

Blue-green Algae FAQ

Chris Teichreb, M.Sc., P.Biol.

Alberta Environment

What are blue-green algae?

- Blue-green “algae” are actually photosynthetic (using sunlight for growth) bacteria
- Hundreds of species are found around the world in various aquatic habitats (lakes, rivers, streams, ponds, wells)
- Can reproduce quickly and may create blooms on lakes under correct conditions

What are some characteristics of blue-green algae?

- Single celled organisms often found in colonies
- Many can use atmospheric nitrogen and dominate in nitrogen poor systems (like those frequently found in Alberta)
- Most pelagic (open-water) species are positively buoyant (float) making them more noticeable on lakes
- May produce toxins, form protective sheaths and structures, or colonies for protection from grazing organisms

Are lake weeds blue-green algae?

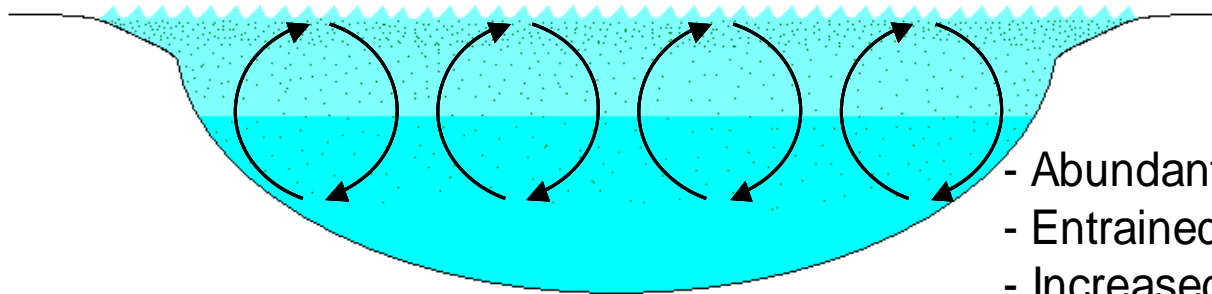
- Lake weeds, or macrophytes, are multi-celled rooted plant species
- Similar to blue-green algae, they grow quickly under the right conditions
- Limited to the littoral (shoreline) areas of lakes. May cover an entire lake or pond if it is shallow enough for light to penetrate to the bottom.

Why do blooms occur?

- Typical blue-green blooms require the following:
 - Nutrients
 - Warm water
 - Calm conditions
- Other contributing factors include:
 - Wet springs (contributes nutrients from runoff)
 - Prior windy conditions (mixes sediment nutrients into overlying water)
 - High phosphorus to nitrogen ratio (many blue-green algae capable of using atmospheric nitrogen)
 - Imbalance in the aquatic food web (e.g., large fish removed)

