SAMMS

How Much Legacy Arsenic Pollution Remains in NWT Lakes

PROJECT SUMMARY

SAMMS quantified the present state and potential future mobility of legacy metal pollution from mining (such as arsenic). Terrestrial and wetland stores of arsenic appear to be available to move into to aquatic systems. Historically deposited arsenic continues to be remobilzied from lake sediment back into lakes and aquatic food webs. Increased potential for arsenic to move due to climate change.

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Sub-Arctic Metal Mobility Study (SAMMS)

Progress

- Clear evidence of mining-associated arsenic in lake sediments more than 80km northwest and 40km northeast of Yellowknife.
- Lake sediments show a variety post-deposition patterns meaning arsenic is mobile, reactive, and continues to migrate from sediments into lake water.
- Climate change affects the amount of dissolved organic carbon, which transports metals, and the timing of stream flows from the arsenic-affected landscape around Yellowknife.

A lake's history is stored in its sediments

User Engagement

- Developed community-focused visualizations of the long-term concentrations of disinfection by-product and dissolved organic matter in all Northwest Territories communities.
- Engagement led to developing new partnerships to answer questions about harmful algal blooms, and the remobilization of nutrients and metals in Jackfish Lake.

Uplands quickly move water to wetlands

Results

- Mining-associated arsenic in lake sediment far from Yellowknife is being remobilized into lake water. Improved understanding of the conditions that lead to arsenic remobilization.
- Catchment size and composition can play a large role in how much arsenic remains in soils, peat, and lake sediments. This adds a layer of complexity to making future predictions about lakes.
- Climate change will alter the timing of stream and river flows as well as the amount of dissolved organic matter, which binds metals, exported from rivers and lakes to downstream environments. These changes are likely to alter arsenic remobilization.

Wetlands slow the movement of arsenic from uplands to lakes

Outcomes and application uptake

Arsenic mobilization is driven and mediated by redox and water movement. Potential future risk may be predicted by the likelihood of sediment anoxia the bottom of lakes. Warmer temperatures and change in autumn snow to rain may increase risk.

Landscapes still show evidence of elevated arsenic and arsenic mobility through soils and wetlands.

Climate change is expected to alter the timing and amount of water and carbon, which binds metals, exported from catchments.

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