

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

Permit Numbers:

Nunavut Research Institute (NRI): **02 003 16R-M**

Parks Canada Agency and collection permit: **QUT-2015-18856-amended 04-05-16**

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Person nights

May 23: FD, MBB, FB, GD arrive

June 2: FD, MBB, FB depart (3 x 10 = 30 person nights)

June 2: MP arrives

July 13: MP, GD depart (10 + 2 x 40 = 90 person nights)

July 13: WV, AC, MK, ML, YT, DS arrive

July 21: WV, AC, MK, ML, YT, DS depart (6 x 8 = 48 person nights)

Total = 168 person nights

Aircraft Hours

A Twin Otter chartered by PCSP and based in Resolute Bay was used to carry the participants to and from Ward Hunt Island on: May 23 2016, June 2 2016, July 13 2016 and July 21 2016, for an estimated total of 32 hours flight time (four round trips). We made day excursions to Lake A, Disraeli Fjord, Markham Fjord and Milne Fjord via PCSP helicopter (Bell 206L) from July 1 to July 19 2016 (flight time of ca. 10 hours).

Fieldwork Location

The work took place on or near Ward Hunt Island, Lake A, Disraeli Fiord, Markham Fiord and Milne Fiord.

Field Activities and Accomplishments

There were five aspects to our research (please see also Figs 1-7, below):

1. Environmental monitoring. We continued our long term measurements from climate stations, permafrost monitoring and automated cameras on Ward Hunt Island. We are making these data available to all stakeholders including northern communities by publication in the online, open access data report series Nordicana D: www.cen.ulaval.ca/nordicanad/dpage.aspx?doi=44985SL-8F203FD3ACCD4138. We also retrieved a 1-year record of lake temperatures at Lake A and decommissioned the Lake A climate station, with an excellent record now available for comparisons with our Ward Hunt Island station. We repeated the glacial-retreat measurements at 'Walker Glacier' (unofficial name) near Markham Fiord.

2. Lake and fjord profiling. We were able to continue our measurements tracking water column change in the lakes and fjords along the northern Ellesmere Island coastline, with profiling of Ward Hunt Lake, Lake A and Milne Fjord (Neige Bay). These data are also available through Nordicana D: <http://www.cen.ulaval.ca/nordicanad/dpage.aspx?doi=45445CE-7B8194DB81754841>; <http://www.cen.ulaval.ca/nordicanad/dpage.aspx?doi=45436CE-0E0A89CB98C148F4>.

3. Microbiological research. This summer, we made considerable progress with high resolution sampling of Ward Hunt Island Lake, Lake A and Milne Fjord, and with additional samples from Disraeli Fiord and vicinity. In each of these sites, we were able to sample for viruses, other microbes, pigments and a wide range of physical and chemical measurements. We anticipate that these data will provide us with a baseline from which to study future change in these sensitive environments.

4. Ward Hunt Lake sampling: In addition to the usual profiling we made observations of bottom sediments, underwater light, oxygen fluctuations and water currents in the moat. The previous bottom thermister in the lake has now been replaced with a string of thermisters and bottom sensors to measure light, plankton and oxygen. Benthic mats were also sampled.

5. Geomorphological, hydrological and snow research (Geo-NEIGE). We continued our observations of hydrology and geomorphology in the Ward Hunt Lake watershed, with detailed measurements of water tracks. Perennial snowbanks were studied to measure slope hydrology, geochemical properties and sediment transfers, and the thickness and layering of the snowbanks were measured using a Ground Penetration Radar. Four sediment cores (<50 cm) were collected from Ward Hunt Lake to examine its environmental history. The optical and physical properties of snow, including grain size, density and thermal conductivity, were measured at five sites on Ward Hunt Island, including at the SILA climate monitoring station.

Preliminary Results: All samples are currently being analysed.

Community consultation and Involvement

Quttinirpaaq National Park and Ward Hunt Island are located in a remote region, far from northern communities. Our interactions are through community consultation, Parks Canada and NRI license applications, interactions with Parks Canada staff, public media interviews, and by meetings with Resolute Bay and Grise Fjord residents at ArcticNet workshops and other events.

Challenges:

Logistics funding continues to be our greatest challenge. We appreciate the Parks Canada camp facilities and laboratory, which greatly facilitated our work, and PCSP logistics.

Plans for next season:

We would like to return in May-July 2017 to continue each of these projects, with the possibility of additional sampling of lakes in the Stuckberry Point area (82.95°N, 66.72°W), ca. 100 km to the east of Ward Hunt Island, and of Thores Lake (82.65N; 73.68W), a long proglacial lake near Disraeli Fiord (Figure 6, below).

