



### NWT Cumulative Impact Monitoring Program (NWT CIMP)

A source of environmental monitoring and research in the NWT. The program coordinates, conducts and funds the collection, analysis and reporting of information related to environmental conditions in the NWT.

### NWT Environmental Research Bulletin (NERB)

A series of brief plain language summaries of various environmental research findings in the Northwest Territories. If you're conducting environmental research in the NWT, consider sharing your information with northern residents in a bulletin. These research summaries are also of use to northern resource decision-makers.

## Are forest fires increasing the amounts of metals in lakes and wetlands?

Forest fires support natural forest regeneration but also release ash and metals bound in soils and plants, potentially affecting water quality. Environment and Climate Change Canada (ECCC) and Carleton University worked with the Yellowknives Dene First Nation, Wek'èzhì Renewable Resources Board, and Tłı̄chǫ Government to see if metals, such as mercury released by fires, were washed into or settled on lakes and wetlands. We found that forest fires in the Northwest Territories (NWT) had not significantly increased total metal concentrations.

### Why is the research important?

Forest fires are predicted to become more frequent and intense because of drier and warmer conditions. The 2014-2015 wildfire season had the largest and longest-burning fires since records have been collected in the NWT. It was not known whether deposited ash increased the concentrations of metals settling in lakes and wetlands in the North Slave region.

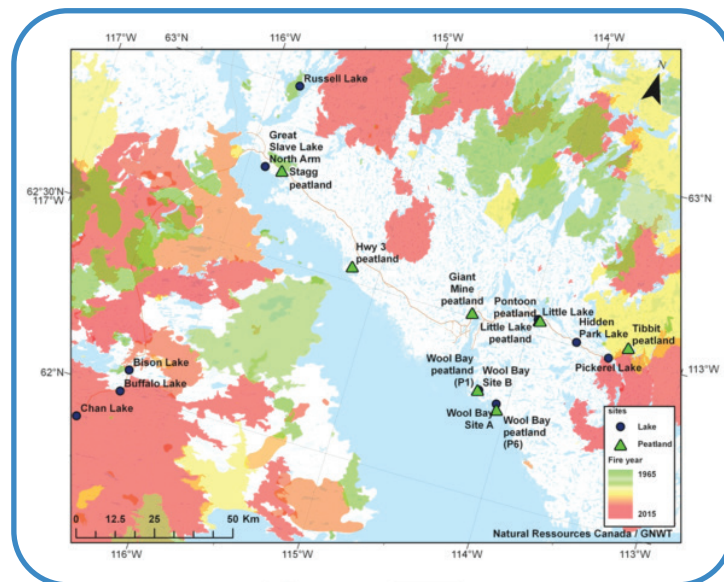


Figure 1. Lake and peatland study sites that were sampled in the North Slave Region in 2016, including the delineation of areas influenced by forest fires over the last 50 years.

## What did we do?

In 2016 we sampled surface water and sediments from the bottom of 10 lakes and peat from five bogs, at different distances from the 2014-15 forest fires. We tested the samples for metal concentrations and charcoal particles. We examined whether fire events, indicated by large amounts of charcoal particles in layers of sediment or peat cores, influenced the concentrations of total metals found.



Figure 2. A peat core used to reconstruct the wildfire and metal deposition history at one of the study bogs. (Credit: Nicolas Pelletier)

## What did we find?

- The ash deposited from a single fire delivered insignificant metal concentrations.
- Metal concentrations (cadmium, lead and mercury) in water and sediment from lakes were below Canadian Council of Ministers of the Environment (CCME) guidelines for protection of the aquatic environment.
- Arsenic concentrations in sediments were in some cases higher, but likely due to pre-existing historic accumulation.

## What does this mean?

Recent forest fires did not appreciably increase total metals in lake sediments and metal guidelines were not exceeded. This information will assist with interpreting long-term monitoring trends of lake water quality in the region.

## What's next?

Future work should examine lakes where the shoreline is burned to determine if surface runoff from burned soils could be an important source of metals.

## How are sediment cores collected and what does metal concentration mean?

Lake sediment or wetland peat cores are collected with a hollow plastic or metal tube to sample layers that accumulated over time.

Metal concentrations mean the amount or quantity of a metal in a litre of water or a kilogram of sediment.

## Recommended Reading

Pelletier, N, J Chélat, O Blarquez, J Vermaire. 2020. Paleolimnological assessment of wildfire-derived atmospheric deposition of trace metal(loid)s and major ions to subarctic lakes (Northwest Territories, Canada). *Journal of Geophysical Research: Biogeosciences*, 125, e2020JG005720. <https://doi.org/10.1029/2020JG005720>

Chélat, J, J Vermaire, N Pelletier, M Palmer. 2018. The influence of forest fires on metal deposition to lakes and peatlands in the North Slave Region, NWT. Final Report submitted to the NWT Cumulative Impact Monitoring Program. 14 pages. Available on the NWT Discovery Portal ([www.nwt.discoveryportal.enr.gov.nt.ca](http://www.nwt.discoveryportal.enr.gov.nt.ca)).

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