

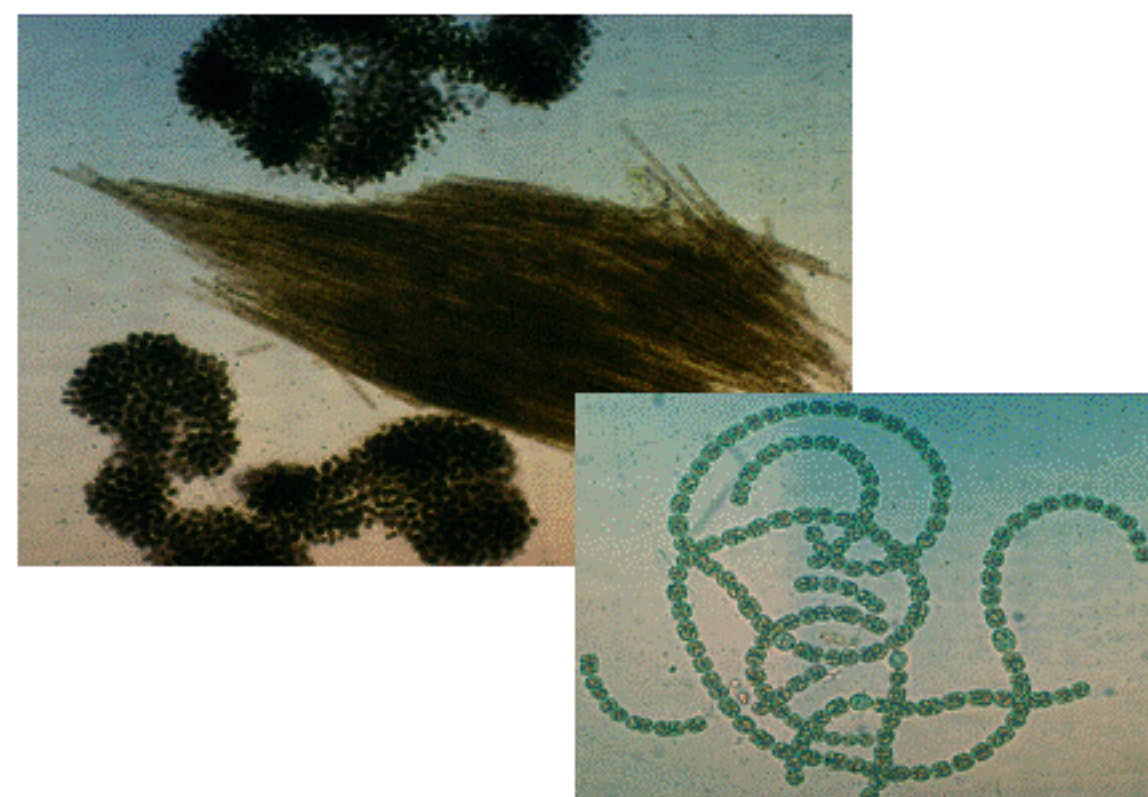
# CYANOBACTERIAL ("Blue-Green Algae") BLOOMS AND TOXICITY



## What are cyanobacterial blooms?

Many Alberta lakes undergo visible changes during the summer months. Clear, transparent water may become soupy green in appearance, or even turquoise, bright blue, grey, tan, red or purple in colour. In very rare instances this is due to excessive growth of microscopic plants called algae. In fact, the organisms responsible for these changes are usually photosynthetic bacteria called cyanobacteria.

Cyanobacteria have long been known as blue-green algae, as they share many similarities in appearance and habitat with algae. When cyanobacteria grow profusely they make lake water look like pea soup. This phenomenon is called a bloom.