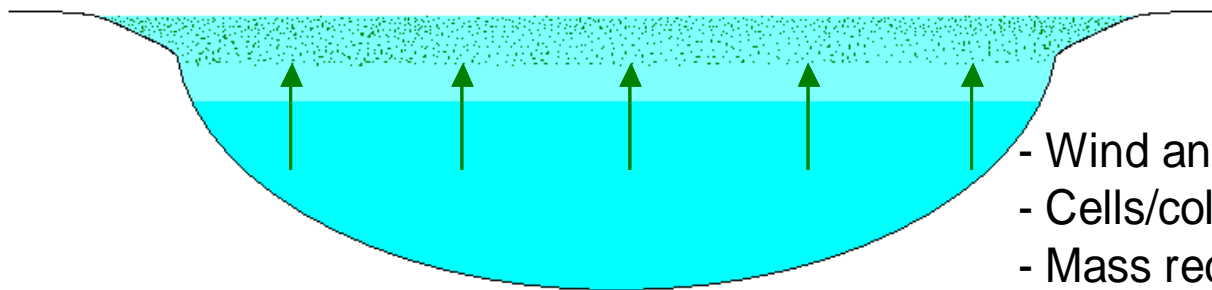
wind → →

Turbulent Conditions



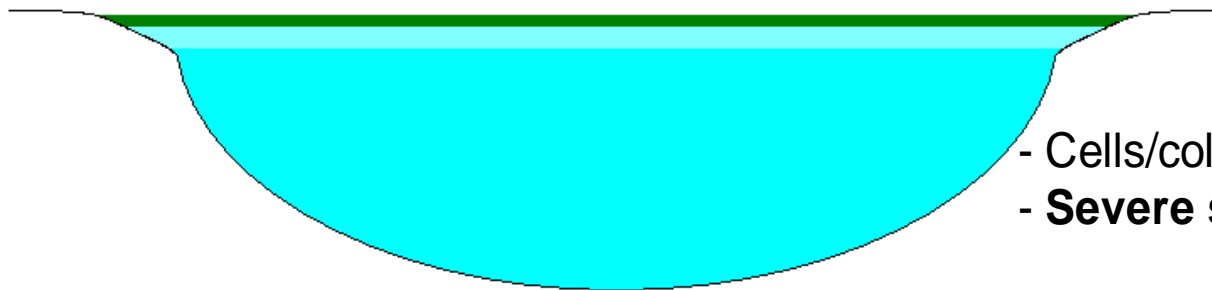
- Abundant existing cells/colonies.
- Entrained throughout water column.
- Increased gas vesicle production.

Calm Conditions



- Wind and wave action cease.
- Cells/colonies over buoyant.
- Mass recruitment towards surface.

Bloom Formation



- Cells/colonies stranded at surface.
- **Severe surface accumulation!**

Why do blooms stink?

- Blue-green algae rise towards the surface to obtain more sunlight
- Blue-green algae at the surface can not sink and are “cooked” by the sun
- During bloom die-off, decomposition by bacteria produces ammonia as a by-product

Why are snails, fish, etc. dieing?

- May be a direct or indirect effect of bloom
- Direct: Toxins produced by blue-green algae may be in high enough concentrations to kill other organisms that consume the water
- Indirect: Bacteria that decompose blooms consume oxygen in the water which may suffocate oxygen breathing aquatic organisms.

Human health concerns?

- Primarily concerned with toxins that may be released by the blue-greens
- Safest approach is to avoid contact with water in areas with visible blooms and never drink any untreated water (this includes reasons beyond blue-green algae)

How can blue-green blooms be prevented?

- Remember the three main factors that cause blooms; nutrients, calm water, warm conditions.
- In many lakes in Alberta, blue-green algae blooms are natural due to nutrient rich soils
- Can help limit blue-green blooms by limiting nutrient inputs into lakes

What about method xyz to prevent blooms?

- Many “cures” have been tried to prevent blooms, some work, but often at a small scale
- Chemical: adding chemicals such as “bluestone” (copper) to water. Effective, but will also kill other organisms like fish. Also expensive for larger water bodies.
- Physical: Aerating surface water to create unstable conditions. Aerators require constant maintenance, and at a large scale it’s cost prohibitive.

Methods (cont.)

- Physical: Dredging of bottom sediments. Effective, but cost prohibitive in most cases. Also destroys habitat for many other organisms (invertebrates, fish spawning grounds, aquatic plants)
- Physical: Removal of bottom, nutrient rich water. Only effective in lakes that thermally stratify (have a warmer upper layer). May also result in lowering of lake level.

Methods (cont.)

- Chemical: Addition of straw bales. Releases dissolved organic carbon which binds to nutrients (mainly phosphorus) making it less available. Again, expensive at larger scale and may damage aquatic habitat.

What can Alberta Environment do?

- Provide information on blue-green blooms such as this talk
- Provide support to individuals and groups who want to steward a lake and its watershed and reduce human caused nutrient inputs into the lake
- Investigate and, if warranted, fine or prosecute individuals/companies deliberately discharging to a water body without a permit
- Intermittently monitor and report on water quality of larger recreational lakes

What can I do?

- Ensure your nutrient input to the lake is minimized:
 - Keep stormwater runoff into lakes to a minimum
 - Maintain natural riparian buffer zone (absorbs nutrients)
 - Minimize erosion by planting long-rooted plants
 - Avoid overuse (or even using) fertilizers
 - Ensure your septic system works properly
- Spread the word!