Blue-green Algae ('cyanobacteria') FAQ

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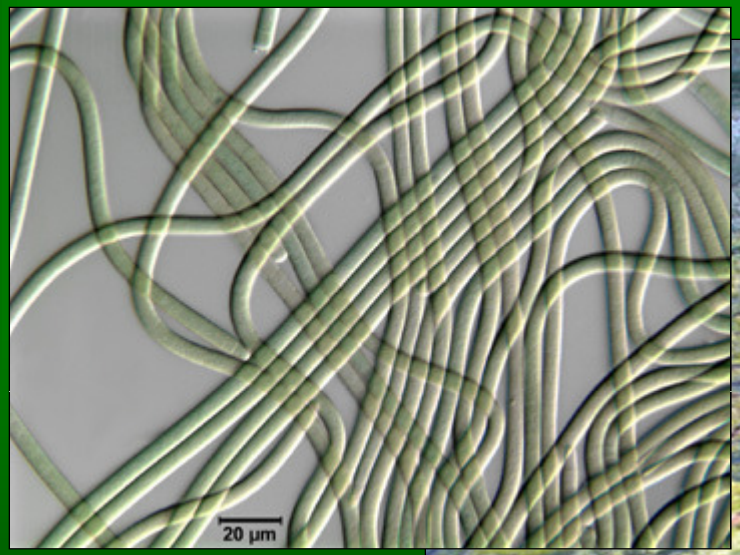
What are blue-green algae?

- Blue-green “algae” are actually photosynthetic bacteria but functionally similar to algae and higher plants (require light)

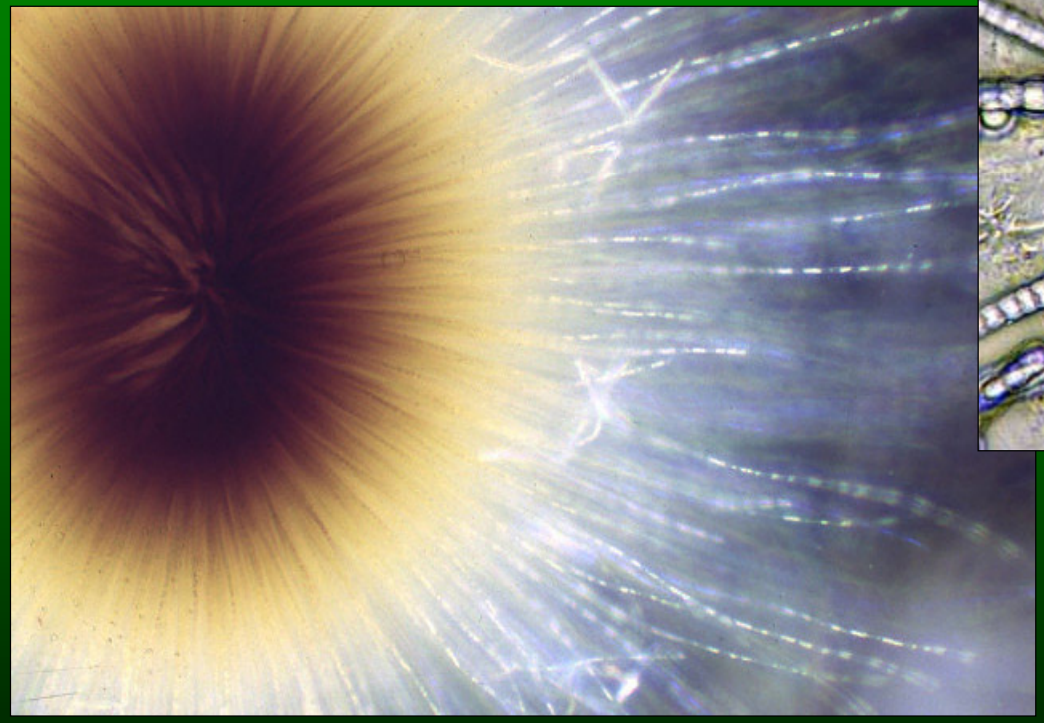
- Hundreds of species are found around the world and several species found across Alberta

