Compendium of Research in the Northwest Territories

2013

www.nwtresearch.com

This publication is a collaboration between the Aurora Research Institute, the Department of Environment and Natural Resources, the Government of the Northwest Territories and the Prince of Wales Northern Heritage Centre. Thank you to all who submitted a summary of research or photographs, and helped make this publication possible.

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Fisheries and Oceans Canada Pêches et Océans Canada

Northwest Territories Environment and Natural Resources

Northwest Territories Education, Culture and Employment

Foreword

Welcome to the 2013 *Compendium of Research in the Northwest Territories.* This annual publication provides summaries of all the licensed research that has taken place in the Northwest Territories this past year. Every year I review this document, I am struck by the vibrant research community working across the NWT on some many topics that are important not only to understanding our region but phenomenon and changes nationally and globally. The NWT, as evidenced in this Compendium, is an important location for research.

This Compendium series has been published since 1986. Each past Compendium is available at nwtresearch.com. As we continue to move into the digital era, ARI is including the contents of this publication, as well as all licensing data onto an online public database. The intent is to make this information both searchable and accessible to everyone. In additional the information contained in the summaries, this database is geo-referenced, which means it is possible to look for research happening in a specific site or area. This rich source of information about research in the NWT is available at http://data.nwtresearch.com/. We are excited to see this online database grow and become a source of information about research activities for all.

In closing, as you look through this Compendium, I encourage you to contact the researchers if there is a project that interests you. The summaries in this publication are only a brief outline of the rich findings and scientific advancements that have been made over the past year. In many cases, more in-depth reports and publication are available.

Pippa Seccombe-Hett
Director, Aurora Research Institute

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Introduction

This compendium offers a summary of research licences/permits that were issued in the Northwest Territories during 2013. The information contained in this book is a product of a collaboration between the Aurora Research Institute (ARI), the Prince of Wales Northern Heritage Centre (PWNHC), the Department of Environment and Natural Resources (ENR) and the Department of Fisheries and Oceans (DFO). The Compendium series began in 1986.

Licensing in the NWT

Under territorial legislation, all research in the NWT requires a licence/permit from one of four agencies, depending on the type of research being conducted:

- *Prince of Wales Northern Heritage Centre* - Archaeology;
- *Department of Environment and Natural Resources, Government of the Northwest Territories* - Wildlife;
- *Department of Fisheries and Oceans* - Fisheries; or
- *Aurora Research Institute* - all other research in the NWT.

Through the licensing process, researchers are informed of appropriate organizations, communities and other licensing/permitting agencies that should be contacted prior to conducting studies. Licensing ensures research activities are communicated to interested parties and provides opportunities for the exchange of information.

The Compendium provides a summary of all licences/permits issued in the NWT by all four licensing/permitting bodies. As each research project is represented by a short abstract, the reader is encouraged to contact the researcher for additional information and results.

How to Use This Book

This book has four main sections. Each of these sections reflects a specific licensing agency and type of licence/permit issued. Within each section, research descriptions have been grouped by subject and listed alphanumerically by the principal researcher's last name. Refer to the Table of Contents for the specific page on which each section and/or subject begins. An index is included at the end of the compendium listing all researchers in each section.

1. File Number

The file numbers shown in each of the Aurora Research Institute's subject areas refer to the file number issued to a particular researcher. It allows cross referencing with research material that may be available on file or in the ARI library. The reference numbers of the other three agencies refer directly to the permit numbers given to each researcher. When requesting information from any of these agencies on specific research outlined in the compendium, please refer to the reference number in your correspondence.

2. Regional Abbreviations

Throughout the book, reference is given to the specific land claim region(s) in which the research took place. The regions are shown on the following page. Some of the land claim regions are still under negotiation and the boundaries shown are only approximations. The abbreviations shown for each region are as follows:

DC	Deh Cho	**SS**	South Slave
NS	North Slave	**SA**	Sahtú Settlement Area
IN	Inuvialuit Settlement Region	**GW**	Gwich'in Settlement Area

3. Glossary

A glossary of terms has been added to the Compendium. The intent of the glossary is to allow the reader to better appreciate the research descriptions.

Available in Print or Free Download

This compendium is available as a printed publication or can be downloaded from the Aurora Research Institute's website (www.nwtresearch.com). Copies can also be requested by contacting the Aurora Research Institute.

Send Us Your Comments

Whether you are a researcher or an interested member of the public, the Aurora Research Institute welcomes your comments and suggestions concerning this publication. Contact us by mail, fax, email or telephone (see address on page vi).

