisoning, other microbial infections/toxins Viral hepatitis Viral Gastroenteritis Hepatotoxic drug ingestion (acetaminophen)
Swallowing water contaminated with cyanobacteria or toxins	**Neurotoxins** (anatoxin-a, anatoxin-a[s], saxitoxin) Paresthesia Tremor Fasciculations Hypersalivation Diarrhea Ataxia Motor weakness Respiratory andmuscular paralysis	Minutes to hours	Pesticide poisoning, other toxin poisoning
Skin contact with water contaminated with cyanobacteria or toxins or contact with animals contaminated with cyanobacteria	**Dermal toxins** (Lyngbyatoxins, lipopolysaccharide endotoxins) Rash, hives Skin blistering Allergic reactions	Minutes to hours	Other dermal allergens. non-allergic urticaria, photosensitivity reactions
Inhaling aerosolized droplets contaminated with cyanobacteria or toxins	Upper respiratory irritation Rhinitis Possible allergic reaction	Unknown, but likely an acute reaction	Other airborne allergens, upper respiratory infection, flu

* Symptom onset times are primarily extrapolations from laboratory animal data and events.

ODH Involvement:



Grand Lake St. Marys (GLSM), located in NW Ohio is Ohio's largest inland lake @ 13,000 acres.

ODH Involvement (cont.)

In the Summer of 2009 there was elevated levels of microcystin (Planktothrix bloom ~82ppb).

In June of 2010 new toxins were detected (Saxitoxin, Anatoxin-a, Cylindrospermopsin)

Photo: Grand Lake St. Marys
St. Marys, Ohio 2010

ODH Involvement (cont.)

July 2010: Highest levels of microcystin detected (>250 ppb up to 2,000 ppb). Associated with subsequent significant blooms of microcystis.

Initial community concerns and complaints in June & July centered on unpleasant odors, dead fish and the appearance of scums on the lake.

July – August 2010: 1st reported illness persons and animals.

ODH Involvement (cont.)

Camp Wilson, Silver Lake, aka Lake Mac O' Chee, is a YMCA camp near Bellefontaine, OH reported an illness event of staff and campers who recreated in the camp lake. Microcystin levels >1,000 ppb and 19 confirmed cases of staff/kids who presented at local ER with gastrointestinal-type illness as well as rashes.

A multi-agency workgroup was established with representatives from the ODH, Ohio EPA, Ohio Dept. of Natural Resources (ODNR), Ohio Dept. of Agriculture.

ODH contacted the following national/ international HAB experts and requested their assistance:

- **CDC/NCEH : Lorraine Backer**
- **USGS: Keith Loftin**
- **Wright State University Professor (retired): Wayne Carmichael**

Collecting Human and Animal Illness Reports

- CDC/NCEH developed the Harmful Algal Bloom-related Illness Surveillance System (HABISS). This system collects data on human and animal illnesses following exposures to harmful algal blooms (HABs).
- ODH team collaborated with our CDC/NCEH partners to modify existing interview forms and case definitions for Ohio human and animal HAB-related illness reports.
- Interviews were conducted by local public health nursing and epidemiology staff.

Case Definitions

- **Suspect**: Exposure to water or to seafood with a confirmed algal bloom AND onset of associated signs and symptoms within a reasonable time after exposure AND *without identification of another cause of illness*.
- **Probable**: Meets criteria for Suspect Case AND there is laboratory documentation of a HAB toxin(s) in the water.
- **Confirmed**: Meets criteria for a Probable Case combined with professional judgment based on medical review.

Human and Animal Illness Reporting Forms

HAB-RELATED HUMAN ILLNESS REPORT

ODH Use Only
HABISS #
Date of this report _____

Fresh water: Anatoxin-a poisoning, Anatoxin-a(s) poisoning, microcystin poisoning...
Marine: Ciguatera fish poisoning, domoic acid (amnesic shellfish poisoning - ASP), saxitoxin (paralytic shellfish poisoning – PSP)...

Identifying information for suspected case:

Name _____
Phone _____
Address _____
County _____
ZIP code _____
Other contact information _____

Source of report:

- ☐ Citizen
- ☐ Healthcare Provider
- ☐ State Agency
- ☐ County Agency
- ☐ Poison Control Center
- ☐ Other

Address _____
Phone number _____

Demographics

Date of birth _____ Or Age _____

Sex ☐ Male ☐ Female

Race
- ☐ American Indian
- ☐ Asian/Pacific Islander
- ☐ Black
- ☐ White
- ☐ Unknown
- ☐ Other

Hispanic ☐ Yes ☐ No

Height _____inches Weight _____lbs.

If source was food

Type of food
- ☐ Shellfish
- ☐ Finfish
- ☐ Lobster/crab/shrimp
- ☐ Other _____

Preparation
- ☐ Cooked
- ☐ Raw
- ☐ Unknown

Store bought
- ☐ Yes, name
- ☐ No
- ☐ Unknown

Restaurant
- ☐ Yes, name _____
- ☐ No
- ☐ Unknown

Exposure information

Date of exposure _____
Time of exposure _____
Duration of exposure _____

Activity at time of exposure
- ☐ Occupational _____
- ☐ Recreational

Circle: Swimming, wading, boating, fishing, tubing/skiing, personal watercraft
- ☐ Unknown Other _____

Location
- ☐ At home
- ☐ Waterbody name _____
- ☐ Beach/shoreline
  location _____
- ☐ Other _____

Route
- ☐ Inhalation
- ☐ Dermal contact
- ☐ Ingestion
- ☐ Unknown
- ☐ Other _____

Source
- ☐ Food
- ☐ Brackish water
- ☐ Sea water
- ☐ Fresh water
- ☐ Drinking water
- ☐ Other _____

Areas in contact with water
- ☐ Head or Face
- ☐ Arms or Hands
- ☐ Legs or Feet
- ☐ Neck
- ☐ Trunk
- ☐ Other _____
- ☐ Unknown

Exposure associated with bloom:
- ☐ Yes
- ☐ No

If yes, HABISS # _____

Environmental conditions

Sick or dead animals
- ☐ No
- ☐ Dead fish count _____
- ☐ Sick fish count _____
- ☐ Other dead animals
  count ____ species _____
- ☐ Other sick animals
  count _____ species _____
- ☐ Unknown

Unusual odors
- ☐ No
- ☐ Yes
  If yes, describe _____
- ☐ Unknown

Waterbody conditions
- ☐ Moving
- ☐ Stagnant
- ☐ Unknown

Color _____
Clarity _____

Scum present
- ☐ Yes
- ☐ No
- ☐ Unknown

Skip tidal questions for Ohio.

Tidal conditions
- ☐ High tide
- ☐ Low tide
- ☐ Slack tide
- ☐ Flood tide
- ☐ Ebb tide
- ☐ Unknown

HAB-RELATED ANIMAL ILLNESS EVENT REPORT

HABISS #_____
Poison Center #
Date of this report_____

Unless a flock of birds, please fill out separate form per animal.

Fresh water: Poisoning from anatoxin-a , anatoxin-a(s), cylindrospermopsis, microcystins, nodularin, pseudosaxitoxin, saxitoxin, or other cyanotoxin.
Marine: Ciguatera fish poisoning, poisoning from azaspiracids (azaspiracid shellfish poisoning – ASP), brevetoxin (neurologic shellfish poisoning - NSP) , domoic acid (amnesic shellfish poisoning - ASP), okadaic acid (diarrheic shellfish poisonings – DSP), saxitoxin (paralytic shellfish poisoning – PSP).

Identifying information for animal caller

Name_____
Phone_____
Address_____
County_____
ZIP code_____
Animal owner (if not caller)_____
Other contact information_____

Animal description

Does the case involve a domestic animal?
☐ Yes ☐ No ☐ Stray ☐ Don't know

If yes, species:
- ☐ Canine ☐ Pet's Name: _____
- ☐ Stray

Breed/Description_____
- ☐ Livestock, Type_____
- ☐ Bird/Number Affected_____
- ☐ Other Domestic_____
- ☐ Wild/Describe_____

Species (list if more than one)_____
Total number of carcasses observed
_____

Sex ☐ Male ☐ Female
Age ____ months/years (circle one)

Neutered ☐ Yes ☐ No ☐ Don't know
Approximate height:
Approximate weight:
Was the exposure associated with a bloom
- ☐ Yes
- ☐ No

If yes, HABISS #_____

Exposure/Mortality Information

Date of exposure_____
Time of exposure_____
Duration of exposure_____
Was the animal found dead?
☐ Yes ☐ No ☐ Don't know

Date carcass found_____
Condition of carcass
☐ Fresh ☐ Scavenged

Place of exposure_____
- ☐ Beach/shoreline
- ☐ Lake/Pond
- ☐ River
- ☐ Marsh/Swamp
- ☐ Other_____

Name of place of exposure
_____

Route
- ☐ Inhalation
- ☐ Dermal contact
- ☐ Ingestion
- ☐ Don't know
- ☐ Other_____

Source
- ☐ Food
- ☐ Brackish water
- ☐ Sea water
- ☐ Fresh water
- ☐ Drinking water
- ☐ Air
- ☐ Other_____

Areas in contact with water
- ☐ Head
- ☐ Paws
- ☐ Legs
- ☐ Neck
- ☐ Trunk
- ☐ Other
- ☐ Don't know

Source of report

- ☐ Citizen
- ☐ Healthcare Provider
- ☐ State Agency
- ☐ County Agency
- ☐ Poison Control Center
- ☐ Biologist
- ☐ Veterinarian
- ☐ Other_____

