

Blue-Green Algae In Wisconsin Waters

Frequently Asked Questions

GENERAL

What are blue-green algae?

Blue-green algae – also known as *Cyanobacteria* – are a form of algae many people call "pond scum." These algae often have a blue-green color which is how they got their name. Blue-green algae grow in lakes, ponds, and slow-moving streams when the water is warm and enriched with nutrients like phosphorus or nitrogen. Sometimes environmental conditions are just right and these algae grow very quickly and float to the surface where they form scum layers or floating mats. When this happens, you may be able to see an "algae bloom." In Wisconsin, algae blooms generally show up in June and may last until late September. It is not always that same species that blooms throughout the summer month. In fact, many lakes experience a bloom that lasts throughout the summer months, but it may actually be altogether different species growing in June than those that shows up in August.

What purpose do blue-green algae serve in the environment?

Algae, including blue-green algae, are very important to the food chain. They are known as "primary producers" – a name that is given to living organisms that can convert sunlight and inorganic chemicals into usable energy for other living organisms. Most algae are microscopic and serve as the main supply of "high energy" food for larger organisms like zooplankton which in turn are eaten by small fish, larger fish, mammals, raptors, and even people.

What are algal toxins?

Algal toxins are naturally produced chemical compounds that are found at times inside the cells of certain species of blue-green algae. For most species, these chemicals are not produced all of the time and there is no easy way to tell when the algae are producing them and when they are not. These chemicals can be categorized as:

- **Endotoxins** – chemicals that affect the skin and other mucous membranes causing allergy like reactions (rash, eye/nose/throat irritation, asthma, etc.). They may also cause stomach cramps, fever, headaches, etc.
- **Hepatotoxins** – chemicals that damage the liver and other internal organs. They may cause gastroenteritis, nausea, convulsions/seizures, vomiting, muscle weakness, vision problems, etc.
- **Neurotoxins** – chemicals that affect the central nervous system by acting as neuromuscular blocking agents leading to seizures, paralysis and respiratory or cardiac arrest.

When blue-green algae are growing in the water, they sometimes produce these toxins and store them within the algal cell itself. If a cell is broken open, the toxins may be released. Sometimes this occurs when the cells die off naturally and they break open as they sink and decay in a lake or pond. Other times, the cells may be broken open when the water is treated with chemicals meant to kill algae or when the cells are swallowed and they are mixed with the digestive acids in the stomachs of people or animals.

Does the presence of blue-green algae always mean the water is contaminated?

The short answer is "No" and "Yes." Many blue-green algae do not produce toxins and while algae blooms may be unsightly, it does not always mean the water is contaminated with toxic substances. Simply seeing a bloom will not tell you whether or not algal toxins may be found in the water. The only way to be sure if the toxins are present is to have water samples analyzed in a laboratory using sophisticated equipment. These tests currently cost about \$600 for each water sample.

On the other hand, these blooms often reach a nuisance state forming ugly, smelly scum layers that look like pea-soup or a green milk-shake if they have a sufficient supply of nutrients like phosphorus and nitrogen. While both phosphorus and nitrogen are natural and important elements for all life forms, human activity has clearly allowed more than necessary to enter our streams and lakes.

Are blue-green algae and their blooms a new problem?

No. Fossil evidence suggests that blue-green algae have been around for millions of years and they are believed to be the precursor to true plants. Scientists have recorded blue-green blooms dating back to the 12th century and they have documented the toxic effects to livestock for more than 100 years. It is probable that blooms seem to be more prominent now than in the past as a result of increased volumes of nutrients having reached our waters due to many human activities, including certain agricultural practices, discharge of untreated sewage, and use of phosphorus-based fertilizers and detergents.

Many lakes and streams in Wisconsin contain native species of blue-green algae capable of producing toxins. The most common species are *Anabaena* sp., *Aphanizomenon* sp., and *Microcystis* sp. – otherwise commonly referred to as "Annie," "Fannie," and "Mike." State researchers are testing a limited number of Wisconsin lakes and ponds in the summer of 2004 to try to learn more about algal blooms and the possible presence of algal toxins. If test results indicate the presence of large populations of algae or the presence of algal toxins, local health authorities will be notified immediately and public advisories or beach closures may be issued.

What is *Cylindro* and how is it different?