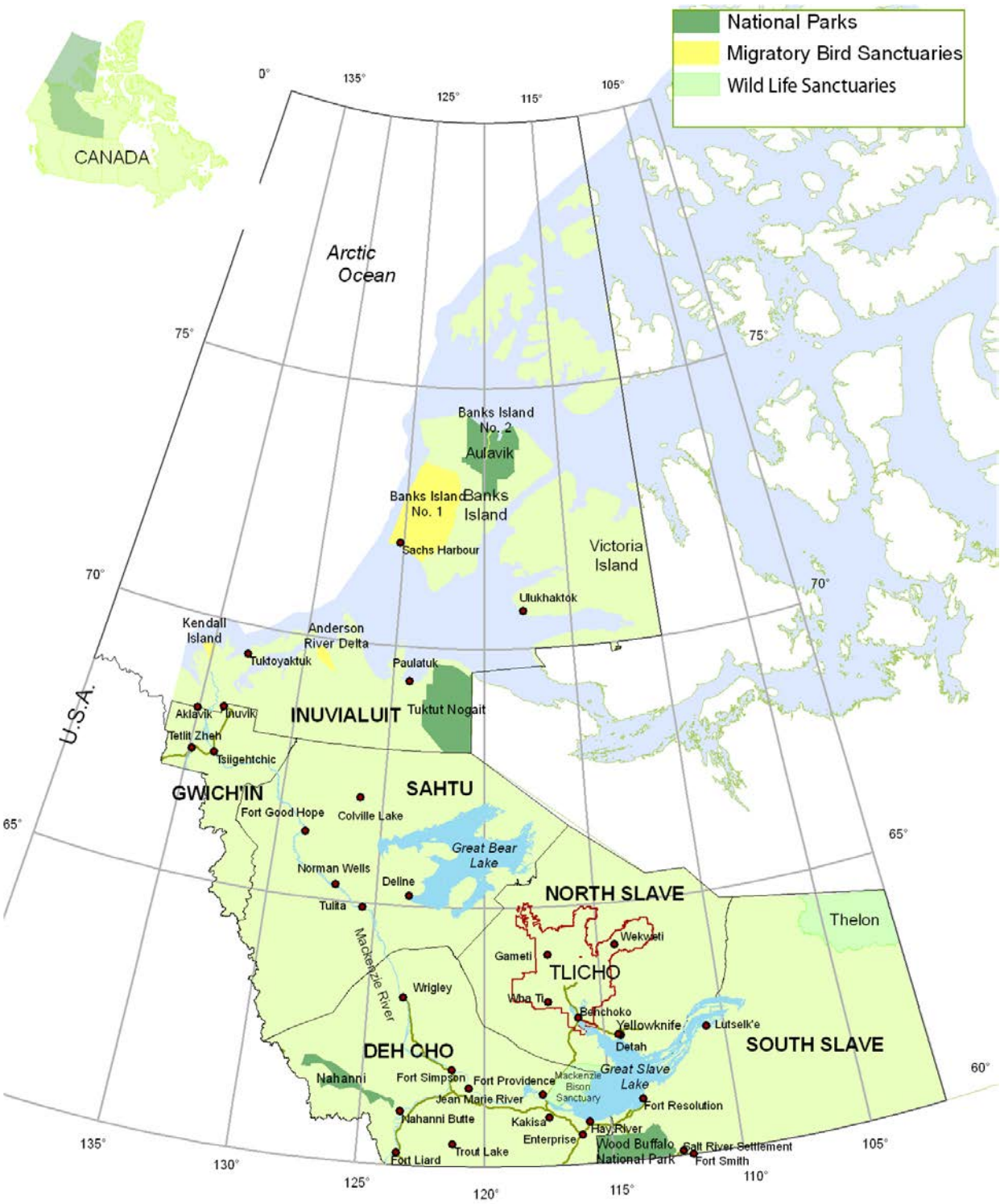

Figure 1. *Land claim regions in the Northwest Territories*

Aurora Research Institute

The Aurora Research Institute's mandate is to improve the quality of life for NWT residents by applying scientific, technological and indigenous knowledge to solve northern problems and advance social and economic goals.

ARI is responsible for:

- licencing and coordinating research in accordance with the NWT Scientists Act: this covers all disciplines including the physical, social, biological sciences and traditional knowledge;
- promoting communication between researchers and the people of the communities in which they work;
- promoting public awareness of the importance of science, technology and indigenous knowledge;
- fostering a scientific community within the NWT which recognizes and uses the traditional knowledge of northern aboriginal people;
- making scientific and indigenous knowledge available to the people of the NWT;
- supporting or conducting research and technological developments which contribute to the social, cultural and economic prosperity of the people of the NWT.

For more information, contact ARI at:

Aurora Research Institute
PO Box 1450
Inuvik, NT X0E 0T0
Tel: (867) 777-3298
Fax: (867) 777-4264
E-mail: licence@nwtresearch.com
Website:www.nwtresearch.com

The Department of Environment & Natural Resources

The Government of the Northwest Territories' Department of Environment and Natural Resources (ENR) has a mandate to promote sustainable development through the management and protection of the quality, diversity and abundance of natural resources and the integrity of the environment.