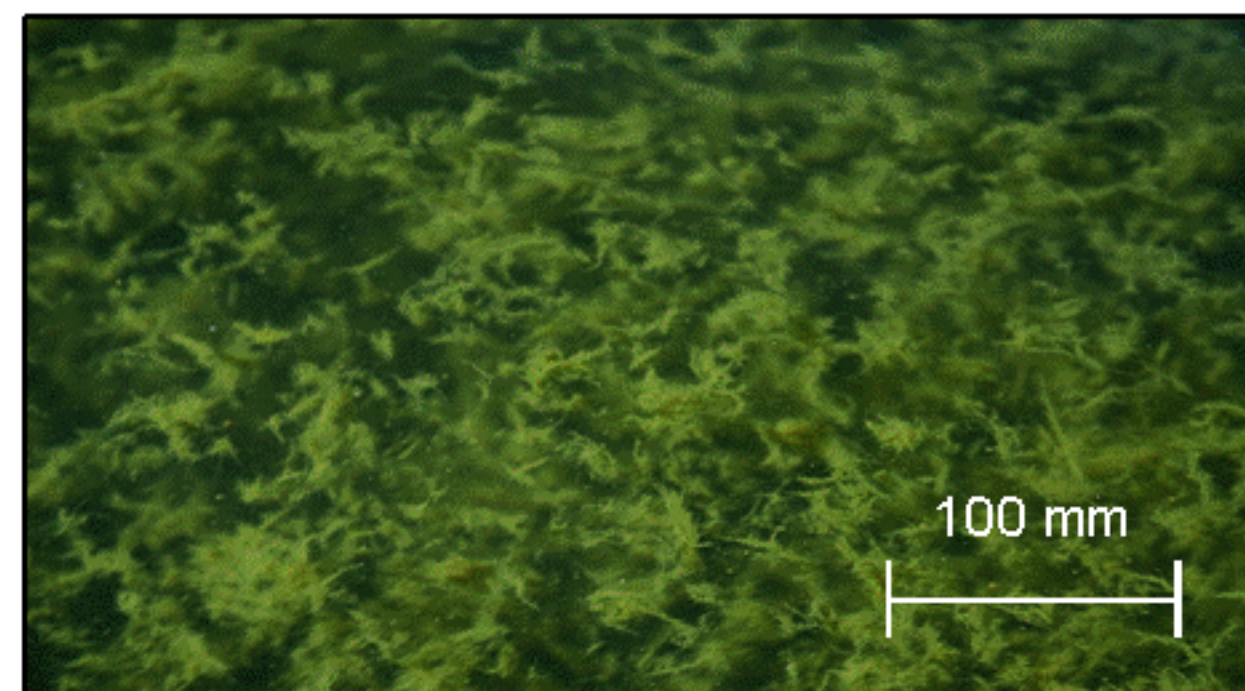


Bloom-forming cyanobacteria magnified 40X

Alberta has more than 100 species of cyanobacteria, ranging from tiny cells invisible to the naked eye to large colonies that look like fine grass clippings, small shapeless clumps, or spheres several millimeters in diameter.

## Why and where do blooms occur?

Cyanobacteria are well adapted to growth and persistence in nutrient-rich lakes, reservoirs and ponds. They out-compete algae for optimal levels of sunlight and nutrients required for photosynthesis, in part by regulating their buoyancy in the water.



Clumps of cyanobacteria near surface

Unfortunately, cyanobacteria become over-buoyant and concentrate near the water's surface when calm conditions follow windy periods. These surface accumulations intensify if waves concentrate cyanobacteria into bays, or along shorelines and beaches. The results are surface blooms that appear as brightly colored slicks and scums.

Most of Alberta's lakes exist in basins comprised of nutrient-rich rock and soils. Consequently, many Alberta lakes naturally support cyanobacterial blooms. The more nutrient-rich the water, the more likely it will experience and sustain surface blooms of cyanobacteria. Urban, agricultural and industrial activities and removal of natural vegetation along shorelines can enhance the movement of nutrients to surface waters and increase the severity of blooms.

## When do blooms occur?

Blooms are most common in lakes from early July to mid-September. Timing, intensity and duration will vary from year to year because of nutrient availability, air and water temperatures, sunlight and wind velocity. Blooms also vary from one lake to another and can occur during winter under ice, but this is rare.

Blooms decompose and can cause odors often reminiscent of raw sewage. Rapid decomposition may deplete the water of oxygen and produce high concentrations of ammonia, both of which can kill fish and other aquatic animals.