Contact_____
Phone number_____

Environmental conditions

Other sick or dead animals
- ☐ No
- ☐ Dead fish
  Count_____
- ☐ Sick fish
  Count_____
- ☐ Other dead animals
  Count_____ species_____
- ☐ Other sick animals
  Count_____ species_____
- ☐ Don't know

Unusual odors
- ☐ No
- ☐ Yes
  If yes, describe_____
- ☐ Don't know

Water body conditions
- ☐ Moving
- ☐ Stagnant
- ☐ Don't know

Color_____
Clarity_____

Scum or foam present
- ☐ Yes
- ☐ No
- ☐ Don't know

Tidal conditions:
- ☐ High tide
- ☐ Low tide
- ☐ Slack tide
- ☐ Flood tide
- ☐ Ebb tide
- ☐ Don't know

Human HAB Illness Reports, 2010, Ohio

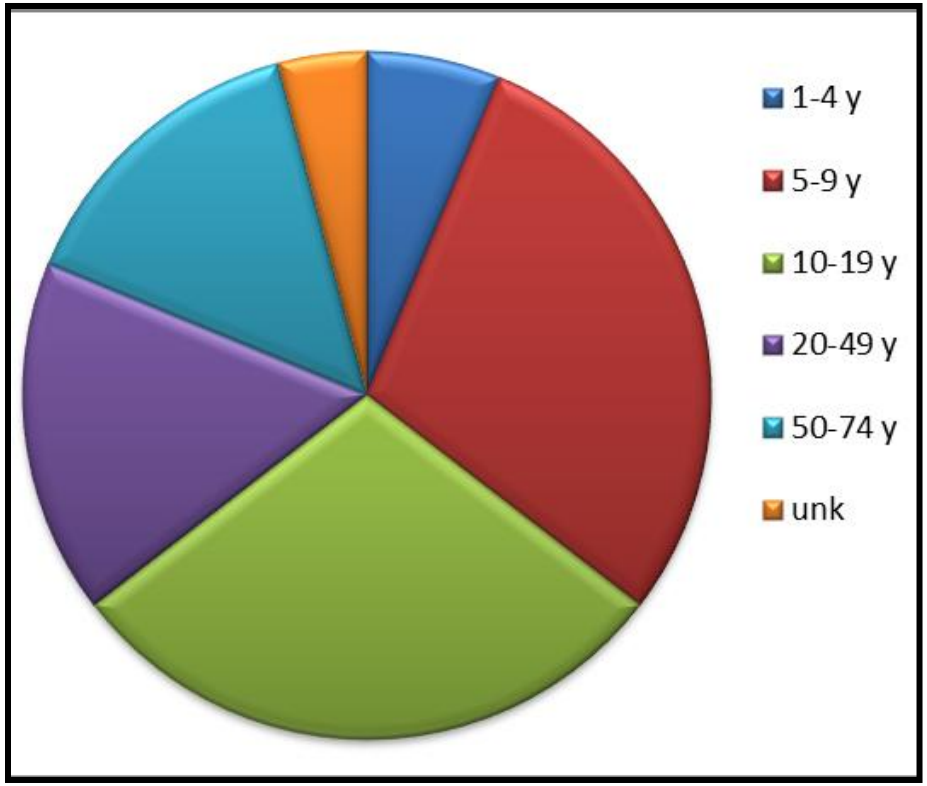
Body of Water	Toxin Reported?	County of Body of Water	Probable	Suspect	Lost to follow-up	Not a Case	Totals
Burr Oak	Yes	Athens	7				7
Grand Lake St. Marys	Yes	Auglaize & Mercer	8		1	12	21
Lake Erie	Yes	Multiple	2	7		1	10
Lake Mac O'Chee	Yes	Logan	19				19
Deer Creek	Yes	Pickaway & Madison	3				3
Berlin Lake Reservoir (US ACE)	*No*	Mahoning & Portage				1	1
Lake Alma	Yes	Vinton	2				2
Lake Hope	*NO (bloom only)*	Vinton		1			1
Statewide totals			41	8	1	14	64

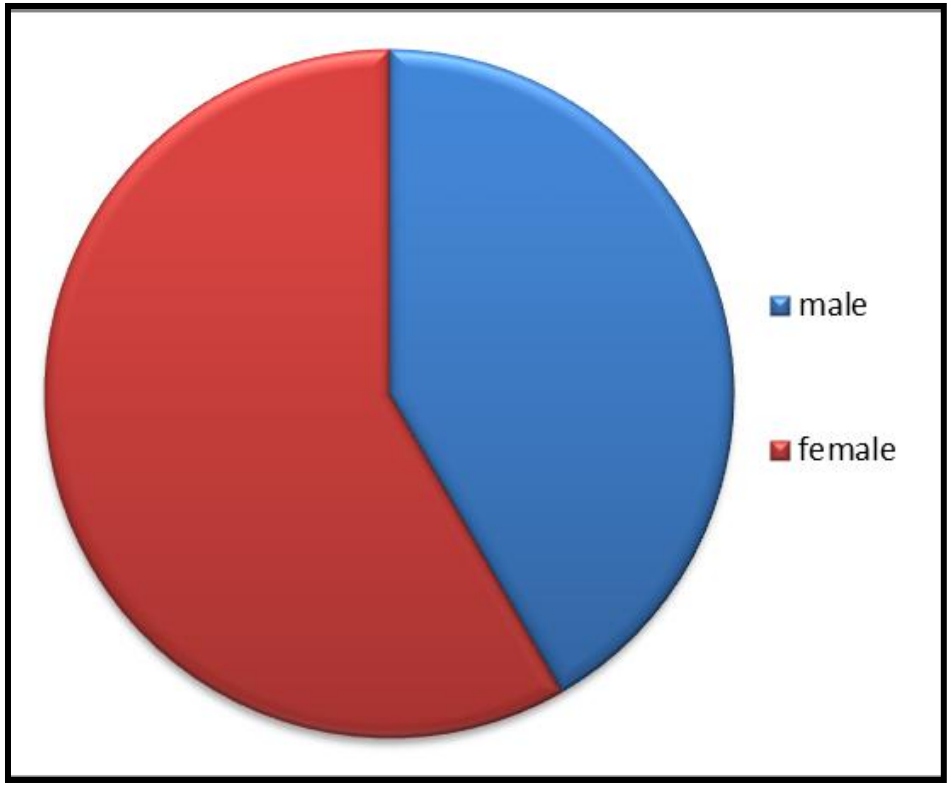
Human HAB Illness Reports, 2010, Ohio

- **July 30 and August 6 ODH HAN messages**
  - "Lake Advisory: Harmful Algal Blooms"
  - "Harmful Algal Bloom-related Illness Reporting," including Human and Animal Illness report forms.
- **Outbreaks**: 6 water bodies had 2 or more illness reports (n=48)
- **Symptoms** most frequently reported (n=48):

rash	50.0%
nausea	41.7%
vomiting	39.6%
diarrhea	33.3%
abdominal cramps	27.1%

Human HAB Illness Outbreak Cases (n=48), 2010, Ohio





Domestic Animal HAB Illness Reports, 2010, Ohio

Body of Water	Toxin Reported?	County of Body of Water	Probable	Suspect	Not a Case	Totals
Grand Lake St. Marys	Yes	Auglaize & Mercer	4*			4
Lake Loramie	Yes (low microcystin)	Shelby	1			1
Burr Oak	Yes	Athens	2			2
Berlin Lake Reservoir (US ACE)	NO	Mahoning & Portage			1	1
East Harbor	Yes (low microcystin)	Ottawa			1**	1
Statewide totals			7		2	9

Veterinary Outreach

- **August 5**
  - Joint memorandum from Ohio Department of Health and Ohio Department of Agriculture State Veterinarians to Ohio Veterinarians outlining reporting procedures, testing, and diagnostic support.

Animal Reports, GLSM

- **July 23 through August 11:**
  - 4 reports of dog illnesses following exposure to the lake water. Three of the four dogs died (between July 22 and July 28).
  - Symptoms included: seizures, diarrhea, vomiting and jaundice.
  - Samples from one dog were collected, but results were inconclusive due to autolysis (decomposition of the specimen). Stomach contents were negative.
- **August 3 and August 11:**
  - 2 ill blue herons were reported and referred to the Ohio Department of Natural Resources (ODNR).

Animal Reports, other lakes

- **August 10 and 11**
  - 2 puppies died following clinical signs (lethargy, fever, excessive drooling, vomiting and diarrhea) 1-2 days after exposure to Burr Oak Lake. Both dogs met probable case definition. No zoonotic samples were submitted for laboratory analysis.

Animal Reports, other lakes

- **August 26**
  - Report of a 6-yr-old boxer, acutely depressed, anorectic and in pain for 3 days after wading and gulping water from Berlin Lake at West Branch State Park. Dog had multiple exposures August 5–13. Owner also reported illness. Neither bloom nor toxin was confirmed for this water body. Both were classified as “not a case.”
- **September 8**
  - Report of a Labrador with water exposure at East Harbor (Lake Erie), and subsequent decline including hemolytic anemia. Neither bloom nor toxin was confirmed for this water body, therefore this report was classified as “not a case.”