With respect to permitting for research and monitoring, ENR is responsible for issuing Wildlife Research Permits under the Wildlife Act (Section 24) for all studies on wildlife or wildlife habitat in the Northwest Territories. Wildlife includes all vertebrates, except fish and marine mammals.

For more information, contact ENR at:

Wildlife Division
Environment and Natural Resources
Government of the Northwest Territories
PO Box 1320
Yellowknife, NT X1A 2L9
Fax: (867) 873-0293
Email: wildliferesearch_permit@gov.nt.ca
Website: www.nwtwildlife.com/ResearchPermits/

Northwest Territories Environment and Natural Resources

Department of Fisheries and Oceans

The Department of Fisheries and Oceans Canada (DFO) is responsible for developing and implementing policies and programs in support of Canada's scientific, ecological, social and economic interests in oceans and fresh waters. Some Fisheries management responsibilities have been delegated or transferred to other federal agencies (e.g. Parks Canada), provinces/territories and co-management groups under Land Claim agreements.

DFO Fisheries Management is responsible for issuing Commercial, Domestic, Licence to Fish for Scientific Purposes (LFSP), Exploratory, Public Display and Educational licences in the NWT. Subject to Land Claim agreements, a Commercial licence is required to sell or barter fish

All individuals fishing for scientific purposes or participating in the acts described below are required to obtain a Licence to Fish for Scientific Purposes (LFSP):

- activities involving fishing, catching or attempting to catch fish;
- activities where the potential exists for the incidental capture of fish;
- sampling or possessing fish caught in a subsistence fishery.

For further information about licensing, contact DFO at:

Licensing Officer
Central & Arctic Region
Government of Canada
Fisheries and Oceans Canada
PO Box 1871
Inuvik, NT X0E 0T0
Tel: (867) 777-7500
Fax: (867) 777-7501
Email: xca-inuvikpermit@dfo-mpo.gc.ca
Website: http://www.dfo-mpo.gc.ca/index-eng.htm

Fisheries and Oceans Canada | Pêches et Océans Canada

Prince of Wales Northern Heritage Centre

The Prince of Wales Northern Heritage Centre (PWNHC), a division of the Department of Education, Culture and Employment, Government of the Northwest Territories, is responsible for managing and protecting the archaeological resources of the NWT. Representing a continuous human occupation stretching back over 7000 years, archaeological sites are fragile and non-renewable and are protected from disturbance by legislation, regulation and policy in the NWT. There are currently about 6000 archaeological sites recorded in the NWT, though this number represents only a fraction of the existing sites as large areas remain unexplored for archaeological resources. A large part of the work done at the PWNHC involves reviewing land use and development permit applications. On average, 300 permits are reviewed per year, with recommendations being proffered to nine land management authorities.

With respect to permitting for research and monitoring, PWNHC is responsible for issuing NWT Archaeology Research Permits.

For more information, contact the Prince of Wales Northern Heritage Centre at:

NWT Cultural Places Program
Prince of Wales Northern Heritage Centre
4750 48th Street
PO Box 1320
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Fax: (867) 873-0205
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Website: www.pwnhc.ca

Northwest Territories Education, Culture and Employment

Biology

Baird, Donald
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File Number: 12 402 885 **Licence No:** 15268
Region: SS **Location:** Salt River; Dog River

Biomonitoring 2.0: biodiversity assessment in Slave River Tributaries

The goal of this study is (1) to assess biodiversity in two tributaries of the Slave River using a group of collection methods, (2) to support the establishment of baseline biomonitoring conditions, and (3) to explore the use of DNA-based identification of animals, plants and microorganisms. Three sites on the Salt and Dog Rivers were selected (in consultation with Smith's Landing First Nation and the Aurora Research Institute). The chosen sites were considered valuable for potential future monitoring activities on the rivers. Fieldwork was conducted from August 12-16, 2013. Sampling at each site involved three samples of benthic invertebrates and biofilms. Benthic invertebrate samples were identified by morphology. Morphological identification has been completed to family level for insects, and order for most other groups. There was an average of 28 taxa for the Dog River samples and 12 taxa for the Salt River samples. A total of 49 different benthic invertebrate taxa have been identified across all samples. Identification by genetic methods (next-generation DNA sequencing using the Illumina system) is ongoing and will be completed in summer 2014. Morphological identification of biofilms was not possible due to a high amount of sediment in the samples. DNA-based identification should be completed by April 2014. Separate samples of biofilms and vegetation were collected and analysed for stable isotopes. This allows researchers to study the trophic levels of the local organisms. Researchers can then identify the food source for primary consumers (invertebrates) and trace the movement of nutrients through the food web. All samples have been processed and carbon and nitrogen isotope concentrations are within the expected ranges. Results, including lists and numbers of species, biodiversity indices and preliminary stable isotope work will be presented to stakeholders in summer and early fall 2014.

