

## **Nunavut Research Institute - License Report 2014**

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

### **Permit Numbers:**

Nunavut Research Institute (NRI): **02 010 14R-M**

Parks Canada Agency and collection permit: **QUT-2013-13854**

Nunavut Impact Review Board (NIRB): **11YN025**

Polar Continental Shelf Program: **Project 61414**

### **Principal Investigator :**

Warwick F. VINCENT

Département de Biologie,

Centre d'Études Nordiques (CEN)

Université Laval, Québec

G1V 0A6 (QC)

### **Research Team**

Vincent, Warwick F. (Prof), Dépt de biologie & Centre d'Études Nordiques (CEN), Université Laval, Québec, QC G1V 0A6

Culley, Alexander (Prof), Dépt de microbiologie, Université Laval, Québec, QC G1V 0A6

Sarrazin, Denis (Mr), Centre d'Études Nordiques (CEN), Université Laval, Québec, QC G1V 0A6

Comte, Jérôme (Dr), Dépt de biologie & Centre d'Études Nordiques (CEN), Université Laval, Québec, QC G1V 0A6

Bégin, Paschale (Ms), Dépt de biologie & Centre d'Études Nordiques (CEN), Université Laval, Québec, QC G1V 0A6

Paquette, Michel (Mr), Dépt de Géographie & Centre d'Études Nordiques (CEN), Université de Montréal, QC H2V 2B8

### **Person Nights**

Our team was delayed by a week at Iqaluit because of persistent fog at Resolute, and the time in the field was therefore less than requested. The final dates were August 2 to 13. All six members left from Resolute Bay to Ward Hunt Island on August 4 2014, and our return was on August 12 2014. The total number of person nights for our project was therefore 8 nights x 6 persons = 48. All of these nights were spent at the QNP Ward Hunt Island Camp. An additional 3 nights (team average) were spent at PCSP Resolute = 66 person nights total.

### **Aircraft Hours**

PCSP charged us full cost recovery this year for all Resolute Base nights, radio, aircraft support etc, so our operations this year were greatly reduced. A Twin Otter chartered by PCSP and based in Resolute Bay were used to carry the participants to and from Ward Hunt Island on: 4 August 2014 and 12 August 2014, for an estimated total of 16 hours flight time (two round

trips). No PCSP helicopter time was awarded to our project this year and so there were no flights.

### **Fieldwork Location**

All of the work took place on Ward Hunt Island, administered by Quttinirpaaq National Park.

### **Field Activities and Accomplishments**

There were four aspects to our research:

1. Environmental monitoring. We continued our long term measurements from climate stations, permafrost monitoring and automated cameras. We are making these data available to all stakeholders including northern communities by publication in the online, open access data report series Nordicana D and our latest 2014 data are now already online and freely available:

[www.cen.ulaval.ca/nordicanad/dpage.aspx?doi=44985SL-8F203FD3ACCD4138](http://www.cen.ulaval.ca/nordicanad/dpage.aspx?doi=44985SL-8F203FD3ACCD4138)

Our Ellesmere Island stations could not be downloaded because of the absence of PCSP support, however we installed a new camera (see images in our 2013 report) on Ward Hunt Island to replace the system that broke down during the 2012-2013 winter.

2. Lake and fjord profiling. We were unable to continue our measurements tracking water column change in the lakes and fjords along the northern Ellesmere Island coastline because of no award from PCSP. However we were able to profile Ward Hunt Lake, and obtain surface measurements from Quttinirpaaq Lagoon. These data will be added to those already available through Polar Data Catalogue. We also sampled Resolute Lake and associated waters at Resolute Bay prior to leaving for Quttinirpaaq.
3. Microbiological research. We expanded our studies on the microbial communities and processes in on Ward Hunt Island with sampling for viruses as well as Bacteria, Archaea and eukaryotes in the lake lagoon, water tracks and lake outflow. Additional sampling was made for microzooplankton and a dilution experiment was run to test methods for the PhD research of P. Bégin, which will begin in 2015.
4. Geomorphological and hydrological research (GEO-NEIGE). This work was continued in the Ward Hunt Lake watershed, to generate information on soil temperatures, snow distribution, flow pathways (especially via water tracks – Figure 3 below), water quality, sediment movement and the timing of delivery. This research also contributed to our project “Arctic Development and Adaptation to Permafrost in Transition” (ADAPT).

## Preliminary Results

This was a cool year similar to 2013, with 2.3 m of multiyear ice on Ward Hunt Lake (Fig .2). The lake ice was forming candles, with a moat up to 20 m wide at the north-western end of the lake, but full ice out seems unlikely this year. We observed a microbial mat community in the lake that we would like to analyse further in 2015.

The water level of Quttinirpaaq Lagoon seemed lower than usual and in the middle and north, extensive moraines are now exposed. These were completely submerged 15 years ago, and the lagoon was composed of blue freshwater water and ice. The salinity of the lagoon in 2014 was around 3000  $\mu\text{S cm}^{-1}$ , which is about 6% seawater and not suitable for drinking.

A very active ermine (Fig. 4) was seen around the camp, perhaps reflecting the high densities of lemmings on Ward Hunt Island last year. Unfortunately, this ermine seems to have found a hole in the Parks Canada cooking tent, and had deposited many pieces of lemmings over the floor. We were unable to find this hole to block it.

We observed three bird species: long tailed jaeger, snow buntings, and plover. Arctic poppies (*Papaver dahlianum* subsp. *polare*), *Saxifraga flagellaris* subsp. *platysepala* (Spider plant) and *Saxifraga cernua* (Nodding saxifrage) were blooming but *Saxifraga oppositifolia* (Purple saxifrage) had already bloomed by the time we arrived.

## 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 (including with Ms Nancy Anilniliak, Superintendent of Nunavut, this year at Iqaluit and a post-season telephone call with the QNP Park Manager Ms Emma Hansen), public media interviews, and by meetings with Resolute Bay and Grise Fjord residents at workshops and other events.

## Challenges

Weather and funding continue to be our greatest challenges. Our first group was delayed by more than 1 week due to uncertain weather at Resolute, cancellation of flights and First Air technical delays. PCSP's full cost-recovery policy is a major challenge for us. We greatly appreciate the Parks Canada camp facilities and laboratory, which greatly facilitated our work.

## Plans for next season

We would like to return in July-August 2015 to continue each of these projects, including the following activities: 1) Environmental station downloads and replacement of instruments; 2) Ongoing lake and fjord profiling, with measurement of their biogeochemical properties; 3) Microbiological work on processes at the base of the marine and freshwater food webs of this region, including on the benthic photosynthetic communities of Ward Hunt Lake; 4) Ongoing research on the water tracks that affect land-water interactions in the Arctic; 5) Some comparative work on lakes and ponds and their outflows in the Resolute Bay area.

## **Appendix 1: Sites**

In 2014 the following QNP stations were visited for observations or sampling:

- Ward Hunt Island (83°05.26'N; 74°10.29'W)
- Quttinirpaaq Lagoon (83°05.30'N; 74°10.293'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 04.775N, 074 00.302 W).

## **Appendix 2: Photographs**



Fig. 1. Preliminary sampling at Resolute Lake.



Fig. 2. Ward Hunt Lake, Aug. 2014



Fig. 3. One of the water track inflows.



Fig. 4. Ermine at the QNP camp