- Can reproduce quickly causing blooms on lakes

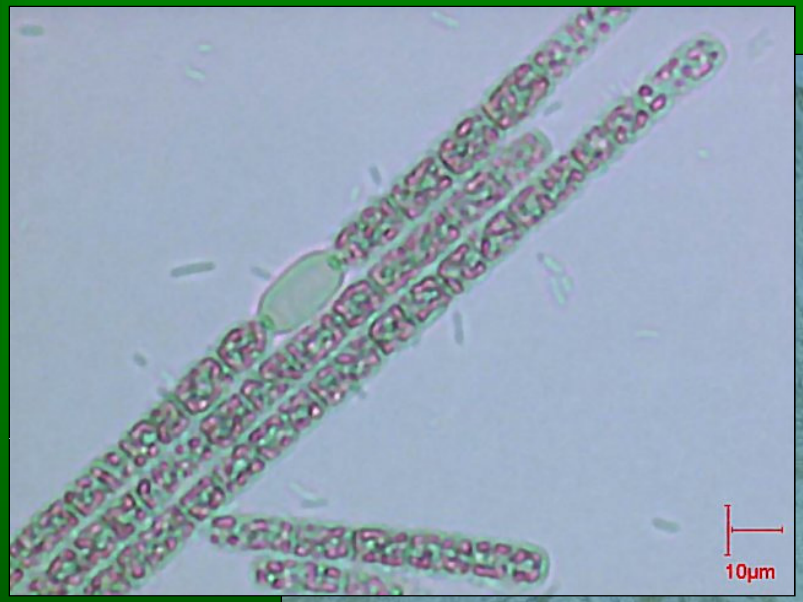
Lyngbya



Gloeotrichia



Aphanizomenon



Anabaena flos-aquae

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

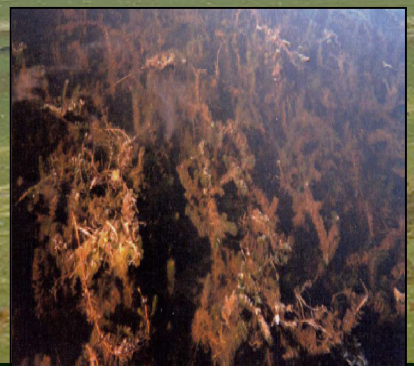
Are lake weeds blue-green algae?

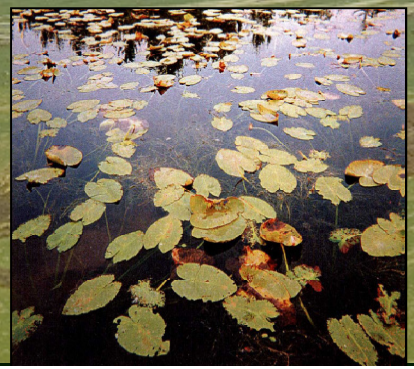
Lake weeds, or macrophytes, are multi-celled rooted plant species

Similar to blue-green algae, they grow quickly under the right conditions

Limited to the littoral (shoreline) areas of lakes.

