

churchillnorthernstudiescentre



# THE BIRDFISH

WINTER/SPRING 2014

Churchill Northern Studies Centre  
Newsletter

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# A Scientist's Eye

## Science from the Perspective of an Undergraduate

Daniel Gibson, Seasonal Research Technician



This was my second summer working at the CNSC as a Summer Research Technician and I can say with absolute certainty that it was the best job I have ever had.

Entering into my undergraduate degree program almost four years ago, I had a vague sense of what research or the process of doing science was - it was something that only really smart and nerdy professionals do. Through the courses that I have taken at university, the professors, whether consciously or not, have tried to articulate what goes on in the mind of scientists and why it is they keep doing science. This summer I learned first-hand what it is to be a scientist myself.

During my time at the CNSC I had the pleasure of observing and working along with people who "do" science on a daily basis and not just talk about it. They are constantly making observations and their minds are endlessly coming up with explanations and mechanisms for what they see. I have always been intrigued by how things work, and why things happen in the way they do. I now see this as the scientist in me as well.

In my first summer, I conducted a small study to test whether or not a tiny insect, an aphid, chose one plant or another as food. It was my first real experience of collecting data in the field. Aphids were not even on my radar before and I most certainly did not want to spend hours staring through a microscope at them, but the hook was set. This summer, I elaborated on that study to determine if the aphids of Churchill choose specific plants to live on, and if so, how specific are they? That was my main question, but as with any research question there are always more questions raised with the process.

At the University of Guelph, I am now analysing the samples and data that I collected this summer for an undergraduate research project. My academic training is starting to fit into the practical, the field collections and observations bringing answers to the question, but also a wealth of new questions – what the professors have been trying to teach me all along. The questions come naturally - you just have to learn how to look at the subject. So whether I continue formally in research or other things, science – the questions, the observations and the needing-to-know-why, will always be a part of my life and way of thinking. ❁



*In my first summer, I conducted a small study to test whether or not a tiny insect, an aphid, chose one plant or another as food.*

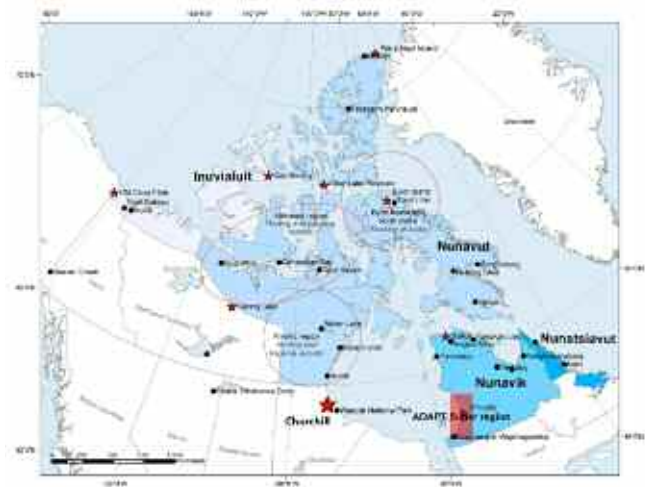


# Coring frozen ground: permafrost research across Canada

Frédéric Bouchard, Postdoctoral Researcher

**D**uring times of marked climate change and unprecedented economic development across the Canadian Arctic, some key questions arise: What are the implications of rapid environmental change caused by thawing permafrost in northern Canada? How did permafrost ecosystems respond to change in the past, and how will they evolve in the future? How will we cope?

ADAPT ('Arctic Development and Adaptation to Permafrost in Transition') is a multi-disciplinary research project that brings together 15 research teams and laboratories across Canada to define how changing permafrost affects tundra landscapes, infrastructures, water and wildlife, and to assess the implications for northern communities who depend on these resources and facilities ([www.cen.ulaval.ca/adapt/index.php](http://www.cen.ulaval.ca/adapt/index.php)). Research sites extend across arctic and subarctic Canada, from Yukon to Labrador via Northwest Territories, Nunavut, both sides of Hudson Bay, Nunavik and Nunatsiavut (see the map below).



ADAPT study sites across northern Canada

Underlain by continuous and discontinuous permafrost and spanning the transition from the boreal forest to the arctic tundra, the western Hudson Bay Lowlands (HBL) offer a unique study site for such research. In mid-June 2013, I had the pleasure to be involved in that research as a member of a team from "another northern studies center" (Centre d'études nordiques (CEN) – Centre for Northern Studies, Laval University, Québec City) who came to Churchill to collect permafrost samples and to install monitoring instruments. In collaboration with research team members from Wilfrid Laurier University and University of Waterloo, and the CNSC scientific staff, this fieldwork aimed to characterize permafrost properties, thermal regime and stability at representative sites within the western HBL.

