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NWT Cumulative Impact Monitoring Program

Cyanobacteria Blooms in Great Slave Lake: Observations from Traditional, Local, and Scientific Knowledge

Summary

By combining Traditional, local, and scientific knowledge sources, we document new and increasing cyanobacteria blooms over time in Great Slave Lake (also known as Tinde'e, Tucho, and Tu Nedhé). Over the last 15 years, these blooms have become more frequent, denser, and spread to new areas, becoming the most widespread and dense in 2024. These blooms are likely climate-driven, made worse by the cumulative impacts of warmer water, reduced wind and ice cover, and nutrient inputs from wildfires, permafrost thaw, and human activities.

Why is This Important?

Documenting the increase of cyanobacteria blooms is important for understanding the ways climate change and other cumulative impacts are affecting Great Slave Lake. Bridging knowledge systems informs our understanding of the rapid changes occurring in our environment more wholistically than using any single knowledge source independently. Some blooms can produce harmful toxins that are not removed from water by boiling, making monitoring of blooms critical.

What Did We Do?

We compiled information across Traditional, local, and scientific knowledge sources to generate a timeline of algal bloom occurrences in Great Slave Lake and other waterbodies in the NWT.

What Did We Find?

- No cyanobacteria blooms were found in Great Slave Lake prior to 1989.
- The earliest blooms were small and found in isolated areas of the North Arm, while recent blooms have spread in size and area and have been observed as far as the East Arm in 2024.
- These dense floating blooms were usually observed along shorelines in late summer.
- So far, no toxins have been detected; however, future blooms should still be avoided as a precaution because cyanobacteria have the potential to produce toxins.

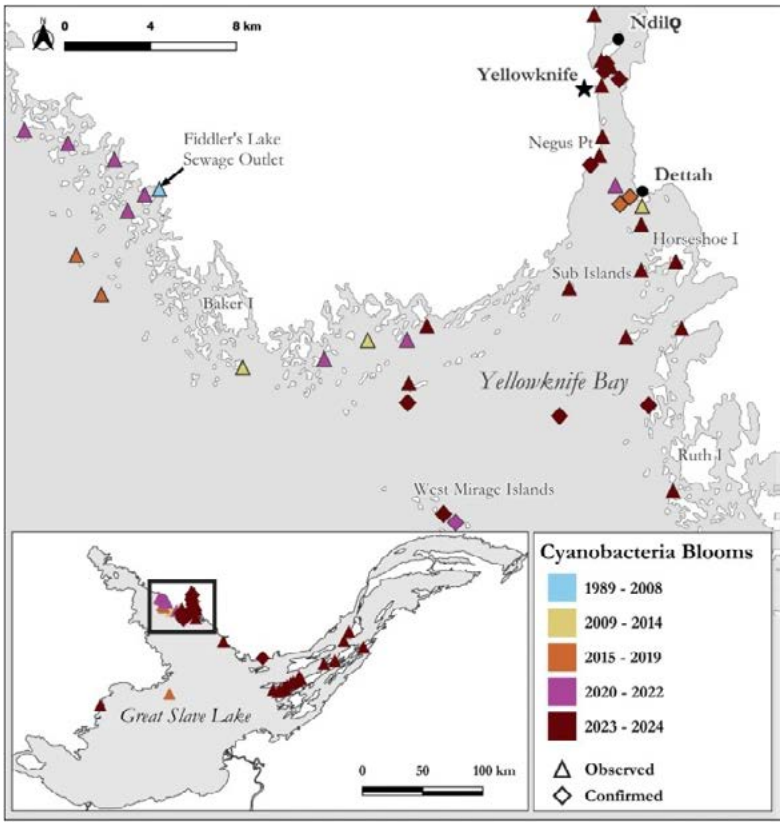
A cyanobacteria bloom, identified as Dolichospermum sp., in Great Slave Lake, August 25, 2024, in Yellowknife Bay (Credit: J. Cederwall).

What Does This Mean?

The increase of blooms is a clear climate change signal showing that even huge, cold, and clear, northern lakes are not immune to the impacts of climate change. Decision-makers should establish an algae and cyanobacteria monitoring network, particularly lakes used for municipal drinking water, and those receiving wastewater.

What's Next?

By analyzing information across all knowledge systems, we establish a foundation for collaborative research and monitoring in our rapidly changing northern water bodies. This approach could be used as a template for bridging different knowledge systems in northern environmental change research. Additional research, surveillance and monitoring are needed with continued collaboration with Traditional, local, and scientific knowledge-holders.



Cyanobacteria blooms in Great Slave Lake, with a focus on the North Arm containing early hot spots (Yellowknife Bay and Baker Island).

What are Cyanobacteria?

Cyanobacteria (also known as blue-green algae) are microscopic, plant-like organisms that naturally occur in freshwater lakes, ponds, and rivers. Individually, they are too small to see but under certain conditions, they can multiply quickly and form large groups called "blooms." Some types of blooms can harm the environment or produce toxins that are harmful to people, pets, and wildlife.

For More Information

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Cederwall, J., Cott, P.A. (2025). Rapidly increasing cyanobacteria blooms in the subarctic Great Slave Lake: observations from Indigenous, local, and scientific knowledge. Scientific Reports. 15, 24492. https://doi.org/10.1038/s41598-025-07432-5 (Open Access)

GNWT-ECC Info Sheet (2024) Cyanobacteria/blue-green algae https://www.gov.nt.ca/ecc/sites/ecc/files/resources/nwt_blue-green_algae_cyanobacteria_blooms_-_info_sheet.pdf

GNWT-HSS Info Sheet (2025) Harmful Algal Blooms, Cyanobacteria and Cyanotoxins in Surface Water https://www.hss.gov.nt.ca/en/services/environmental-contaminants/harmful-algal-blooms-cyanobacteria-and-cyanotoxins-surface-water

NWT CIMP is a source of environmental monitoring and research. The program coordinates, conducts and funds the collection, analysis and reporting of information related to NWT environmental conditions. If you're conducting environmental monitoring and research, consider sharing your information with northern residents and decision-makers in a Bulletin.