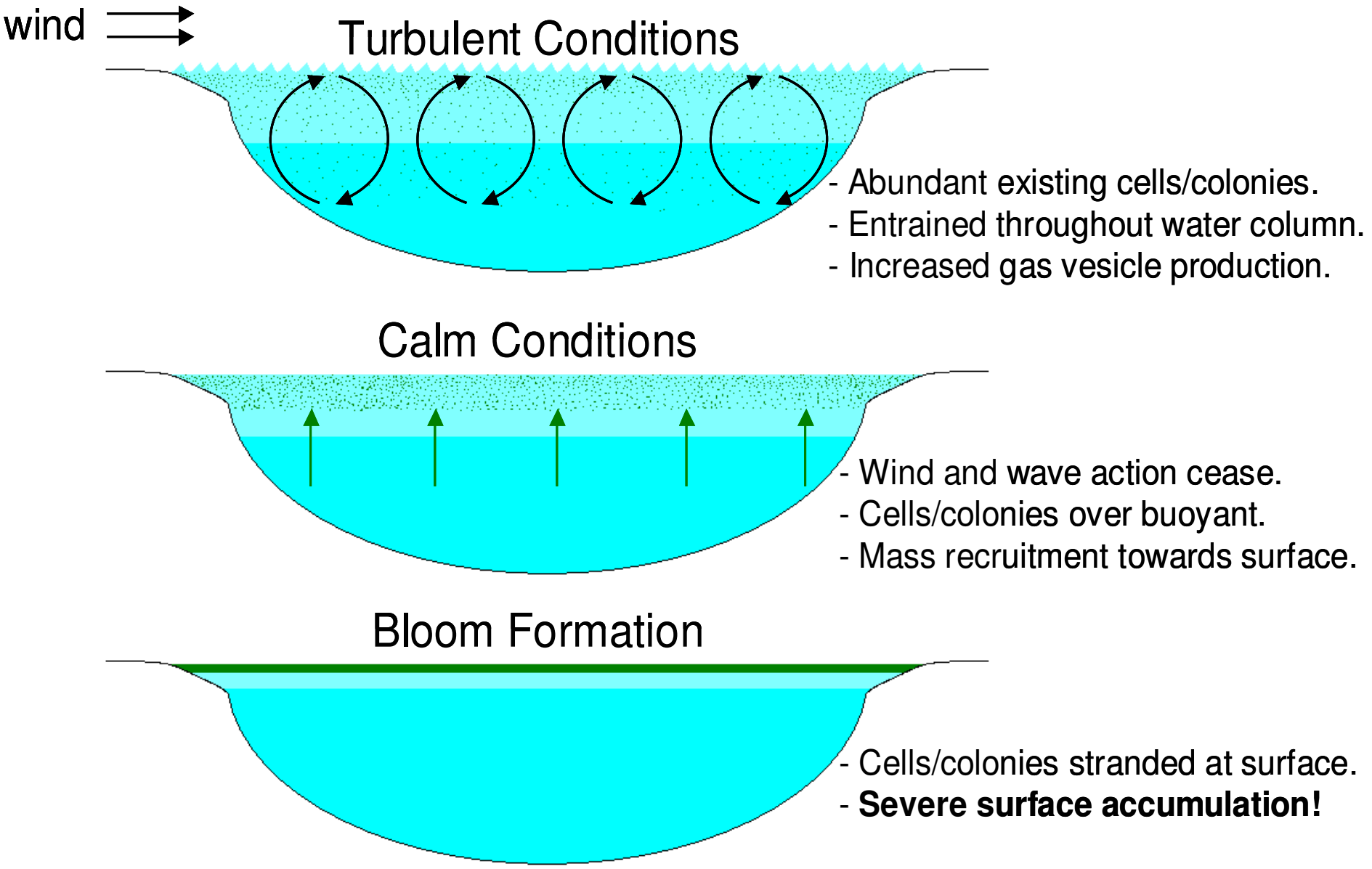
May cover an entire lake or pond if it is shallow enough for light to penetrate to the bottom.