Challenges

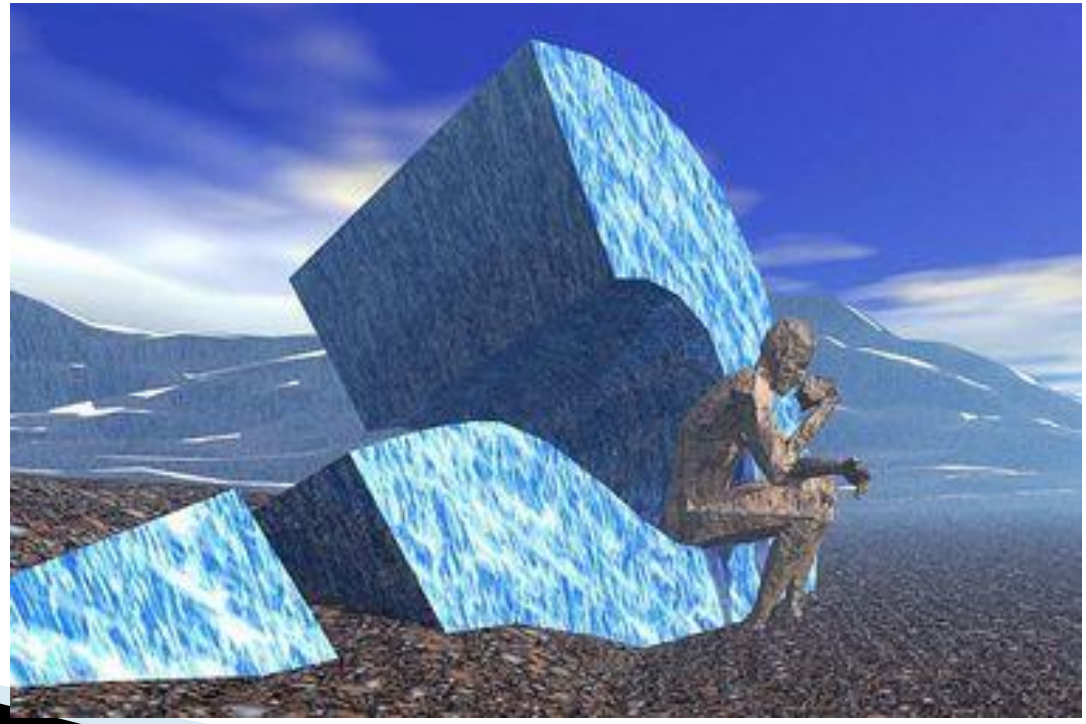
- **Time** delay between report and illness/exposure prevented verification of blooms in some instances.
- **Geography**
  - Larger water bodies with few sampling points but multiple exposure points.
- **Case definitions** are essentially diagnosis of exclusion.
- **Medical evaluation**
  - Not all who were reportedly ill sought medical care.
- **HABISS** online data entry time-intensive.
- **Funding**
  - Water testing reactive rather than routine surveillance for bodies of water due to costs.
  - No funds to hire dedicated staff.
- **Testing**
  - Lack of a CLIA-certified human assay for confirmation.

With appreciation

- Ohio local public health epidemiologists and nursing staff
- Dr. Lorraine Backer, NCEH
- Dr. Deanna Manassaram, NCEH
- Northern Ohio Poison Center
- Central Ohio Poison Center
- Cincinnati Drug and Poison Information Center
- Ohio EPA, Division of Surface Water
- Ohio Department of Natural Resources
- Dr. Tony Forshey, ODA, State Veterinarian
- Dr. Kathy Smith, ODH, ZDP, State Public Health Veterinarian (now ret.)
- Marika Mohr, ODH, ORBIT
- Dr. Mary DiOrio, ODH, State Epidemiologist
- ODH Recreation Program

What we discovered:

We discovered that there was very little information available for the public and medical provider community and that the information that was available was full of variability and uncertainty.



Initial concerns and complaints:

- dead fish
- scums on the lake
- unpleasant odors

Bureau of Environmental Health
Health Assessment Section
"To protect and improve the health of all Ohioans"

Odors and your Health

Answers to Frequently Asked Health Questions

Odors:

Ohio's local public health officials are often asked to evaluate the health impacts from exposure to environmental odors. An odor is a chemical in the air that is "smelled" or sensed by our nose (olfactory system). Apples smell like apples due to the chemicals that create the apple odor. Odors, also called smells, can be both pleasant and unpleasant. Stench and stink are words typically used to describe unpleasant, foul odors.

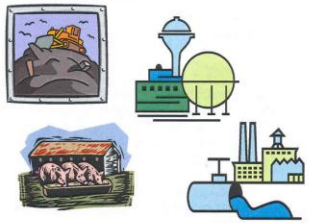
We breathe 10,000 to 20,000 liters of air a day, mostly through our noses. The olfactory system comes in contact with a different variety and concentration of chemical odors every day. **Odors *can* alert people that something may be harmful, but generally, you can smell many chemicals before they are at levels that are harmful to your health.** For example, we are able to smell hydrogen sulfide (H_2S) (smells like rotten eggs) at very low levels; levels much lower than those at which this chemical can cause toxic health effects.

Sources of environmental odors:

Many products and activities in our daily lives produce odors. For instance, the foods we eat, our cleaning supplies, paints, carpet, gasoline, gardens, air fresheners, cut grass, old shoes, etc. all have odors.

Environmental odor sources include:

- agricultural practices (fertilizers/ pesticides)
- animal farms
- chemical manufacturing or handling facilities
- food processing plants
- landfills
- petroleum refineries
- wastewater treatment facilities
- wood treatment plants



* To view the toxic effects of chemicals and/or the "Landfill Gas" fact sheets, visit the Ohio Department of Health (ODH), Health Assessment Section (HAS) web page at: www.odh.ohio.gov/odhPrograms/eh/hlth_as/hlth_as2.aspx and click on "Health Assessment Section Fact Sheets" on the left-side menu.

Can odors cause health problems?

Yes, certain groups of chemicals that produce odors are potentially harmful and can cause health problems. Some of these harmful chemicals are regulated by the Environmental Protection Agency (EPA) under the Clean Air Act. Other environmental chemical odors may not be regulated under the Clean Air Act, thus making it very difficult to address and/or enforce nuisance odor-type complaints.

Just because something smells bad does not mean it is harmful (example: rotten eggs). On the other hand, some dangerous and/or deadly chemicals can have a mild or sweet odor (benzene) or no odor at all (carbon monoxide).

Health effects from exposure to chemical odors can be an immediate (acute) health threat, a long-term (chronic) threat, or may pose no health threat at all. Getting sick from chemical odors will depend on what you are exposed to, how much you were exposed to (dose), how long you were exposed (duration), how often you were exposed (frequency) and your individual sensitivity to the odor.

The influence of odors on the health and comfort of individuals is difficult to evaluate. Odor sensitivity and response to odors differ from person to person. For some people who are more sensitive to odors, simply smelling a small amount of a foul odor can cause headaches and nausea (upset stomach). Sensitive populations include young children, pregnant women, the elderly and people with chronic health problems. People with chronic health problems include persons with asthma, emphysema and other respiratory diseases, persons with COPD (Chronic Obstructive Pulmonary Disease), persons with depression, chemical hypersensitivity or stress-induced illness.

The most common community health complaints resulting from exposure to odor-producing chemicals are:

Respiratory (breathing)
- Upper respiratory → eye irritation, scratchy throat
- Lower respiratory → coughing, wheezing

Gastro-Intestinal (stomach) → vomiting, diarrhea
Central Nervous System (CNS) → drowsiness, dizziness, headaches
Cardiovascular (heart) → tachycardia (increased heart rate), increased blood pressure
Psychological → mood changes, behavioral changes

Usually, these symptoms occur at the time of exposure and end within a short time after the odor disappears. Although this situation is highly undesirable, the health effects usually end when the exposure to the odor ends and rarely requires medical attention.

General fact sheet on Cyanobacteria and HABs

http://www.odh.ohio.gov/odhPrograms/eh/hlth_as/chemfs1.aspx

Bureau of Environmental Health
Health Assessment Section

"To protect and improve the health of all Ohioans"

Blue-Green Algae/Cyanobacteria Harmful Algal Bloom (HABs)

What are Blue-Green Algae?

Cyanobacteria, often called blue-green algae, are bacteria that are naturally found in Ohio lakes, ponds, and slow-moving streams. Although many species of algae do not produce toxins, some species of blue-green algae can cause Harmful Algal Blooms (HABs). HABs can produce neurotoxins (which affect the nervous system) and hepatotoxins (which affect the liver). These toxins can potentially impact the health of people who come into contact with water where HABs are present in high numbers.

Why does massive growth of Blue-Green Algae occur in the environment?

Under the right water conditions, which usually occur in the warmer months, the number of these blue-green algae can dramatically increase, or "bloom." Some blooms can be visible as thick mats or scum on the surface of the water, while others can be present without visible surface scum. The mats or scum can vary in color and could be bluish-green to red in color.

It is important to note that not all "blooms" produce toxins. Scientists do not fully understand what causes the same species of algae to trigger toxin production during one bloom and not produce toxin during the next.

Blue-green algae need warm temperatures, sunlight, phosphorus, and nitrogen to reproduce. Phosphorus and nitrogen are commonly found in animal and human waste and in fertilizers. Some common ways for phosphorus and nitrogen to enter lakes and streams are from agricultural and residential lawn runoff, improperly functioning septic systems, and erosion of nutrient-rich soil.

Can you get sick from exposure to Blue-Green Algae (cyanobacteria toxins)?

Yes, you can get sick from exposure to cyanobacteria toxins. But getting sick will depend on the type of cyanobacteria, the levels in the water and the type of contact you had with this "algae." Read more about this on the next page.

Can the cyanobacteria toxins be released to the outside air and pose a health hazard?

The chemical toxins produced by these blue-green algae do not volatilize (change from a liquid to a gas) and they are not released as vapors to the outside air. However, recreational activities like power boating, water-skiing, jet-skiing and tubing can whip up the surface of the water and create aerosols – toxin-containing water droplets – that can be inhaled or ingested, potentially resulting in negative health effects. Other activities that have the potential to aerosolize the lake water include using the lake water to irrigate (spray) lawns/gardens and golf courses.

