

Bioaccumulation of Hg and As in freshwater invertebrates from Ponhook Lake, Nova Scotia: Effects of historical gold mine tailings

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Historic artisanal and small-scale gold mining in Nova Scotia has left a legacy of mercury (Hg) and arsenic (As) contamination in lacustrine ecosystems across the province. These contaminants pose a significant risk to environmental health due to their toxicity and ability to bioaccumulate (Hg, As) and biomagnify (Hg). Our research at a tailings site on the northern shore of Ponhook Lake, Queen's Co., NS, is focussed on quantifying Hg and As concentrations in benthic communities and shoreline sediments. In the summer of 2025, we collected sediment samples along a 10 km transect of Ponhook Lake's northern shoreline, as well as a 1 km reference transect of the southern shore. These sediments were dried and reduced to silt-clay sized sediment using a 200 µm stainless steel sieve. The sorted sediments were analyzed for total mercury (THg) and total arsenic (TAs) using a NIC MA-3000 direct mercury analyzer and Epsilon 1 X-Ray Fluorescence for As. Preliminary analyses have shown elevated levels of THg concentrations (ranging 2.742–5787.611 ng g⁻¹; mean = 494.6657 ng g⁻¹; Std Dev. = 1049.621 ng g⁻¹; n = 58) and TAs (ranging 11.097–1060.089 µg g⁻¹; mean = 108.4756 µg g⁻¹; Std Dev. = 183.2704 µg g⁻¹; n = 60) at Ponhook Lake. THg concentrations near the mine tailings exceed the Canadian interim sediment quality guidelines (ISQGs) of 170 ng g⁻¹. TAs concentrations exceed the ISQG of 5.6 µg g⁻¹ in all samples collected due to local geologic influences.

Keywords: Mine tailing contamination, bioaccumulation, benthic macroinvertebrates, mercury, arsenic

Oral presentation