## Peat, kelp, and crunchy pebbles

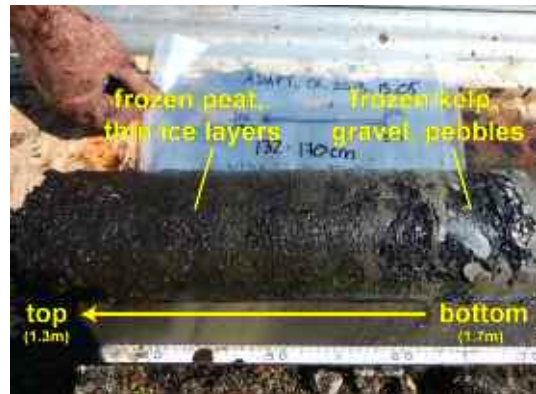
From June 13 to June 16, 2013 the ADAPT 'Drilling Squad' was able to sample permafrost cores at two different open-tundra sites around the CNSC. In order to retrieve frozen ground cores, we used a portable drill that can be operated on several types of landscapes by two experienced – and motivated – workers (see the picture below). Since organic carbon is expected to play a crucial role in future climate change and related permafrost thawing, frozen peat deposits contained within organic permafrost mounds and plateaus are usually good locations to drill.



The ADAPT 'Drilling Squad', sampling frozen peat cores... and resisting all mosquito attacks!

Successively sampling frozen cores of 30-40cm, we were able to reach a maximum of ~2m depth (see the picture below). From the surface to ~1.5m, we sampled organic-rich frozen peat interbedded with thin ice layers, and the last ~50cm consisted of frozen kelp and varied mineral materials (clay, sand, and pebbles). While drilling, we could "feel" the transition between these contrasting ground types, because the core barrel (equipped with diamond teeth) could cut easily through frozen peat and ice layers, yet not as smoothly through clays and pebbles, giving a "crunchy" sensation.

So... what next? What to do with all these samples? First, we brought them back – still frozen – to Laval University and started a series of physical analyses: X-radiographs (like the ones we get at the hospital), water and ice content and thermal and geotechnical properties. We also started to perform several chemical and microbiological analyses (for example; carbon and nitrogen content, bacteria), and radiocarbon dating. All ADAPT research team members – and ultimately everyone interested in permafrost in Canada – will benefit from these investigations, as the data obtained will be freely available online via the web portal Polar Data Catalogue ([www.polardata.ca](http://www.polardata.ca)) and the CEN data journal Nordicana D ([www.cen.ulaval.ca/nordicanad/](http://www.cen.ulaval.ca/nordicanad/)).



A permafrost core: from frozen peat (left) to "crunchy" pebbles (right).

cont'd on page 6



## Hands on History: Archaeology of Prince of Wales Fort

July 31 – August 7, 2014 & August 7 – 14, 2014

Instructor: Donalee Deck

16 Participants

\$2,195 CDN

**NEW!**

Imagine living in a stone fort on the coast of Hudson Bay in the 1700s. Men who worked for the Hudson's Bay Company built, lived and worked at such a fort as labourers, tradesmen, traders and officers. Prince of Wales Fort served as a trading post, but was built for defensive purposes during the French and English rivalry for control of the territory and resources around Hudson Bay. As a member of the archaeology team, you will be re-discovering what life was like at the fort. Working side-by-side with Parks Canada archaeologists you will excavate, screen and document their discoveries in the field, as well as clean and identify artefacts in a field lab. Participants will travel daily by boat across the Churchill River with beluga whales in pursuit and may get a glimpse or two of a polar bear on Eskimo Point. After an exciting day in the field, everyone will return to the Churchill Northern Studies Centre to participate in lectures on related topics and interact with a dynamic group of scientists who study many natural features of the region, and like you, call the Centre home at this time of year. No visit to Churchill is complete without guided tour of the former Research Rocket Range and a visit to the Eskimo Museum. The museum is renowned for its collection of historical artefacts dating back to the pre-Dorset culture and provides a unique glimpse into the everyday lives of the first people to have inhabited the Churchill area.