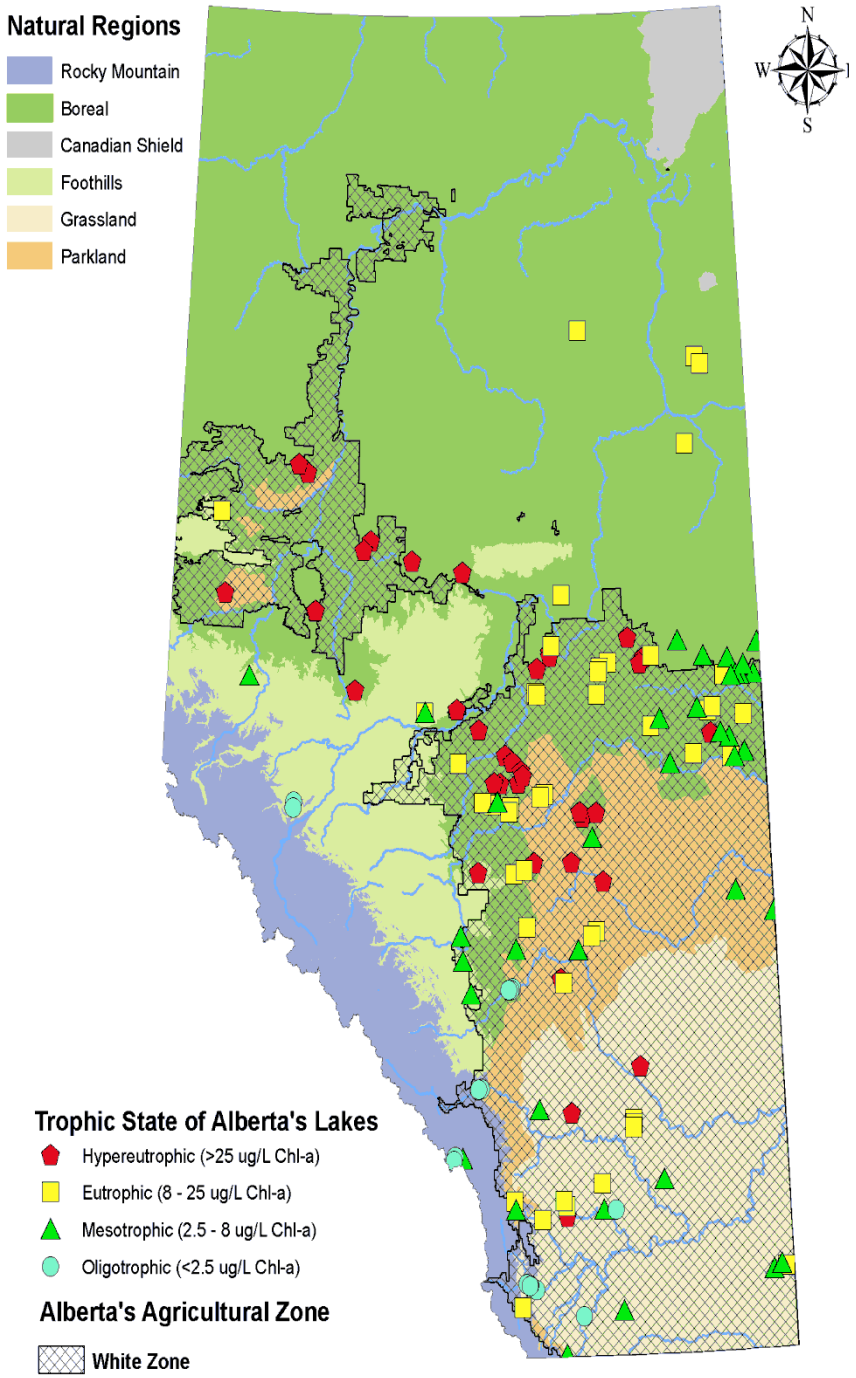




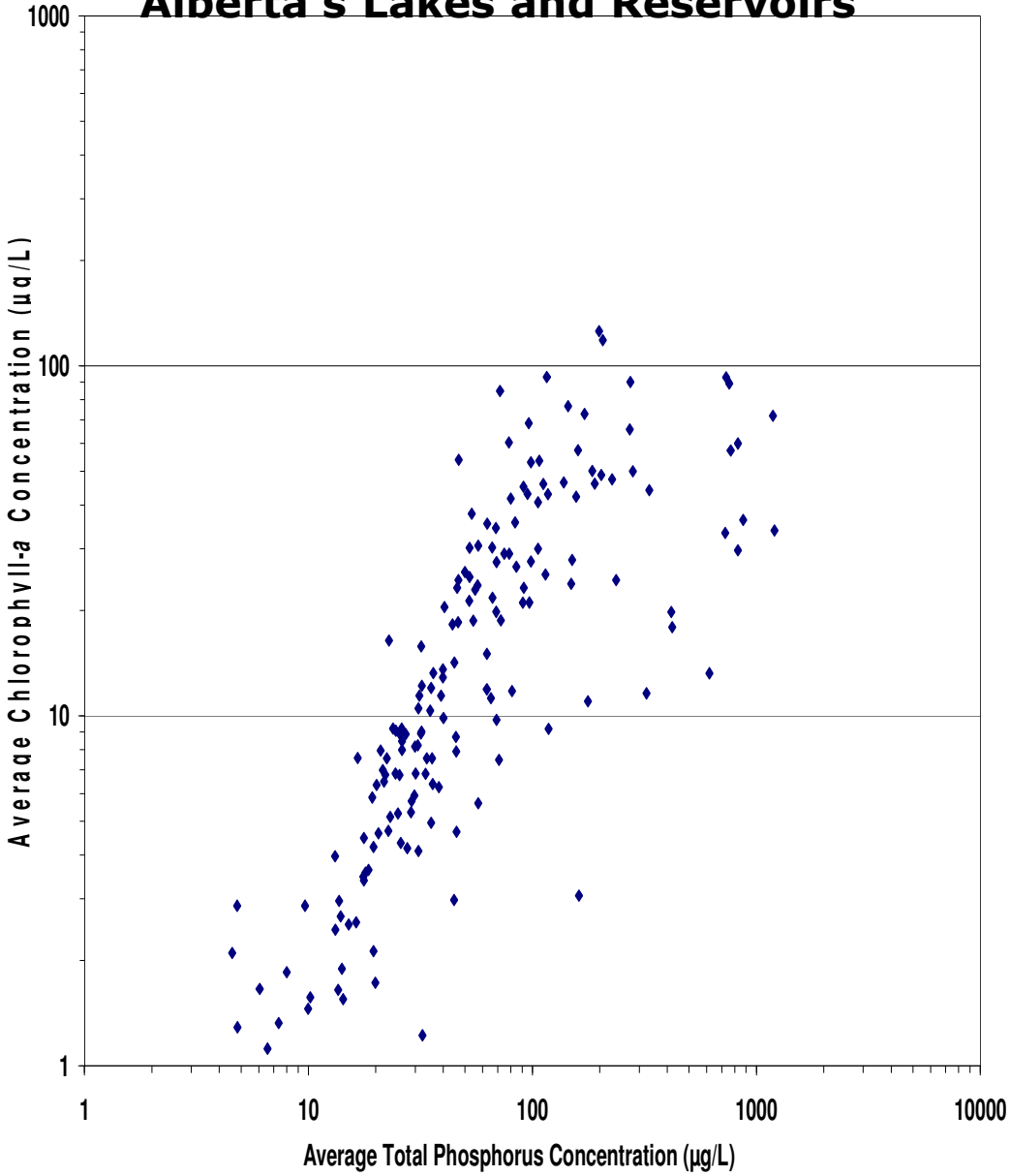
Why do blooms occur?

- Typical blue-green blooms require the following:
  - Nutrients
  - Warm water
  - Calm conditions
- Other contributing factors include:
  - Wet springs
  - Prior windy conditions
  - High phosphorus to nitrogen ratio
  - Imbalance in the aquatic food web


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!**



Relationship Between Total Phosphorus and Chlorophyll-*a* concentrations in Alberta's Lakes and Reservoirs



Aesthetic effects of blooms

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

Ecological effects of blooms

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

Human health concerns with blooms

- Primarily concerned with toxins that may be released by blue-greens
- Toxins can include skin irritants, hepatotoxins (liver) and neurotoxins (nervous system)
- Toxins may last for weeks after a bloom is gone, and are broken down through bacterial action and UV radiation

How can blooms be reduced?

- 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. Illegal to use in most cases.
- 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 to do?

AENV

- Provide information and support to individuals and groups who want to steward a watershed and reduce human stresses
- Investigate and, if warranted, fine or prosecute individuals/companies discharging without a permit
- Intermittently monitor and report on water quality of larger recreational lakes

Public

- Ensure 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 septic system works properly
- **Spread the word**

Closing information

- Treat all blooms with caution!
- Do not drink from bloom-infested waters.
- Provide alternative sources of drinking water for pets/livestock.
- Do not swim/wade in blooms. If you suspect that blooms may be endangering swimming, contact Alberta Health Services
- If symptoms related to cyanobacteria are experienced, contact a physician immediately
- If your pet shows symptoms, contact a veterinarian immediately
- For water quality info or to report dumping/discharging into a water body (or activities in/near a waterbody), contact Alberta Environment
- To report dead animals or wildlife near a lake, contact Alberta Sustainable Resource Development