Are the odors associated with Blue-Green Algae hazardous to my health?

Some of the blue-green algae produce an odor-generating byproduct, named geosmin. The human nose is extremely sensitive to geosmin and is able to detect it at concentrations at very low levels. These odors are not chemically toxic but do have a very unpleasant smell which can cause sensitive individuals to become nauseated (upset stomach, vomiting) and have headaches.

For more information about how odors can impact health, visit the ODH HAS program Web site at www.odh.ohio.gov/odhPrograms/eh/hlth_as/Hlth_As2.aspx and choose the menu item "Health Assessment Section Fact Sheets" and select the "Odors and your Health" fact sheet.

What is the safe level for algal toxins in water?

The World Health Organization set guidelines for microcystin toxin (a toxin produced by cyanobacteria) at 1 part per billion (ppb) in drinking water and 20 ppb for recreational waters. Currently, no similar guidance exists for the other toxins produced by cyanobacteria.

How do you come in contact with Blue-Green Algae and HABs?

- Ingestion (drinking) untreated water or incidentally swallowing water during recreational activities that comes from a lake or reservoir with HABs.
- Dermal (skin) contact by swimming and other recreational activities in HAB-contaminated waters.
- Inhaling aerosolized water droplets (misting) from water-related activities such as jet-skiing, power boating, tubing, or water skiing.
- The incidental swallowing or inhalation of aerosolized water droplets when watering lawns, gardens and golf courses with contaminated water.

What types of health problems can people and pets experience from exposure to HIGH concentrations of HABs?

- **Skin contact:** Contact with the skin may cause rashes, hives, or skin blisters (especially on the lips and under swimsuits).
- **Inhalation of (breathing) water droplets:** Breathing aerosolizing (suspended water droplets-mist) from the lake water-related recreational activities and/or lawn irrigation can cause runny eyes and noses, a sore throat, asthma-like symptoms, or allergic reactions.
- **Swallowing water:** Swallowing HAB-contaminated water can cause:
  - Acute (immediate), severe diarrhea and vomiting
  - Liver toxicity (abnormal liver function, abdominal pain, diarrhea and vomiting)
  - Kidney toxicity
  - Neurotoxicity (weakness, salivation, tingly fingers, numbness, dizziness,
  - Difficulties breathing, death

Is it safe to eat fish caught from HAB-contaminated water?

Some studies have shown that cyanotoxins can accumulate in fish in waters with high toxin levels. While there have been no confirmed reports of cyanotoxin-related human health effects related to fish consumption, there are few data on cyanotoxins on which to base judgments about health risk. Should you decide to consume fish, you would do so at your own risk, and should remove intestines, fat and skin, consuming only the fillet.

How to protect yourself, your family, and your pets from exposure to HABs:

- Don't swim, water-ski, or boat in areas where the blooms are occurring – avoid direct contact with the lake water or aerosolizing the water.
- Don't water lawns, gardens, or golf course with water from HAB-impacted lakes or ponds.
- Report unpleasant tastes or smells in your drinking water to your local water utility.
- Follow posted water body closures announced by state agencies or local public health authorities.

How to treat people or animals that have been exposed to HAB toxins:

- If you do come into contact with the HAB – contaminated water, rinse off with clean, fresh water as soon as possible.
- Pets that have been swimming in an area with an algae bloom may ingest significant amounts of toxins by licking their fur after leaving the water. Thoroughly rinse of your pets with clean, fresh water.
- Seek medical treatment ASAP if you think you, your pet, or your livestock might have been poisoned by toxic HABs.
- Remove people from the exposure and treat the symptoms.

For additional information:

This ODH fact sheet is intended to be a simplified and shorter version of the available information on HABs. For more in-depth analysis and documentation, visit the following information on the CDC and Wisconsin web sites listed in the below reference section.

References:

CDC Facts About Cyanobacteria and Cyanobacterial Harmful Algal Blooms (electronic July, 2010) www.cdc.gov/hab/cyanobacteria/pdfs/facts.pdf

CDC, Environmental Hazards & Health Effects, Harmful Algal Blooms (HABs), (electronic July, 2010) www.cdc.gov/hab/cyanobacteria/facts.htm#treat

Wisconsin Division of Public Health, Human Health Hazards, Algae Blooms: Blue-Green Algae/Cyanobacteria (PPH 45069 06/2004).Hazards, Algae Blooms: Blue-Green Algae/Cyanobacteria (PPH 45069 06/2004).

Wisconsin Department of Health Services, Blue-Green Algae (electronic July, 2010) www.dhs.wisconsin.gov/eh/bluegreenalgae/

Created July, 2010

HAB Physician Reference

Bureau of Environmental Health
Health Assessment Section
"To protect and improve the health of all Ohioans"

Blue-Green Algae/Cyanobacteria Harmful Algal Bloom (HABs) Physician Reference

The Public Health Issue:

This summer Ohio's local health departments, local physician offices, Poison Control Centers and the state health department have received reports of illness from people who have claimed to have had contact with HAB-contaminated water. Several of Ohio's inland lakes have experienced cyanobacteria blue-green algae blooms, commonly referred to as Harmful Algal Blooms (HABs). Depending on the genera, water conditions, and other factors, neurotoxins, hepatotoxins, cytotoxins, dermatotoxins and gastrointestinal toxins can be produced by cyanobacteria. These toxins are released to the water as the bacteria die. Water samples from various Ohio lakes have detected the presence of microcystin, anatoxin-a, cylindrospermopsin and saxitoxin. Both humans and animals can experience illness from exposure to these toxins during recreational activities and other water uses.

Exposure and Clinical Presentation:

Route of Exposure	Symptoms/Signs	Time to symptom onset*	Differential Diagnosis
Swallowing water contaminated with cyanobacteria or toxins	**Hepatotoxins** (microcystins, cylindrospermopsin) Elevated AST/ALT, GGT Gastroenteritis Acute hepatitis Kidney damage Malaise Headache Anorexia	Minutes to hours	Other hepatotoxin poisoning, other microbial infections/toxins Viral hepatitis Viral Gastroenteritis Hepatotoxic drug ingestion (acetaminophen)
Swallowing water contaminated with cyanobacteria or toxins	**Neurotoxins** (anatoxin-a, anatoxin-a(s), saxitoxin) Paresthesia Tremor Fasciculations Hypersalivation Diarrhea Ataxia Motor weakness Respiratory and muscular paralysis	Minutes to hours	Pesticide poisoning, other toxin poisoning
Skin contact with water contaminated with cyanobacteria or toxins or contact with animals contaminated with cyanobacteria	**Dermal toxins** (Lyngbyatoxins, lipopolysaccharide endotoxins) Rash, hives Skin blistering Allergic reactions	Minutes to hours	Other dermal allergens, non-allergic urticaria, photosensitivity reactions
Inhaling aerosolized droplets contaminated with cyanobacteria or toxins	Upper respiratory irritation Rhinitis Possible allergic reaction	Unknown, but likely an acute reaction	Other airborne allergens, upper respiratory infection, flu

* Symptom onset times are primarily extrapolations from laboratory animal data and events.

definitions and the following human illness reporting form for HAB-related illnesses:

HAB-related human illness report:
www.odh.ohio.gov/ASSETS/73AB68EA30EB4F28944F96211E0E6905/HAB-Related%20Human%20Illness%20Form-%2008-06-2010.pdf

Animal Illness:
Reports of suspected domestic animal illness associated with exposure to HAB should be reported to the Local Health District. Local health districts receiving reports from veterinarians should contact the ODH Zoonotic Disease Program (ZDP) at 614-752-1029, select option two (2). Completed animal illness report forms can be faxed to the ODH ZDP at 614-644-1057.

HAB-related animal illness report:
www.odh.ohio.gov/ASSETS/F142B8DFD67B4B55B71650062F4F72C6/Animal%20HAB-Related%20Illness%20Form.pdf

Diagnosis and Lab Testing:

Currently there is no laboratory diagnostic testing which can confirm the presence of cyanotoxins in human clinical specimens. In the absence of laboratory confirmation, presumptive diagnosis can be made based upon exposure history, clinical signs and symptoms, and ruling out other diagnoses. In cases where exposure to hepatotoxins is suspected, a standard liver panel is recommended (AST (SGOT), ALT, ALP, GGT, albumin and bilirubin). Tests for ruling out other diagnoses should also be performed.

Case Definition:

CDC case definition summary for selected toxins (for complete description see CDC *Proposed Case Definitions for Algal Toxin-related Diseases*)

- **Suspect Case** Exposure to water with a confirmed algal bloom AND onset of associated signs and symptoms within a reasonable time after exposure AND without identification of another cause of illness.
- **Probable Case** Meets criteria for *Suspect Case* AND there is laboratory documentation of a HAB toxin(s) in the water.
- **Confirmed Case** Meets criteria for a *Probable Case* combined with professional judgment based on medical review.

Freshwater Cyanotoxins	Type of Toxin	Causative organism	Vector
Anatoxin-a	Neurotoxin	*Anabaena* spp. *Aphanizomenon* spp. *Planktothrix* spp.	Contaminated fresh water
Anatoxin-a(s)	Neurotoxin	*Anabaena flos-aquae*	Contaminated fresh water
Cylindrospermopsin	Hepatotoxin	*Cylindrospermopsis raciborskii*, *Aphanizomenon ovalisporum*	Contaminated fresh water and possibly fish
Lyngbyatoxin	Dermal toxin	*Lyngbya* spp.	Contaminated fresh or marine waters
Microcystins	Hepatotoxin	*M. aeruginosa* *Anabaena* spp. *Planktothrix* spp.	Contaminated fresh water
Saxitoxins	Neurotoxin	*Anabaena circinalis* *Lyngbya wollei*	Contaminated fresh water

Treatment and Patient Management:

Symptomatic, supportive care. There are currently no known antidotes for exposures to the group of toxins associated with cyanobacteria. Follow-up laboratory testing as indicated.

