

Research Bulletin

NWT Cumulative Impact Monitoring Program

What Drives Differences in Fish Mercury Levels Among Lakes in the Dehcho?

Summary

Since 2012, Dehcho Guardians and university researchers have been working together to understand why fish in some lakes have different mercury levels, what causes the differences, and if we can predict how climate change and other stressors will affect fish mercury levels. From 2022-2024, we studied multiple lakes in the Dehcho and learned what determines mercury levels in Lake Whitefish and how mercury is magnified through lake food webs. The relative size of the lake's catchment to lake area was a good predictor of fish mercury levels, and both catchment area and lake area can be sensed remotely and inform what lakes to study next.

What Did We Do?

Each summer for the past 12 years, Dehcho Guardians and university researchers study 2 to 3 lakes chosen by communities. They spend four weeks on the land each summer, collecting fish, water, sediment, invertebrates, and zooplankton. Researchers also studied differences in lake catchments – surrounding land that drains into each lake.



Dry fish at Ekali Lake. (Credit: E. Vokey)



What Did We Find?

- Mercury levels in Lake Whitefish were low overall, but they varied from lake to lake.
- Lake Whitefish mercury levels were higher in lakes with higher mercury levels in invertebrates (i.e. the bugs at the bottom of the food chain), which depend on how much mercury is in the lake's sediment and water.
- Invertebrate mercury is higher in lakes with more dissolved organic carbon (i.e. more tea-coloured lakes).
- Dissolved organic carbon is linked to the catchment size and how much forest it has. Lakes with a larger catchment and more forest in the catchment area have more mercury built up through the food chain.

Mercury is a naturally occurring element. Levels in water are often very low, but mercury can build up in food chains that are long and in fish that are large, old, and slow-growing.

What Does This Mean?

Every lake studied has some fish with low mercury levels. Mercury was lowest in fish from lakes that were relatively large compared to their catchments, had less forest around them, and had clearer water. We can explain 65-80% of among-lake variation in fish mercury levels with one variable: relative size of the catchment.

For More Information

Mike Low, Dehcho AAROM
jmichaellow@gmail.com

Heidi Swanson, Wilfrid Laurier University
hswanson@wlu.ca

NWT Cumulative Impact Monitoring Program (CIMP154)

Aqdam, M.M., Baltzer, J.L., Branfireun, B.A., Low, G., Low, M., Laird, B.D., Swanson, H.K. (2025). Factors and mechanisms driving among-lake variability of mercury concentrations in a benthivorous fish in the Canadian subarctic. *Chemosphere* 372: 144078. <https://doi.org/10.1016/j.chemosphere.2025.144078>



Ekali Lake Camp, September 2024. (Credit: E. Vokey)

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.