Appendix 1: Sites

In 2016 the following QNP stations were visited for observations or sampling:

- Ward Hunt Island (83°05.26'N; 74°10.29'W)
- Ward Hunt Lake and shores (83°05.26'N; 74°08.09'W)
- Ward Hunt Island: SILA station (83°04.88'N; 74°7.85'W)
- Ward Hunt Island automated camera site (83 04.78'N, 074 00.30'W)
- Lake A climate station (83°00.12'N; 75°23.40'W)
- Lake A (82°50.82'N; 75°26.46'W)
- Markham Fiord region/Walker Glacier (83° 00.601' N; 72° 12.387' W)
- Milne Fjord (82°35.57'N; 80°35.23'W)

Appendix 2: Photographs from the 2016 field season

See below.

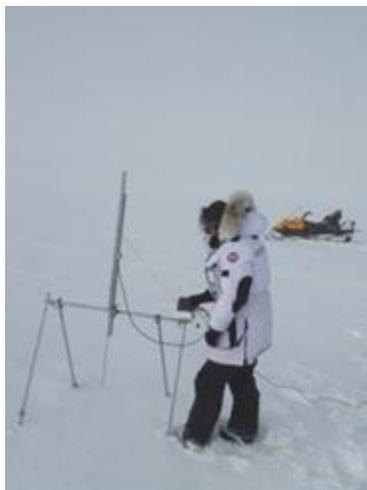


Fig. 1. Snow measurements.



Fig. 2. Ground penetrating radar.



Fig. 3. Lake sediment coring.

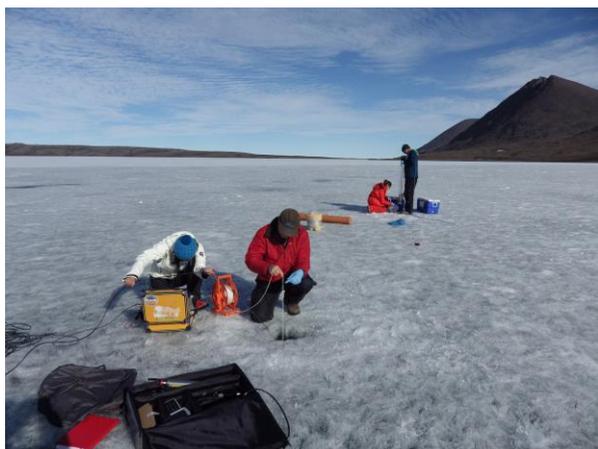


Fig. 4. Microbiological sampling at Lake A.

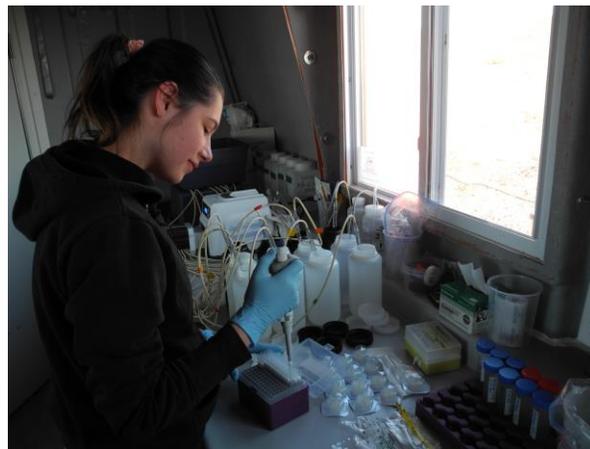


Fig. 5. Ward Hunt Island laboratory analysis.



Fig. 6. Thores Lake near Disraeli Fiord.

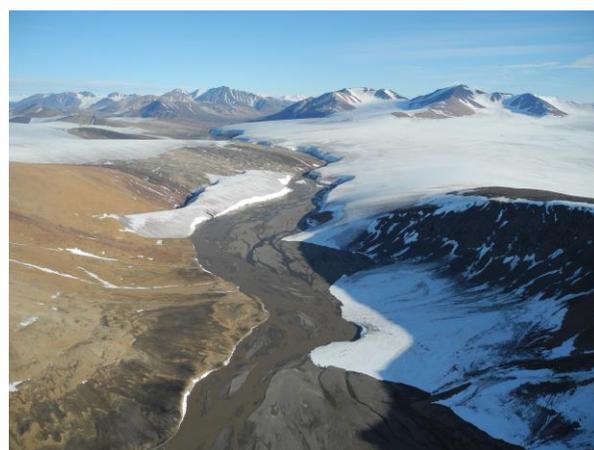


Fig. 7. Walker Glacier near Markham Fiord.