Florida
http://www.doh.state.fl.us/environment/medicine/aquatic/pdfs/BG_algae_FAQ.pdf
http://research.myfwc.com/support/view_faqs.asp?id=45
Wisconsin Department of Natural Resources
http://www.uwsp.edu/cnr/uwexlakes/ecology/Blue-green%20FAQ%202.pdf
http://dnr.wi.gov/lakes/bluegreenalgae/WisconsinLakesBGA.pdf

Where can I get more information?

Ohio Department of Health
Bureau of Environmental Health
246 N. High Street
Columbus, Ohio 43215
Phone: (614) 466-1390
Fax: (614) 466-4556

Revised 08/18/10

HABs Campground Operators & Privately-Owned Lakes/Ponds

Bureau of Environmental Health
Health Assessment Section
"To protect and improve the health of all Ohioans"

Harmful Algal Bloom (HABs)
Ohio's Campground Operators and Privately-Owned Lakes and Ponds

What are Blue-Green Algae?
Cyanobacteria, often called blue-green algae, are bacteria that are naturally found in Ohio lakes, ponds, and slow-moving streams. Although many species of algae do not produce toxins, some species of blue-green algae can cause Harmful Algal Blooms (HABs). HABs can produce neurotoxins (affecting the nervous system), hepatotoxins (affecting the liver) and dermatotoxins (affecting the skin). These toxins can potentially impact the health of people and pets that come into contact with water where HABs are present in high numbers.

Can you get sick from exposure to Blue-Green Algae (cyanobacteria toxins)?
Yes, you can get sick from exposure to cyanobacteria toxins. But getting sick will depend on the type of cyanobacteria, the levels in the water and the type of contact you had with this "algae."

What types of health problems can people and pets experience from exposure to HABs?
- **Skin contact:** Contact with the skin may cause rashes, hives, or skin blisters (especially on the lips and under swimsuits).
- **Inhalation of (breathing) water droplets:** Breathing aerosolized (suspended water droplets) mist from the lake water-related recreational activities and/or lawn irrigation can cause runny eyes and noses, a sore throat, asthma-like symptoms, or allergic reactions.
- **Swallowing water:** Swallowing HAB-contaminated water can cause:
  - Acute (immediate), severe diarrhea and vomiting
  - Liver toxicity (abnormal liver function, abdominal pain, diarrhea and vomiting)
  - Kidney toxicity
  - Neurotoxicity (weakness, salivation, tingly fingers, numbness, dizziness,
  - Difficulties breathing, death

To read more about Cyanobacteria Harmful Algal Bloom (HABs) and how they impact health, visit the ODH home page at www.odh.ohio.gov and select "Harmful Algal Blooms."

How do you know if you have a cyanobacteria (HAB) bloom or a harmless algae/aquatic plant bloom?
Algae blooms can look like foam, scum, or mats on the surface of fresh water lakes and ponds. They can also make the water look green, blue-green without a scum. However, HAB blooms can be blue, blue/green, bright green, brown, or red and may look like paint floating on the water.

To see the photographic difference between HABs and non-toxic common algae blooms, visit the ODH home page and select the "Photos of Algae Blooms" document.

How do I report a HAB?
Ohio EPA is collecting reports of algal blooms in Ohio waters. The Ohio EPA HAB report form is available at: www.epa.ohio.gov/dsw/HAB.aspx.

Note you will need Microsoft Excel to complete the electronic form. If you do not have Excel or if you have any questions about reporting an algal bloom, please contact the Ohio EPA Public Information Center at (614) 644-2160.

When should you sample?
Privately-owned lakes and ponds should sample their water if they meet the following criteria:
- The private body of water is used for swimming, boating or fishing.
- The private body of water is used as a drinking water source for people or livestock.
- The private body of water is located in a residential camp or a licensed campground.

Who conducts sampling? What is the sampling protocol/safety procedures?
The private owner/operator can either hire a consultant or conduct the sampling themselves. If you decide you want to conduct the sampling yourself, it is very important you do it in accordance with the sampling protocol established by the Ohio EPA. When sampling, use appropriate safety precautions including wearing rubber gloves and avoid contact with the water and/or scum. For information regarding the Ohio EPA sampling protocol, contact Ohio EPA HAB Coordinator Linda Merchant-Masonbrink at (614) 644-2135 or 644-2001.

Who pays for the sampling?
All costs associated with the testing of a privately-owned lake/pond would be incurred by the owner/operator. Costs may range from $45 to $250 per sample depending upon the type of test.

What should you test for?
The water sample should be tested for the following:
- Identification (ID) of the type of cyanobacteria present (genera).
- The type of cyanotoxin produced by the type of cyanobacteria identified (microcystin, anatoxin-a, cylindrospermopsin and saxitoxin).

What laboratories are available to conduct the analysis?
When choosing a laboratory, it is important to make sure the lab can identify the different genera of cyanobacteria present and provide an analysis of the individual cyanotoxins detected. The below list of labs are currently used by the Ohio EPA. Please note that the below list is not a comprehensive listing of the available labs and that the Ohio EPA does not offer an endorsement of any particular lab.

BSA Environmental Services, Inc. (Dr. John Beaver)
23400 Mercantile Rd. Suite 8
Beachwood, OH 44122
(216) 765-0582
(Algae ID and toxin analyses, not anatoxin-a)

Green Water Laboratories/CyanoLab (Dr. Mark Aubel)
205 Zeagler Dr., Suite 302
Palatka, Florida 32177
386-328-0882
(Algae ID and toxin analyses, including anatoxin-a)

Celina Utilities-Water Department (Mike Sudman)
714 S. Sugar Street
Celina, OH
(419) 586-2270
(microcystin analysis)

Should you post a caution or warning sign?
ODH is recommending that public access waters in Ohio be posted with a caution sign as soon as there is visual evidence of a HAB. ODH recommends that a sign be posted which alerts swimmers/boaters/fishers to "avoid contact with the water." For examples of signs, please contact ODH at (614) 466-1390.

Is it safe to eat fish caught from HAB-contaminated water?
Some studies have shown that cyanotoxins can accumulate in fish in waters with very high toxin levels. While there have been no confirmed reports of cyanotoxin-related human health effects related to fish consumption, there are few data on cyanotoxins on which to base judgments about health risk. Should you decide to consume fish from HAB-contaminated waters, you would do so at your own risk, and should remove internal organs, fat and skin, consuming only the fillet.

For additional information:
This fact sheet is intended to provide basic HAB information to Ohio's Campground Operators and to Landowners of Privately-Owned Lakes and Ponds. For a more detailed discussion of HABs and their impact to public health, visit the hyperlinked references listed below.

Ohio Department of Health
Bureau of Environmental Health
246 N. High Street
Columbus, Ohio 43215
Phone: (614) 466-1390

References:
Ohio Department of Health Blue-Green Algae /Cyanobacteria HABs (electronic August, 2010)
www.odh.ohio.gov/odhPrograms/eh/hlth_as/chemfs1.aspx
Ohio Department of Health HAB Provider Reference (electronic August, 2010)
www.odh.ohio.gov/odhPrograms/eh/hlth_as/chemfs1.aspx
Ohio Department of Health Photos of Algae Blooms (electronic August, 2010)
www.odh.ohio.gov/odhPrograms/eh/hlth_as/chemfs1.aspx
Ohio EPA Harmful Algal Blooms (HABs) and Algal Toxins (electronic August, 2010)
www.epa.state.oh.us/dsw/HAB.aspx
Ohio Department of Natural Resources (ODNR) HAB Website (electronic July, 2010)
http://www.ohiodnr.com/tabid/22957/Default.aspx
CDC Facts About Cyanobacteria and Cyanobacterial Harmful Algal Blooms (electronic July, 2010)
www.cdc.gov/hab/cyanobacteria/pdfs/facts.pdf

Created August 2010

Pond Water - Drinking Water Treatment

Private Water Systems

Bureau of Environmental Health

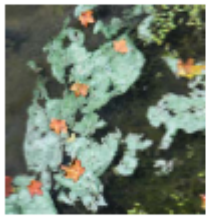
"To protect and improve the health of all Ohioans"

Pond Water - Drinking Water Treatment of Blue-Green Algae

The Public Health Issue:

Algae growth has always been regarded as a problem for ponds. Algae in ponds can especially be a problem if the pond is used as a drinking water source or other household uses. Cyanobacteria, often called blue-green algae, are bacteria that are naturally found in Ohio lakes, ponds, and slow-moving streams. Although many species of algae do not produce toxins, some species of blue-green algae can cause Harmful Algal Blooms (HABs). HABs can produce neurotoxins (which affect the nervous system), hepatotoxins (which affect the liver) and dermatotoxins (which affect the skin). These toxins can potentially impact the health of people and pets that come into contact with water (including drinking water) where HABs are present in high numbers.

For more information about HABs and what you need to do if you own a private water body, visit the Ohio Department of Health web page at www.odh.ohio.gov and select the "H" in the A through Z index. In the "H" section, choose *Health Assessment Section* and then select the *Health Assessment Section Fact Sheets* menu choice. In the fact sheet section you will see *Cyanobacteria – Harmful Algal Blooms (HABs)* with four fact sheet choices. We encourage you read *HABs Campground Operators – Privately Owned Waters* to learn more about HABs in your privately-owned pond and view the *Photos of Algae Blooms* to see if your bloom is a HAB or the common, non-harmful algal bloom.