Cylindrospermopsis raciborskii – also referred to as "Cylindro" – is a blue-green algae that is not native to Wisconsin. Recent reviews of archived samples by DNR scientists have shown that Cylindro has been present in some Wisconsin lakes dating back to the early 1980's. It is likely that migratory waterfowl brought this algae to Wisconsin and other Midwestern states. This could have occurred by landing in lakes where the algae were growing and then carrying some of the algae on their feet and plumage to other lakes in a northerly direction.

Cylindro is different from many other blue-green algae because it does not always have the characteristic blue-green color and it is also believed to be less buoyant than other species of blue-green algae making it more difficult to see when it is blooming. Also, Cylindro may be capable of producing algal toxins more consistently than some of the native blue-green species. Current information on Cylindro indicates that it may be actively growing in some nutrient enriched Wisconsin waters from late July through the middle of September.

Why do blooms sometimes appear overnight?

Even if you can't see algae floating on the surface of the water, that doesn't mean that a bloom isn't present in the water - the bloom could be suspended at various depths in the water where you can't see it. The depth at which algae blooms float depends on a number of factors. The most important of these are light and food (phosphorus and nitrogen). Many species of blue-green algae have evolved to be able to control their buoyancy as the availability of these light and food change with the time of day and the local weather conditions. By being able to sink and rise at will, they are able to move to take advantage of the best light and nutrient levels. Light is a key factor that activates the mechanism for algae blooms to move. At night, when there is no light, cells are unable to adjust their buoyancy and often float to the surface, forming a surface scum. This scum literally appears overnight and lingers until the wind and waves scatter the cells throughout the water.

What can be done to reduce the frequency and intensity of blue-green algae blooms? There are no quick and easy remedies for the control of blue-green algae once they appear in a lake or pond. Reducing the amount of nutrients that wash into our lakes and ponds may eventually reduce the intensity of algae blooms, but it will take a long time and a lot of community involvement to effectively change the nutrient concentrations in the water. Even if the nutrients washing into the water are reduced, there may still be large amounts of the nutrients in the sediment or muck at the bottom of many lakes and ponds that serve as food for the blue-green algae.

Regulatory agencies like the Wisconsin Department of Natural Resources and the Wisconsin Department of Agriculture, Trade, & Consumer Protection are working with communities around the state to reduce stormwater runoff and to encourage agricultural practices that reduce soil erosion while maintaining high crop yields. On a local basis, however, landowners and interested citizens can help minimize the problems associated with algal blooms by working together with all of the partners in their watershed to reduce the input of nutrients that reach our nearby lakes, streams, and ponds. There are many practices that can be promoted within your neighborhood or your community that will help, including:

- Use lawn fertilizers only where truly needed,

- Prevent yard debris (i.e., leaves, grass clippings, etc.) from washing into storm drains,
- Support local ordinances that require silt curtains for residential and commercial construction sites,
- Plan and maintain vegetative buffer strips along public and private land bordering lakes, streams, and ponds.
- Allow native plant species to grow along shorelines of lakes, streams, and ponds. Native plants are much more effective at filtering runoff than the typical grass species found on most residential lawns.

EFFECTS ON HUMANS & ANIMALS

Can blue-green algae make me sick?

Similar to allergies related to exposure to ragweed and goldenrod, some people may develop allergic reactions if they come in contact with water containing some species of blue-green algae when toxins are being produced. Symptoms may include skin rash, hives, itchy eyes and throat, etc.

If blue-green algae are swallowed through the mouth or nose, it is possible for more severe illness to occur. Because of the uncertainty about when the algae are actually producing toxins and just how much is being produced, there is no way to say how much is too much. A physician should be consulted if someone ingests these algae and one or more of the following symptoms occur: stomach cramps, vomiting, diarrhea, fever, headache, severe muscle or joint pain. Emergency room attention is warranted if someone is showing signs of seizure or convulsions after swimming or drinking water where blue-green algae are present.

Are children more vulnerable than adults?

Yes. Children may be at greater risk than adults for two primary reasons. First, children love to play in the water and they may not truly understand the health risks as well as adults. As a result, they may drink the water because they are thirsty or swallow it accidentally while swimming. Second, children have less relative body weight and a smaller quantity of the toxin may be trigger an adverse response in their liver or central nervous system.