### Your instructor...



Donalee Deck is an archaeologist with Parks Canada. She received an undergraduate degree in Anthropology from the University of Regina in 1985 and a Masters degree from the University of Manitoba in 1989. She has excavated at historic and Indigenous archaeological sites in Manitoba, Saskatchewan, Alberta, Ontario, Northwest Territories, Yukon and Monticello, Thomas Jefferson's home in Virginia. She taught at the University of Manitoba archaeological

field school and directed numerous public archaeology projects in conjunction with the Manitoba Archaeological Society, the Saskatchewan Archaeological Society and through Wind River Research Services. She also directed research projects along the Winnipeg River for the Deep River Science Academy. Donalee worked as a consultant specializing in flotation analysis, paleoethnobotany and scientific illustration. Archaeological work with Parks Canada has been focused in Wood Buffalo National Park, Riding Mountain National Park, Cypress Hills Massacre National Historic Site of Canada (NHSC), with six years of archaeological research at the Prince of Wales Fort NHSC. ❄️

**BOOK TODAY!**



Parks  
Canada

Parcs  
Canada

**For more information** on these and other exciting course offerings at the Churchill Northern Studies Centre, please visit [www.churchillscience.ca](http://www.churchillscience.ca) and download our course brochure today or call (204) 675-2307 to register! Well, what are you waiting for?

## Hands on History - Frequently Asked Questions

**Q: Will I see whales, polar bears and northern lights?**

**A:** You will see beluga whales each day when you cross the Churchill River to Prince of Wales Fort and, although we can't guarantee it, polar bears often frequent the area around the work site. That's why we have trained bear guards on-duty all day! Plus, the night sky will be getting darker by early August making it easier to see the aurora. If there is one program this summer where you could potentially see it all – this is the one!

**Q: Is this 'real' research or just for show?**

**A:** This is definitely 'real' research. You will be contributing to our understanding of everyday life at the Fort during the fur trade. Past excavations have revealed trade goods, equipment, cannon platforms, and even a rare mineral water bottle from the Pouhon Spa in Belgium!

**Q: Do I need prior archaeological experience to take part in this program?**

**A:** No. All that is required is patience and enthusiasm. There will be one Parks Canada archaeologist for every four program participants to assist with training.

**Q: I've heard the bugs can be really bad in the summer.**

**A:** Yes, mosquitoes and blackflies can certainly be a nuisance, at times! The good news is that insect activity declines in late-July and each participant will be provided with a high-quality bug jacket to protect you while you work. ❄️

### Upcoming Road Scholar Programs:

#### **Lords of the North:** The Polar Bears of Churchill

October 12 – 19, October 17 – 24, October 22 – 29 and October 27 – November 3, 2014

For more information on Road Scholar programs visit [www.road scholar.org](http://www.road scholar.org)



## Lords of the Arctic:

### The Ecology of Hudson Bay's Polar Bears

November 4 – 11 & November 11 – 18, 2014

### Upcoming CNSC Learning Vacations:



#### **Spring's Wings:** Birding in Churchill

June 5 – 10, 2014

#### **Belugas in the Bay:** The White

Whales of Churchill July 17 – 22, 2014



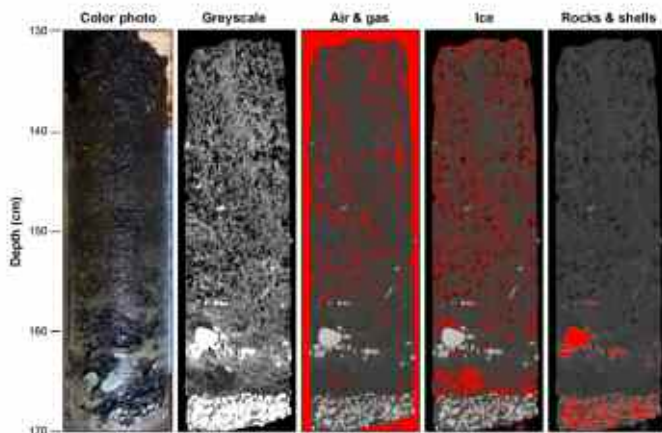
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## A look inside

To have a first look 'inside' the frozen cores, we used a medical scanner at Institut national de la recherche scientifique (INRS) in Québec City. These scans are similar to radiographs taken at a hospital by giving us x-ray images in 3D through different types of materials (soil, rock, wood, ice, water).

We could then interpret the obtained images based on a quite simple principle: higher density materials (e.g., rock, minerals) appear in lighter colors, whereas lower density materials (e.g., organic fragments, gas) appear in darker colors. So, we placed all our Churchill cores in the scanner, and the preliminary results look very promising (see the picture below). Because of their contrasting densities, we can clearly distinguish frozen peat, air/gas bubbles, ice, and rock pebbles. With a closer look, we can even identify mollusk shells that will be very useful for radiocarbon dating, as well as sedimentary structures that were not visible with the naked eye.



This method has many advantages. First, it is innovative and efficient: in a very short time (few minutes), we can obtain 2D images of different orientations and 3D images, calculate volumes (ice, gas, sediment), and localize many structures normally invisible to the naked eye (e.g., micro-faults). Second, it is non-destructive: the cores were not altered in any way during scanning operations, and were available for other analyses. Third, it is complementary: the images obtained can be associated with other techniques to understand permafrost properties, formation and dynamics. ❄️

So, stay tuned for more ADAPT publications and outreach activities.