Water Treatment Systems for Private Water System Ponds:

The water treatment system for a pond is designed to work in stages to maximize the effectiveness and make the water potable and safe for drinking. During extended periods of warm weather and increased nutrient enrichment, algae blooms in ponds may overwhelm the disinfection and filtration treatment system and may not be as effective at reducing higher levels of the different types of blue-green algae toxins.

Reduction of blue-green algae and the toxins in a pond drinking water system can be accomplished using the following combination of pond management and water treatment:

- watershed management
- pond preemptive algae control
- pond intake placement
- continuous filtration
- oxidation with disinfectants such as chlorine or ozone
- granular activated carbon (GAC) or powdered activated carbon (PAC).

It is important to keep ahead of the common-type algae formations in your pond. It is the responsibility of the homeowner to control their watershed that recharges the pond (Ohio Administrative Code 3701-28-15 (B) (1). The watershed should be covered with grass or other vegetation. Do not apply fertilizers or other chemicals on the watershed area and do not use the watershed as a pasture. Do not install on-site wastewater treatment systems in the upstream portion of the watershed area. If the watershed is not currently under your control, you should use diversion ditches and swales to make sure the pond water recharge is not originating off of your property. Contact your local Soil and Water District for assistance with any changes you may need to make for watershed control.

A variety of algicides, including copper sulfate, can be used in private water system ponds. Algicides that meet NSF/ANSI Standard 60 must be used and can be found at www.nsf.org. However, it is very important to note that using algicides to treat blue-green algal blooms once they have occurred can actually cause more harm because as the blue-green algae die, their cell walls can burst and release more toxins into the water. Therefore, use of algicides for blue-green algae blooms once they have occurred are not recommended.

Steps for reducing blue-green algae and toxins from your finished pond water:

Water Intake:

Since the levels of toxins in water usually decrease with depth, the water intake should be placed at lower depths.

- A floating filter intake should draw water in at between 18 to 36 inches below the surface in the deepest part of the pond. *If algae are still prevalent at this depth consider using another source of water.*

A cased pond intake relies on the bank to filter water and can filter out some the algae before entering the treatment system.

- If the water appears green in the cased intake, then the filtration that is taking place through the bank is inadequate.

Filtration:

A slow sand filter, pressurized rapid sand filter, or pre-coat filter is the next step in treatment to filter out as many of the blue- green algae cells as possible before the water enters the disinfection system.

- Pressured rapid sand filters are the most common filters used for drinking water ponds. There is concern that toxins can be released during the back wash cycle as the algae cells burst. If backwashing pressurized sand filters are used in the treatment process, they should be preceded by a coagulation step with a final filter that must be an absolute 1 or 2 micron sized cyst reduction filter. The cyst reduction filter is designed to remove protozoans but can also remove some of the algae cells. (An absolute filter is capable of removing 99% of cells or particles 1 or 2 microns in size or larger)
- Slow sand filters work simply by gravity and do not have a back wash cycle.
- Pre-coat (sometimes called diatomaceous earth filters) can filter out very small particles but require extensive maintenance to ensure proper operation.

Disinfection and Oxidation:

The next step is disinfection and oxidation. Chlorine both disinfects and oxidizes. Under normal conditions chlorine residual levels for disinfection are set at 0.2 PPM after 20 minutes of contact time. Note that higher chlorine doses are required to remove many of the blue-green algae toxins.

- The recommended dose for chlorine in order to remove some of the toxins is 3 mg/l for 30 minutes of contact time with the water. Some of the remaining toxins have to be removed from the water by using granular activated carbon (GAC) or powdered activated carbon (PAC) filter units.

Ultraviolet Light (UV) for Disinfection:

If you are using ultraviolet light (UV) for disinfection it is unlikely that your UV device can provide the high doses required to remove the toxins produced by the blue-green algae. If you have a UV unit, you will need to add a chemical oxidizing stage that uses chlorine, ozone, or other strong oxidizer in order to accomplish removal of the toxins.

Granular Activated Carbon (GAC) or Powdered Activated Carbon (PAC) Filter Units:

For whole house water treatment of the water, use GAC or PAC filters with a bed depth of at least two feet.

- The three primary types of GAC and PAC filters are coal-based, coconut hull-based, and wood-based. Although all GAC and PAC filters can remove some of the blue-green algae toxins, wood-based GAC filters have been shown to be the most effective.
- The GAC or PAC filters will also remove other chemicals like tannic acids, chlorine and chlorine by-products.

Sizing the PAC or GAC filter treatment device for removing contaminants should be done by an experienced professional water treatment dealer. Remember that carbon filters only last a certain period of time and the GAC or PAC will need to be replaced. If they are not replaced in a timely manner, the GAC or PAC will cease to work and also could release toxins that had previously been removed.

Any work done on the pond and treatment system must be done by a Private Water System contractor registered with the Ohio Department of Health. You can review a list of Private Water System Contractors at: www.odh.ohio.gov/odhPrograms/eh/water/water1.aspx

If you are unsure your pond treatment system is capable of removing the blue-green algae and the toxins from your drinking water, you should consider using an alternative drinking water source or use bottled water during times of increased algal growth. If your choices for alternative water are limited because public water is unavailable or if groundwater is insufficient for water wells, then a hauled water storage tank system should be installed.

Ponds, wells, springs, rainwater cisterns, and hauled water storage tanks used as private drinking water systems are regulated under Ohio Administrative Code Chapter 3701-28 by the local health department. The regulations for ponds include requirements for the watershed management, pond construction, and continuous disinfection and filtration systems. If you have additional questions about ponds as water supplies call your local health department or the Ohio Department of Health (614)-466-1390.

Created August 2010

Photos of HABs and Aquatic Plants

Examples of Cyanobacteria (Blue-Green Algae)

Examples of Cyanobacteria (Blue-Green Algae)

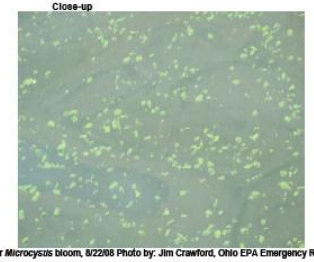
Examples of Common-Harmless Algae and Aquatic Plants

Examples of Common-Harmless Algae and Aquatic Plants

Examples of Blue-Green Algae *Microcystis* Bloom

Ohio River *Microcystis* bloom, 8/22/08 Photo by: Jim Crawford, Ohio EPA Emergency Response

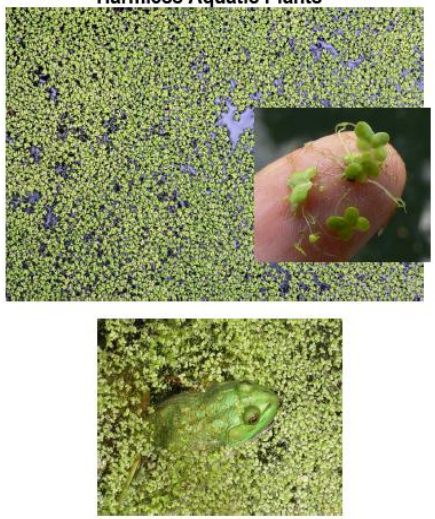
Close-up



Ohio River *Microcystis* bloom, 8/22/08 Photo by: Jim Crawford, Ohio EPA Emergency Response

Examples of Duckweed

Harmless Aquatic Plants



Revised 08/18/10

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Mercer-Auglaize Counties Independent News Service.

The Columbus Dispatch

Cuyahoga Falls NEWS·PRESS

THE REPUBLIC
Columbus, Indiana

toledoBlade.com

The Evening LEADER
Delivering your hometown news since 1905

Communications Toolkit for Local Health Departments

Communications Toolkit Includes:

- Key Public Health Messages (messages for local public health officials)
- Frequently Asked Questions (an FAQ based upon what questions have been asked)
- Two Template Press Releases (draft press releases for our local public health partners to use)
- Facebook and Twitter Messages

Using Social Media

The State of Ohio has launched a new Web site www.Ohioalgaeinfo.com as a one-stop shop for harmful algal bloom information in Ohio.

On the Web site you can see a list of current advisories and sampling data, a report on the potential algal blooms, and get tips about harmful algal blooms.

Do you know what a harmful algal bloom is? If your answer to the question is no, visit www.ohioalgaeinfo.com to learn about how to protect yourself.

Thinking about visiting an Ohio beach this weekend? Be sure to check if there is a harmful algal bloom advisory posted by visiting www.ohioalgaeinfo.com.

Did you know that harmful algal blooms are caused by bacteria and not by algae? Learn more by visiting http://www.odh.ohio.gov/~/media/ODH/ASSETS/Files/eh/HAS/BlueGreenAlage.ashx

This summer avoid contact with waters that have advisories posted or anywhere the water is pea green, has a floating bright green scum, or is generally discolored. Also remember: When in doubt, stay out!

Pets that have been swimming in an area with an algae bloom may ingest significant amounts of toxins by licking their fur after leaving the water. Do not let your pets swim or drink in water where a harmful algal bloom is present. If your pet does come into contact with HAB-contaminated water, thoroughly rinse them with clean, fresh water. Take your pet to the veterinarian if you think it has been poisoned by the toxins in the water.

Using Social Media (cont.)