Can blue-green algae make my pet sick?

Animals are not necessarily more sensitive to algal toxins than humans. However, many animals like dogs and cattle enjoy being in the water and they do not seem to be concerned with the fact that there is an unsightly green scum layer floating on the water. They will drink the water and are likely to consume large quantities of the algae as well. If the algae are producing toxins at the time the animals ingest them, they can become very ill and even die.

Signs of algal toxin poisoning may range from general lethargy and loss of appetite to more severe symptoms like seizures, vomiting, and convulsions. Dogs are particularly susceptible to blue-green algal poisoning because scums can attach to their coats and be swallowed during self-cleaning. If you suspect that your animals are showing any of these symptoms you should seek veterinary advice.

Should I let my pets or my livestock drink or swim in water containing algal blooms?

No. Animals can and do commonly become extremely ill and even die after swallowing water containing blue-green algae. As public awareness has increased, so has the number of reports of veterinarians suggesting that algal toxins have played a role in the deaths of dogs where other causes are not obvious. It is probable that the number of dogs that die from this phenomenon is an under-reported statistic.

DRINKING WATER CONCERNS

Other than recreation on the water, how likely am I to drink water contaminated with blue-green algae and/or its toxins?

Not very likely if your water supply is provided by a municipal drinking water agency. For most Wisconsin residents and tourists, drinking water is provided by underground water sources that are not going to have blue-green algae or its toxins present. Even though Lake Michigan and Lake Superior serve as the water supply for many residents of communities on or near those lakes, there is no reason to worry since the water is pumped from far offshore in deep water areas that are not affected by blue-green algae blooms. Rainbow Lake in Waupaca County and Lake Winnebago are the only two inland lakes that serve as the water supply for area communities (i.e., Appleton, Neenah, Menasha, & Oshkosh). While algal blooms may be seen on these lakes in summer months, the toxins that may be produced are removed by the routine water treatment process managed by the local utilities and they have not been found in the water after it has undergone routine treatment.

Keep in mind that water that is not treated may pose risks far beyond those associated with blue-green algae. All natural surface waters contain bacteria, algae, viruses, and other pathogens that if consumed may pose health risks to humans, pets, and other domestic animals. No one should ingest raw lake or pond water at any time.

How do water treatment plants deal with blue-green algae?

As previously noted, Wisconsin has a limited number of communities that must be concerned about algal toxins in the water supply. Studies conducted by scientists from the University of Wisconsin in the late 1990's did not detect any significant concentrations of algal toxins in the finished drinking water of several communities using Lake Winnebago as their water supply.

While most municipal water treatment plants with surface water supplies do not regularly monitor for algal toxins, they do use treatment techniques that would remove the toxins if they were present. Conventional water treatment facilities can remove the cells of algae and other growing organisms by adding chemicals that bind them together. As the cells clump together, they become heavier and fall to

the bottom of settling basins. Additional removal is obtained by filtration and where necessary, algal toxins or other chemicals of concern are further reduced by using activated charcoal.

Can I treat my water at home to remove blue-green algae and their toxins?

There are a number of home water treatment options available to provide filtered water. Some of these systems include an activated charcoal step that will help remove certain chemicals like algal toxins if maintained and operated properly. However, variability in the design of the products on the market and the operation and maintenance by the homeowner prevent state health officials from declaring these products fail-safe.

Can I cook using water with blue-green algae in it?

No! Boiling water does not remove toxins from the water. Since it is impossible to detect the presence of toxins in the water by taste, odor or appearance, you are better off assuming that they may be present.

What about using water with blue-green algae for washing?

If blue-green algae are visible, try to find a better source of water for washing food (i.e., fruits & vegetables, etc.), dishes, and clothes. Bathing or showering in water with blue-green algae should also be avoided, as skin contact with the algae may lead to skin irritation and rashes.

RECREATIONAL WATER CONCERNS

Can water containing blue-green algae blooms be used for recreational activities?

Because local health officials cannot easily determine when algal toxins are being produced, anyone considering recreation on or in the water should use common sense. Simply put, if a scum-layer or floating mat is present, the chance for health effects is greater if you or your children participate in water-related activities like swimming, wading, water or jet-skiing, or wind surfing, especially if you ingest a large quantity of water containing the algae. It is advisable to try to find areas where the blooms are not present.