### For more information:

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– Centre for Northern Studies  
Université Laval, Québec (QC)



*The kind of images we can get from the scanner: a greyscale image on which we can separate (in red) air and gas bubbles, ice, rocks and shells, based on their different density*

## News from the CNSC

From the mailbox...

Dear CNSC Staff:

*Please find attached a few images of the CNSC and Rocket Range from days gone by.*

*In 1985 I was hired as an undergraduate student to work with McMaster University's climate projects in the Churchill region. It was an amazing experience, and eventually resulted in my completion of doctoral climatology research at Queen's University.*

*I visited CNSC in the summer a couple of years ago and mentioned these slides, but it took a while to get them copied as digital files and then longer to get around to emailing them to you. CNSC has certainly come a long way!*

*Sincerely,*

David Joiner, Geography Department Head  
St. Andrew's College

CNSC main facility at Akudlik, home to CNSC from 1976 – 1985.



# +16°C

## Fun Composting Facts

June through November 2013 the Centre has composted 1387 kg of organic waste, which is equivalent to the weight of a small car.

Each day, the Centre is able to divert 0.2 kg of organic waste per person from the landfill.



Furthermore, through composting the Centre has diverted 22 % of their total waste from the landfill.

The Centre has added grain products to the organic matter that is composted and has plans to expand more organic waste to the compost.

The difference between the mean ambient temperature and central heap temperature of the heap compost was 16°C. ❄️



Accommodations at Akudlik ca. 1985.



Established in 1976, the Churchill Northern Studies Centre is an independent, non-profit research station located along the western coast of Hudson Bay.

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### to understand and sustain the north

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The Birdfish Newsletter is produced by CNSC staff with assistance from researchers and program participants.

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# contribute



Although our new building is finished, our fundraising is not! Like any major project, there are still many loose ends requiring attention.

churchillnorthernstudiescentre

Your contribution is still needed to ensure that our redevelopment meets all the expectations that YOU, our participants, researchers, and members have for the future of the CNSC. No contribution is too small. Every gift counts.

And it's so easy...

Clip this form and mail it with your cheque payable to: CNSC Capital Campaign, Churchill Northern Studies Centre, P.O. Box 610, Launch Road, Churchill, Manitoba, Canada, R0B 0E0;

Or visit our web site at [www.churchillscience.ca](http://www.churchillscience.ca) and click on the big blue Donate button. This will take you to a secure site that exclusively handles donations to organizations like ours. Additional information about the security features is provided on the web page.

Or just give us a call at (204) 675-2307.

All donations will be recognized in campaign materials and annual reports unless you wish to remain anonymous. Tax receipts are provided for all Canadian contributions over \$25. Contact Kim at (204) 675-2307 or [daley@churchillscience.ca](mailto:daley@churchillscience.ca) for details.



## Help Us Save \$\$\$\$ and Trees...

Did you know that you can receive the *Birdfish* via email?

Help the CNSC save on postage and save trees by opting to receive your *Birdfish* via email. Renewing your membership? Check the box to receive your *Birdfish* in electronic form. Membership up to date? Just contact Kim at (204) 675-2307 or [daley@churchillscience.ca](mailto:daley@churchillscience.ca) and say change my status to email only. Since our last newsletter, several dozen members have taken advantage of this option and earned themselves a \$10 credit for use in our giftshop (in-person purchases or select mail items). ❄

# join

the Churchill Northern Studies Centre Today!



We rely on our membership to provide the support and funding needed to make the CNSC a place for world class research and education programs in the Canadian subarctic. Join us now and be part of these exciting times at the CNSC. Already a member? Use this form to ensure your membership remains current and YOU stay abreast of Centre activities.

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In accordance with the Personal Information Protection and Electronic Documents Act, names, addresses or other personal information collected by Churchill Northern Studies Centre is used for internal purposes such as informational mailings, membership renewals and other communications, and is not shared with any third party. Complete details of our privacy policy are available by contacting the CNSC.

NEW\* membership  RENEW\* my membership  I would like to receive my copy of *The Birdfish* in electronic form

Individual \$50  Student/Senior \$40  Family \$80  Corporate \$500 \*One-year CNSC membership

I would like to send a one-year gift membership to:

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I want to support CNSC Capital Campaign. Here is my gift of \$ \_\_\_\_\_

Tax receipts are provided for Canadian donations of \$25 or more. Membership fees are not tax-deductible.

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We appreciate your support of the Churchill Northern Studies Centre. Your donations support research and education that makes the world a better place. Thanks very much.