## Controlling blooms

Chemical control of cyanobacteria in natural lakes is not allowed in Alberta, because chemicals are toxic to fish and organisms they eat. The long-term solution is reducing the amount of nutrients by controlling sewage, fertilizers, industrial effluents and agricultural runoff.



Cyanobacterial bloom on a central Alberta lake



## Cyanobacterial toxins

Cyanobacteria can produce and release several types of toxins, the most common being liver toxins. Nerve toxins are more rare, but can cause periodic loss of livestock, pets and wildlife. Some cyanobacteria cause skin irritation. In Alberta, numerous cases of animal poisonings have occurred; reports of human illness linked to cyanobacteria also exist.

Not all cyanobacteria produce toxins although some species produce several types. Within a single species, some strains are toxic while others are not. This makes prediction a difficult task. Toxic and non-toxic strains usually occur simultaneously.

## Predicting toxicity

Toxin concentration depends on the density of toxin-producing species in a lake. Cyanobacterial blooms vary in time and location in lakes, as does toxicity. Lakes can suddenly become toxic and, conversely, lakes that have shown toxicity in the past may not show it for several years. Some areas of a lake can be toxic, while other regions remain safe. Caution should be taken at lakes where blooms have occurred in the past.

Toxicity is temporary. About 90% of toxin will degrade naturally within two weeks after the collapse of a bloom.

## Risk to Animals

Wildlife, livestock or pets can be poisoned by toxic cyanobacteria when they have no other sources of drinking water.

Some toxins affect the animal's liver and can cause death within 48 hours of drinking tainted water. Common symptoms of poisoning are lethargy, pallor, extreme gastro-intestinal pain and diarrhea. This may lead to liver damage and hemorrhaging and in severe cases result in death by shock if much of the animal's blood pools in the liver.

Nerve toxins cause rapid death (often within 30 minutes) due to paralysis and respiratory arrest. Several toxins may be present at once, so symptoms may vary or lack clear definition.

The volume of water required to kill an animal depends on the density of toxin-containing cyanobacteria and the size and health of the animal. Much smaller volumes of water will poison old, very young, sick or weak animals with lower tolerance levels.

## Risk to Humans

Humans are as susceptible to cyanobacterial toxins as animals, but most of us will not voluntarily drink affected lake water because of its objectionable appearance and odor. Accidental swallowing of cyanobacteria can result in fever, headache, dizziness, stomach cramps, vomiting, diarrhea and sore throat.

Humans can also suffer skin and eye irritation and swelling, sore throat and swollen lips from contact with a bloom. These seldom persist for more than two or three days.

Children can be more intensely affected because they spend more time in the water than adults and have lower tolerances to the toxins.

Laboratories in Alberta can rapidly determine the concentrations of liver and some nerve toxins. Alberta Environment monitors toxin levels in many recreational lakes and reservoirs.

## Take Precautions

- **Treat all blooms with caution**
- **Do not drink from bloom-infested lakes and reservoirs. Do not drink any untreated surface waters**
- **Do not swim or wade in water containing dense accumulations or scums of cyanobacteria**
- **If you suspect that cyanobacteria may be endangering swimming, contact your regional health authority**
- **Provide alternative sources of drinking water for domestic animals and pets**
- **If symptoms related to cyanobacteria are experienced, contact a physician immediately**
- **If your pet shows symptoms, contact a veterinarian immediately**

## For more information

● For information about water quality or to report dead animals or wildlife near a lake, contact Alberta Environment by calling **toll-free 310-0000**

● For information on the impact to human health, contact Alberta HealthLink by calling **toll-free 1-866-408-LINK (5465)**

● For information on specific beach closures, contact your health region at:

<http://www.health.alberta.ca/resources/links.html#Regions>

● For information on cyanobacteria blooms and toxicity; water quality characteristics like clarity, pH, alkalinity and nutrients; and summary data reports for many of Alberta's lakes, visit Alberta Environment's website at:

[www.environment.alberta.ca](http://www.environment.alberta.ca)



ISBN: 978-0-7785-7605-1 (Printed)

ISBN: 978-0-7785-7606-8 (On-line)