NSERC Canadian Network for Aquatic Ecosystem Services

Theme 1, Project 1.4

# Linking Mining Wastewater Discharge to Methylmercury Production and Persistence in a Sub-Arctic Peatland

**Lauren Twible, MSc Candidate**
University of Western Ontario
ltwible@uwo.ca
https://www.linkedin.com/in/lauren-twible-2197b270

**Project team**
Brian Branfireun, University of Western Ontario, Supervisor
John Price, University of Waterloo, Co-Investigator
Colin McCarter, University of Waterloo, Collaborator
Aaron Craig, University of Western Ontario, Technician

## Abstract

Mines in remote northern regions have limited options for handling their wastewater produced through industrial and processing activities due to geographic isolation, cost, and energy requirements. Wetlands have a recognized capacity to assimilate nutrients and particulate matter, and thus are an appealing water polishing option. To test the impacts of wastewater discharges on northern peatlands, an experiment that continuously adds simulated wastewater to a string fen in the James Bay Lowlands was initiated in 2014. Previous research on temperate peatlands has shown that the addition of sulphate leads to increased methylmercury concentrations in peatland pore waters through enhanced methylation by sulphate-reducing bacteria. Preliminary sampling from the summer of 2014 has shown an increase in total and methyl mercury as nutrient additions continued. Continued data collection in the summer of 2015 will allow us to assess the persistence of methylmercury generation throughout the fen during nutrient addition. Nutrient addition will cease in 2016, but sampling will continue to determine if there are legacy effects on methylmercury generation. Through the analyses of both the short-term (first year) and long-term (multi-year) methylmercury dynamics we can evaluate the potential risks associated with using peatlands in the remediation of mine wastewater that contains sulphate.

**Keywords:** Mercury, Methylmercury, Mining, Arctic, Peatland, Wetland, Wastewater

**Geographic Location:** 52° 49’ 15”, -83° 53’ 00”

## How does your project link to Canadian aquatic ecosystem services?

Understanding the extent to which methylmercury is generated in wastewater peatlands used in far North mining and the effect it has on water quality in those regions.