

NRI Scientific Research License: Annual Summary Report

Project Title: Impacts of air pollution on terrestrial and aquatic ecosystems on southern Baffin Island

Fieldwork Dates: three to four weeks annually during summer (2022–2025)

Researcher Name and Affiliation:

Principal Investigator: Dr. Julian Aherne, Trent University
Researcher: Kayla Wilkins, Trent University

Summary Report from 2023 Field Season (Number 01 015 23R-M):

Field members: Kayla Wilkins and Kelly Evans, Trent University

The purpose of this four-year project (2022–2025) is to assess the impacts of air pollution on aquatic and terrestrial ecosystems in the Iqaluit region of Baffin Island.

During July and August 2023, water samples (<250 mL) were collected from twenty lake catchments (lakes have been sampled since 2016) and analysed for microplastic content and trace elements. Moss (*Hylocomium splendens*) samples (1 g) were also analysed for microplastics, and a subset were analysed for trace elements and nitrogen content. Plant species abundance counts were taken at vegetation plots (established July 2022) and a second nitrogen amendment (since 2022) was carried out. Plant Root Simulator (PRS) probes were deployed at the plots to measure plant-available ions in the soil. Passive air samplers were also deployed alongside the Nunavut Environment active air sampling equipment on the NRI laboratory rooftop to estimate the deposition of nitrogen-containing compounds.

The preliminary results of this ongoing project suggest that microplastic abundance follows a spatial trend and is greatest in the eastern lake catchments in the region. Initial plant species abundance counts show that the vegetation plots are dominated by blueberry, mountain avens, and moss and lichen species. After the final year of nitrogen amendments (2025), changes in species abundance, soil nitrogen content, and foliar nitrogen content will be assessed by comparing treatment and control plots. Results of the study will be made available online through data archives, including the Polar Data Archive.

Proposal from 2024 Field Season

Field members: Kayla Wilkins and Ekaterina Papatheodorou, Trent University

In the 2024 field season, we are planning two trips to the Iqaluit region. During the first trip (July 2–11, 2024), we will revisit the vegetation plots to repeat the vegetation species abundance counts and deploy PRS Probes, as well as repeating the nitrogen amendments. Passive air samplers will be exchanged. During the second trip (August 24–30), we will revisit the vegetation plots to collect the PRS Probes and finish the nitrogen amendments. We will also exchange the passive air samplers for the winter. Water samples will potentially be collected from the 20 study lakes if time permits.