(140 character limit):

Do you know what a harmful algal bloom looks like? Click here: http://www.odh.ohio.gov/~/media/ODH/ASSETS/Files/eh/HAS/photosofalgaeblooms.ashx to see images of blooms that have occurred in Ohio.

Ohio has 3 types of advisories that may be posted at public bodies of water. Learn more about what they mean at www.Ohioalgaeinfo.com

This summer avoid contact with waters that have advisories posted or anywhere the water is pea green or has a floating green scum.

The State has launched a new Web site www.Ohioalgaeinfo.com as a one-stop shop for harmful algal bloom information in Ohio.

Did you know that harmful algal blooms are caused by bacteria and not by algae? Learn more: www.Ohioalgaeinfo.com

Using Social Media (cont.)

Cyanobacteria, often called blue-green algae, are bacteria that are naturally found in Ohio lakes, ponds, and slow-moving streams. Although many species of algae do not produce toxins, some species of blue-green algae can cause Harmful Algal Blooms (HABs). This HAB informational video provides pictures of blooms and information on advisories. http://www.youtube.com/watch?v=XF-j8hdMQOY

ODH Web Site

Ohio.gov State Agencies | Online Services

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A—Z Index 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

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

OhioHABinfo.com is a one-stop shop for algae information in Ohio. You can view a list of current advisories or sampling data, report potential algal blooms, and get tips about HABs. You can also watch the HAB informational video to see pictures of blooms and learn more about advisories.

The State has also developed standards for the posting of Ohio Recreational Use Advisories.

- The public health advisory would be posted when tests conclude microcystin levels are at least six parts per billion (ppb). At this point, the public would be advised that swimming and wading are not recommended, water should not be swallowed and surface scum should be avoided
- A no contact advisory would recommend the public to avoid all contact with the water at that location. A no contact advisory would be posted if test results show microcystin levels at least 20 ppb and there has been a report of human illness or pet death. If a no contact advisory is posted for a recreational contact area, the State may sample the lake to determine if an open water no contact advisory should be posted.

Once an advisory is posted, the State will periodically sample until microcystin is below acceptable thresholds or the end of the beach season in Ohio. To view a map of the current HAB advisories click here.

HAB FAQs

What are HABS?
HABs can produce neurotoxins (which affect the nervous system) and hepatotoxins (which affect the liver). These toxins can potentially impact the health of people who come into contact with water where HABs are present in high numbers.

Under the right water conditions, which usually occur in the warmer months, the number of these blue-green algae can dramatically increase, or "bloom." Scientists do not fully understand what causes the same species of algae to trigger toxin production during one bloom and not produce toxin during the next.

Some cyanobacterial blooms can look like foam, scum, or mats on the surface of fresh water lakes and ponds. The blooms can be blue, bright green, brown, or red and may look like paint floating on the water. Some blooms may not affect the appearance of the water.

Humans and pets can get sick from exposure to cyanobacteria toxins. However, the development of illness will depend on the type of cyanobacteria, the levels in the water and the type of contact an individual has had with this "algae."

What types of health problems can people and pets experience from exposure to high numbers of Blue-Green Algae and HABs?

- Skin contact: Contact with the skin may cause rashes, hives, or skin blisters (especially on the lips and under swimsuits).
- Breathing of water droplets: Breathing aerosolized (airborne mist) from the lake water while participating in recreational activities and/or lawn irrigation can cause runny eyes and noses, a sore throat, asthma-like symptoms, or allergic reactions.
- Swallowing water: Swallowing HAB-contaminated water can cause:
  - Acute (immediate): severe diarrhea and vomiting
  - Liver toxicity (abnormal liver function, abdominal pain, diarrhea and vomiting)
  - Kidney toxicity
  - Neurotoxicity (weakness, salivation, tingly fingers, numbness, dizziness, difficulties breathing, death)

How can I protect protect myself, family and pets from exposure to HABs?

- Don't swim, water-ski, or boat at high speeds in areas where the blooms are occurring – avoid direct contact with the lake water or aerosolizing the water.
- Don't water lawns, gardens, or golf course with water from HAB-impacted lakes or ponds.
- Report unpleasant tastes or smells in your drinking water to your local water utility.
- Follow posted water body advisories announced by state agencies or local public health authorities.

How do you treat people or animals that have been exposed to HAB toxins?

- If you do come into contact with the HAB contaminated water, rinse off with clean, fresh water as soon as possible.
- Pets that have been swimming in an area with a HAB may ingest significant amounts of toxins by licking their fur after leaving the water. Thoroughly rinse of your pets with clean, fresh water.
- Seek medical treatment ASAP if you think you, your pet, or your livestock might have been poisoned by toxic HAB.
- Remove people from the exposure and seek medical treatment if symptoms occur.

Local health districts can report suspected human illnesses associated with exposure to a HAB to the Ohio Department of Health (ODH) at 614-995-5589. Reports of suspected animal illnesses can be reported to ODH at 614-752-1029, select option 2.

What types of odors are associated with blue-green algae?

Some of the blue-green algae produce an odor generating byproduct, named geosmin. The human nose is extremely sensitive to geosmin and is able to detect it at concentrations at very low levels. These odors are not chemically toxic but do have a very unpleasant smell which can cause sensitive individuals to become nauseous (upset stomach, vomiting) and have headaches.

The chemical toxins produced by these blue-green algae do not change from a liquid to a gas and they are not released as vapors to the outside air. However, recreational activities like power boating, water-skiing, jet-skiing and tubing can whip up the surface of the water and create aerosols – toxin-containing water droplets – that can be inhaled or ingested, potentially resulting in negative health effects. Other activities that have the potential to aerosolize the lake water include using the lake water to irrigate lawns/gardens and golf courses.

Resources:

State of Ohio Algae Web site: www.ohioalgaeinfo.com

Ohio Department of Natural Resources HAB Website

Centers for Disease Control and Prevention, Environmental Hazards & Health Effects, Harmful Algal Blooms HABs

ODH Photo Examples of Cyanobacteria Blooms

ODH Blue-Green Algae Fact Sheet

ODH Health Care Provider Fact Sheet

ODH Odors and Your Health Fact Sheet

ODH Privately Owned Bodies of Water Fact Sheet

ODH Pond Water - Drinking Water Treatment of Blue-Green Algae

ODH HAB human illness reporting form

ODH HAB animal illness reporting form

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Search

Ohio Department of Health

Forms | Rules | Local Health Departments | About Us | Data & Statistics | Our Programs

A—Z Index 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

Health Assessment Section (HAS)

Professional Services

Chemical Fact Sheets

Public Health Assessments

Public Health Consultations

Chemical Fact Sheets

These files are in .PDF format. The free Adobe Acrobat Viewer is required to view them.

Chemical

- 1,3 Butadiene
- 1,2 DCE
- 1,1,1 TCA
- Arsenic
- Arsenic in Gardening
- Benzene
- BTEX
- Chlorobenzene
- Chloroform
- Cumene
- Ethanol
- Hydrogen Sulfide (H2S)
- Isopentane & TMP
- Lead
- Lead Contamination in Gardens
- Manganese
- Manganese in Water
- Methane
- Nitrates/Nitrites
- Perchlorate
- PCE
- Polycyclic Aromatic Hydrocarbons (PAHs)
- TCE
- Vinyl Chloride

Mercury Packet

- Mercury Packet Contents
- Mercury fact sheet
- Mercury Spills fact sheet
- Suggested Action Levels for Indoor Mercury Vapor in Homes.
- Small Mercury Spills
- Large Mercury Spills
- Mercury Cleanup Kit
- Ohio EPA Mercury in the Household
- Mercury Exposure Tartan Brand Polymer Flooring
- Mercury in Flooring Presentation
- Compact Fluorescent Lightbulbs (CFL's) - ODH Public Health Opinion

C-8

- C-8 Physician Reference
- C-8 Quick Fact Q & A
- C-8 Community Fact Sheet
- Perfluorochemicals (PFO's)

Cancer

- Cancer
- Cancer Clusters
- Exposure to Toxic Chemicals and Cancer

Cyanobacteria - Harmful Algal Blooms (HABs)

- Blue-Green Algae/Cyanobacteria HABs
- HAB Provider Reference
- HABs Remediation Operators - Privately Owned Waters
- Pond Water - Drinking Water Treatment of Blue-Green Algae
- Photos of Algae Blooms
  - Harmful Algal Blooms (HABs) 2010 Presentation (part 1)
  - Harmful Algal Blooms (HABs) 2010 Presentation (part 2)
- Harmful Algal Bloom Video
- HAB human illness Report Form
- HAB Animal Illness Report Form

Methamphetamine "Meth"

- Meth – A Public Health Issue
- Meth Lab Clean-up
  - Meth Presentation - University of Akron October, 2008

Miscellaneous

- Exposure to Chemicals
- E. coli
- Landfill Gas
- Natural Metals in Ohio's Groundwater 2008 Presentation
- Odors and your Health
- Total & Fecal Coliform Bacteria
- Vapor Intrusion
- Wind Turbine Health Impact Summary Report
  - Wind Turbine Presentation

Last Updated: 05/05/12

Ohio EPA Web Site

Translate this Web Site

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Search

Air | Land | Water | News | Answer Place | eBusiness Center | Permit & Compliance Assistance | Home

Division of Surface Water Harmful Algal Blooms

Division Links

Division Forms and Publications
Division Rules and Laws
Policies and Guidance
Surface Water Programs
Related Sites
Interactive Maps
Do Business Online
What's New (October 26, 2010)
DSW Intranet (OEPA staff only)
About Us
Division Contacts
Division Home

