

Field Report - 2022

Project Title: Northern Ellesmere Island in the Global Environment (NEIGE)

Permit Numbers:

Nunavut Research Institute Scientific Research License: 02-031-22 R-M AMENDED

Parks Canada Research Permit: QUT-2022-42119

Nunavut Impact Review Board (NIRB): 11YN025

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Person nights

- Resolute Bay (PCSP) region: 223 person-nights in the period 6 July to 10 August 2022
- Ward Hunt Island: 212 person-nights in the period 14 July to 8 August 2022
- Northern Ellesmere Island: 40 person-nights in the period 23 July to 2 August 2022

Fieldwork Locations

The work took place in the vicinity of:

- PCSP Station at Resolute Bay
- Ward Hunt Island
- Northern Ellesmere Island (Thores Lake, Lake A, Markham Fiord area, Clements Markham Inlet and Stuckberry Valley).

Field Activities and Accomplishments

- We collected lake ice from Ward Hunt and Markham Lakes, which we will use to perform one of the first functional analyses of this poorly described microbial habitat. We were also able to sample Markham Lake for the first time, a unique site on the northern coast of Ellesmere Island that has undergone major change in the last decades.
- We sampled the water column and sediments of three ice-covered lakes, one near Resolute and two in northern Ellesmere for chemical speciation of selenium and sulfur,

with additional samples for greenhouse gas and general water chemistry analysis. We have prepared and deployed a lake buoy equipped with high-frequency sensors in Ward Hunt Lake.

- We took water column profiles, water chemistry samples and sediment cores from three lakes in the Clements Markham Inlet region, in addition to reconnaissance of other potential study lakes. We visited Stuckberry Valley to recover moorings in two lakes that have been recording oxygen and temperature dynamics in the lakes since June 2019.
- We collected microbial biofilms and microplankton from diverse sites for molecular analysis, cryopreservation, culturing and experiments. This will provide new insights into the biodiversity and functioning of northern freshwater ecosystems.
- We collected samples from sediment, mats, ice and lakes along the northern coast of Ellesmere Island to study the ecology of microorganisms, including viruses. This work is part of a large-scale project studying the region of Tuvaijuittuq, or the Last Ice Area, considered the last refuge of permanent sea ice-dependent organisms in the Arctic Ocean.
- We conducted a permafrost campaign to study ground ice of the polar desert landscape across various terrain units; the cores will be analyzed in our laboratory in Montreal and the data used to improve the ground ice map of Canada. This was complemented by a non-vascular plant inventory across the same terrain units, to provide improved records for the geospatial distribution of plants on Ward Hunt Island.

Preliminary Results: All samples are currently being analysed.

Community Consultation:

We work closely with the Resolute Bay community, and for the Ward Hunt Island work we hired an Inuk guide from the community. We also consult with Resolute Bay and Grise Fiord (with Inuktitut translations) via our permitting applications and reports for Parks Canada (Nunavut Field Unit, Iqaluit), and our involvement in the Management Plan for Quttinirpaaq National Park.

Future plans

We would like to return to the Ward Hunt Island region, Nunavut, in summer 2023, to continue this research.