Is it safe to let your pets & kids swim in ponds? (e.g., farm ponds, stormwater detention ponds, golf course ponds?)

By design, many farm ponds, golf course ponds, and stormwater detention ponds are constructed to trap nutrients, eroded soil, and other debris. By doing this, they prevent those materials from reaching nearby lakes, ponds, and streams. Because more nutrients may be available and because these types of ponds are generally shallower and warmer, it is possible for them to have more frequent algae blooms bringing about the possibility of more frequent algal toxins. Without having specific information, the common sense approach is also recommended for these

types of waters. If a scum-layer or floating mat is present, it is advisable to try to find areas to recreate where the blooms are not present.

Is there a risk to SCUBA divers who swim in blue-green algae blooms?

It may not always be possible to avoid swimming in algae blooms. Rescue SCUBA divers may be required to swim in areas where a bloom is present. In those cases, divers should try to minimize the ingestion of water during the course of the dive. At a minimum, individuals should shower or rinse off thoroughly after exiting the water. All gear should also be rinsed thoroughly. Any diver who shows any signs of illness afterward should seek medical attention.

Do blue-green algae pose a risk to competitive swimmers such as triathletes?

When organizers establish the schedule and pick a course for a triathlon, they have no way of knowing whether or not an algae bloom will be present in the swim area, nor do they have any way of knowing whether or not algal toxins may be present. To the degree possible, race organizers are encouraged to establish a course that minimizes the exposure of participants to algae blooms. Race organizers may also want to consider having a rinse station established near the swimming finish area. Where this is not possible, all participants are encouraged to minimize the ingestion of water during the course of the event. At a minimum, individuals should shower or rinse off thoroughly after exiting the water. As is the case in any organized race, participants should seek medical attention if they show any signs of illness during or after the event.

FISH CONSUMPTION

Can I eat fish from water with blue-green algae?

Certain algal toxins have been shown to accumulate in the tissues of fish and shellfish, particularly in the viscera (liver, kidney, etc.). Whether or not the accumulation levels are sufficient to pose a risk to humans is uncertain although it would depend in part on the levels of consumption and the severity of the algal blooms where the fish or shellfish were caught or collected.

The Wisconsin Department of Natural Resources has not received any information that people eating fish have become ill due to algal toxins. The World Health Organization has advised that people choosing to eat fish from waters where blue-green algae blooms exist should eat them in moderation and avoid eating the viscera of the fish where accumulation of toxins may be greatest.

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IMPORTANT FACTS ABOUT HYGIENE & CONTACT INFORMATION

Important Note: All natural surface waters contain bacteria, algae, viruses, and other pathogens that if consumed may pose health risks to humans, pets, and other domestic animals (cattle, swine, etc...). No one should ingest raw lake or pond water at any time.

General Recreational Use Guidance:

- Common sense should be the guide to choosing whether or not to recreate on or in the water of any lake or pond that contains blue-green algae.
- No one should swim or dive where algae are visible (e.g., pea soup, floating mats, scum layers, etc.) or the water is discolored.
- Humans who enter the water where blue-green algae are present should not drink the water and should take precautions to prevent inhalation of water into the sinuses.
- Parents of children should keep them out of the water whenever algae are visible or the water is discolored, as it is possible that children are more susceptible to algal toxins than most adults.
- Pet owners should avoid allowing their pet to swim or drink the water whenever algae are visible or the water is discolored. Pet owners should also keep animals from eating algae that may have washed up along the shoreline.

If you experience illness that may be due to exposure or ingestion of blue-green algae, contact your doctor or the Poison Information Hotline at 1-800-222-1222.

If your pet shows symptoms such as seizures, vomiting, or diarrhea after contact with the water, contact your local veterinarian.

For more information about contacting your local health department, check the Wisconsin Department of Health & Family Services website:

http://www.dhfs.state.wi.us/dph_ops/LocalHealth/

OTHER WEBSITES OF INTEREST:

www.pca.state.mn.us/water/lake-faq.html#blue-greenscum

www.pca.state.mn.us/water/clmp-toxicalgae.html

www.in.gov/dnr/fishwild/fish/cylind.htm

dnr.metrokc.gov/wlr/waterres/lakes/bloom.htm

www.btny.purdue.edu/Pubs/APM/blue-green_factsheet.pdf