Agency Links

Divisions and Offices
Topic Index
Regulatory Ombudsman
Rules and Laws
Pollution Prevention
Funding Sources
Publications
Public Records
Public Participation
Resources for Citizens
Jobs
Ohio EPA Home

Learn More About

Harmful Algal Blooms (HAB) and Algal Toxins

- Ohio Department of Natural Resources Algae Advisory Update web page - Includes the current advisory levels for state owned bodies of water
- Ohio Department of Health Harmful Algal Blooms web page
  - Managing Harmful Algal Blooms in Private Ponds [PDF]
- Ohio EPA News Releases

Background Information

- Harmful Algal Blooms in Ohio Waters
  - Fact Sheet [PDF 746K]
  - Poster [PDF 5,291K]
- Ohio HAB Initiative [PDF 30K]
- Harmful Algal Blooms - Protect Your Pets and Livestock [PDF 407K]
- Information for Veterinarians [PDF 142K]
- Photo Gallery of Ohio HABs [PDF 767K]
- Algae - Graphic Renderings of Microscopic Appearance [PDF 1,273K]
- Toxin and Taste-and-Odor Producing Cyanobacteria [PDF 68K]
- References of Algal Toxin Impacts on Animals

Algal Toxin Sampling Data for Grand Lake St. Marys Area

All documents are in PDF*

- Grand Lake St. Marys
  - 2009 microcystin data
  - Other GLSM data
- St. Marys River and Beaver Creek
- Miami and Erie Canal

Grand Lake St. Marys Web Page - summary information other than data

Algal Toxin Sampling Data for Other Inland Lakes

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ODNR Web Site

Ohio.gov | Department of Natural Resources

Wildlife | Parks | Boating | Nature Preserves | Forests | Other Divisions · Offices ·

Ohio Department of Natural Resources - Algae Advisory

QUICK LINKS
- ODNR Program List
- Fishing Licenses
- Hunting Licenses
- Parks Reservations
- Boat Registrations
- License Plates

RECREATION
- Wildlife
- Parks
- Boating
- Nature Preserves
- Scenic Rivers
- Forests
- Ohio Trails

CONSERVATION
- Geology
- Lake Erie Coastal
- Mineral Resources
- Recycling
- Soil & Water
- Water Resources
- Water Well Logs

INFORMATION
- About ODNR
- Public Records Requests
- Publications
- Educational Resources
- Grant Opportunities
- Ohio Jobs
- GIS

Algae Advisory Update

Updated Nov 5, 2010

Cyanobacteria, often referred to as blue-green algae, are bacteria naturally found in Ohio lakes, ponds and slow-moving streams. While not harmful by itself, blue-green algae has the potential to grow toxins that could be harmful to both human and pet health.

If ODNR recognizes an algal bloom in a state body of water, cautionary signs will be posted indicating t harmful algae may be present and individuals and their pets should avoid contact with the algae and the water until the state can confirm that blue-green algae bloom is present.

If you notice blue-green algae, please be advised to avoid direct contact with it and the water that it is in Also, similar to any other untreated open water body, avoid ingesting any water.

Blue-green algae grows into "blooms" through photosynthesis when the weather is hot and there is enough sunlight. Hotter weather and more sunlight allow the "blooms" to grow larger and more rapidly. These "blooms" are of highest concern because they can produce neurotoxins (which affect the nervous system) and hepatotoxins (which affect the liver).

If it is confirmed as a blue-green algal bloom, the body of water will be tested for the presence of toxins. toxins are present, ODNR will post stricter signs advising users not to contact the water for various activities, including swimming, fishing, and boating.

Here are the current advisory levels for state owned bodies of water:

No Contact Advisory

An algae bloom has made this area unsafe for recreational activities. You are strongly advised to avoid any & all contact with or ingestion of the lake water. This includes the launching of any watercraft on the lake.

Toxin Advisory

Wingfoot Lake

An algae bloom has made this area potentially unsafe for water contact. Avoid direct contact with the water.

** Lake Erie Bloom

Bloom Advisory

--

An algae bloom has made this area potentially unsafe for water contact. Avoid direct contact with visible surface scum.

** Lake Erie Bloom

Not surprisingly, given that this summer has been hot with many sunny days, blue-green algae has grow at a number of waterbodies throughout the state. Regardless of the body of water you are considering using for recreation, everyone is encouraged to avoid blue-green algae if you see it on the water. If you do see blue-green algae, or what you think may be blue-green algae, Ohio EPA has a harmful algae bloom report form that can be submitted on where and when the algae was witnessed so that further investigation can be taken.

Additional information and data on Harmful Algal Blooms is online at:

Ohio EPA

ODNR (Harmful Algal Blooms)

ODNR Home | News | Regulatory Policy | Privacy Statement | ODNR Employees | Contact ODNR

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Home · Contact Us · Offices/SWCD · | Well Logs · | Watersheds · | Education · | Programs · Publications & Data

ODNR Division of Soil and Water Resources - Grand Lake St. Marys Water Quality

Stormwater Links
- Stormwater and Land Development Manual
- Changes Under Consideration for RLD Manual
- Current Working Issues
- Critical Storm Method (Urban Stormwater)
- Links to Other Stormwater Partners

- Home
- News & Publications
- Offices/SWCDs
- Soils
- Water
- Programs & Projects
- Education & Training

- Administrative Assistant Development Program
- Agricultural Pollution Abatement Program
- Conservation Reserve Enhancement Programs
- Rainwater and Land Development Manual
- Source Water Environmental Education Teams (SWEET)
- Technician Development Program
- Watershed Coordinator

Grand Lake St. Marys Water Quality Improvement Initiative

The Ohio Department of Natural Resources (ODNR), Ohio Department of Agriculture (ODA) and Ohio Environmental Protection Agency (OEPA) and partners announced a cooperative plan to help curb the nutrient loading that has contributed to declining water quality at Grand Lake St. Marys.

The plan encourages partnerships between the area residents and other private and public entities, including Mercer and Auglaize Soil and Water Conservation Districts and the Natural Resources Conservation Service, to minimize pollution sources within the watershed.

Below are Documents Regarding the Water Quality Improvement Initiatives

Updates:

9/21/2010	**Alum Treatment Pilot Project begins at Grand Lake St. Marys** Alum treatment will begin Thursday, September 23 and be completed by late Friday, September 24 at demonstration areas around Grand Lake St. Marys. (Download this 3 page Q&A fact sheet about the treatment, 172Kb PDF)
7/30/2010	**State Actions for Water Quality Improvement at Grand Lake St. Marys** On July 30, Ohio Governor Ted Strickland, joined by several state agency directors, announced both short- and long-term action plans to help restore Grand Lake St. Marys, Ohio's largest inland lake. (Download this 8 page Action Plan now, 76Kb PDF)
7/22/2010	**Frequently Asked Questions About Algal Toxins** (Download this OEPA four page fact sheet, 40Kb PDF)
05/20/2010	**Progress Report Highlights** (Download this 2 page report now, 92Kb PDF) **Full Progress Report - March 2010** (Download this 8 page report now, 220Kb PDF)

February 2012

Inside this issue:

Greetings	1
Actions and Alerts	1
New Drinking Water Epidemiologist	2
Healthy Swimming Video Contest Winner	2
National Ground Water Awareness Week 2012	2
Recreational Water Illness and Injury Prevention Week 2012	2
Ohio: Harmful Algal Bloom	3
Model Aquatic Health Code	4
Contact Us	4

A Drop of News...

..from CDC's Waterborne Disease Prevention Branch (WDPB)

***A Drop of News** is a forum for highlighting state and local public health activities related to waterborne diseases and outbreaks and for sharing informal updates from the Centers for Disease Control and Prevention (CDC) programs about waterborne diseases, outbreaks, and other water-related disease prevention initiatives.*

Welcome to the first *A Drop of News* for 2012! On page 2, meet WDPB's new drinking water epidemiologist, Julia Gargano, and learn about resources for National Ground Water Awareness Week 2012. Read about the Healthy Swimming Video Contest winner, and get a preview of Recreational Water Illness and Injury Prevention Week 2012. On page 3, learn about Ohio's multi-agency response to harmful algal blooms in 2010. See page 4 for an update on the Model Aquatic Health Code (MAHC) and for CDC-specific information about waterborne disease outbreak contacts and related links.

Email NORSWater@cdc.gov if you have an idea for a future article! To read previous issues, visit http://www.cdc.gov/healthywater/statistics/wbdoss/drop_of_news. Thank you for your feedback and contributions to *A Drop of News* in 2011.

Actions and Alerts!

- 2007-2008 national waterborne disease outbreak surveillance data were published in the Morbidity and Mortality Weekly Report (MMWR) on September 23, 2011. Find these and previous MMWR surveillance summaries for recreational water and drinking water outbreaks on the Healthy Swimming website at http://www.cdc.gov/healthywater/statistics/wbdoss/surveillance.html.
- The deadline to review and provide input on the Regulatory Program Administration module of the Model Aquatic Health Code (MAHC) is February 5, 2011. To provide comment on this and future modules, visit http://www.cdc.gov/healthywater/swimming/pools/mahc/structure-content/.

Mark Your Calendars!

WASH Webinar:
February 21, 2012

National Ground Water Awareness Week:
March 11-17, 2012

World Water Day:
March 22, 2012

WASH Webinar:
April 17, 2012

National Drinking Water Week:
May 6-12, 2012

Recreational Water Illness and Injury Prevention Week:
May 22–28, 2012

CDC

For More Information:

- Robert Frey, Ph.D. Geologist, Principle Investigator
- Laurie Billing, MPH, Epidemiologist
- John Kollman, MS, RS, CIH, Toxicologist
- Greg Stein, Community Involvement/Health Ed.

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