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File Number: 12 402 880
Region: SA
Licence No: 15297 (Multi-year Licence: 1 of 2 years)
Location: The west side of the Mackenzie River southeast of Norman Wells 40 km along the proposed year-round access route

EL462 & EL463 2013-2014 biolophysical baseline study
The objective of this ongoing study is to identify and describe the fish species in the area of Husky's proposed exploration activity. In order to meet these objectives, surveying was conducted at 14 locations (5 waterbodies and 9 watercourses) during September 2013. Sites were located on Bogg Creek and Slater River immediately upstream and downstream of current/proposed access roads. The assessment focused on area of potential operational water sources. Backpack electrofishing was used to inventory the watercourses and a combination of hoopnets, minnow traps and beach seines were used on the waterbodies. For all collection methods, fish were identified to species level, fork length and weight was measured. At locations where a large number of fish were caught, a representative sample was weighed. All game species captured were weighed due to cultural and economic importance. Fish were released back into the area after the sampling was done. A total of 171 fish were caught. Lake chub were the most common, representing 64.9% of the total catch. This was followed by finescale dace (15.8%), arctic grayling (12.9%), slimy sculpin (4.1%), and northern pike (2.3%). A single burbot was also seen.

Hynes, Kristin
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File Number: 12 402 893
Region: IN
Licence No: 15361
Location: Mayoklihok Lake; In and around Ulukhaktok

Mayoklihok Lake fisheries survey
The Mayoklihok Lake fisheries survey provided information on the fish and water of a traditionally important fishing site to the community of Ulukhaktok. The Olokhaktomiut Hunters and Trappers Committee (OHTC) requested this survey to investigate whether or not former mining exploration had impacted the lake, and to learn more about the fish species in the area. Two Inuvialuit monitors (selected by the OHTC), travelled to Mayoklihok Lake in November 2013 and completed the field component of this survey. Here they sampled fish, collected water samples, recorded additional environmental variables. 200 fish were harvested and sampled (187 arctic char and 13 lake trout) and the catch of each net set was recorded. Basic biological information (species, length, weight, sex, maturity) was recorded for all harvested fish, and additional samples were collected to determine age (otoliths), genetics (fin clip) and mercury levels (dorsal tissue). Water quality and fish tissue samples have been processed and show no indication of significant impact from exploratory mining. Water quality results appear normal, and mercury levels detected in fish tissue were low (no consumption concerns).

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File Number: 12 402 884
Region: NS
Licence No: 15235
Location: Yellowknife Bay and Lower Martin Lake

2013 Yellowknife Bay baseline data collection for aquatics and fisheries

In June 2013, Stantec Consulting Ltd. ran three field programs on Yellowknife Bay and Lower Martin Lake in support of the Giant Mine Remediation Project. The fisheries field programs included fish collection and tissue sampling throughout Yellowknife Bay and Lower Martin Lake, and a fish habitat assessment of Upper Baker Creek and Trapper Creek. The aquatics field program included collection and analysis of samples for water chemistry, sediment chemistry, phytoplankton, zooplankton, and benthic invertebrates. Fish were collected in four areas in Yellowknife Bay (Baker Creek Outlet, Back Bay, Mosher Island, and Horseshoe Island Bay), as well as Lower Martin Lake. Three types of fish were targeted for collection and tissue sampling, including northern pike (predatory), lake whitefish (forage), and slimy sculpin (small-bodied). Tissue samples were frozen for later analysis. The fish habitat assessment of Upper Baker Creek included the area upstream of Baker Creek Pond to Lower Martin Lake; five reaches, over the total length of 3.7 km, were identified based on differences in fish habitat characteristics on a landscape-scale. Trapper Creek, from Baker Creek Pond to Trapper Lake, was assessed and four distinct reaches were identified. For the aquatics program, water chemistry results showed that Yellowknife Bay is likely an oligotrophic waterbody. Nutrients were low or below detection limit throughout the bay, and concentrations of metals varied. Sediment chemistry also varied throughout the bay. Chlorophyll a concentrations were low. During the June 2013 sampling event, blue-green algae and cryptophytes were the dominant phytoplankton taxa, while rotifers and copepods were the dominant zooplankton taxa. Benthic invertebrate density and richness varied throughout the bay; the dominant taxa were bivalves, chironomids, and amphipods. Water, sediment and benthic invertebrate samples were also collected from Lower Martin Lake.

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File Number: 12 402 859 **Licence No:** 15239
Region: GW **Location:** Richardson Mountains to the Yukon border

Assessment of the *Boloria chariclea* complex

The study's primary objective was to collect a species of butterfly (scientific name: *Boloria chariclea*) from sites in the Yukon and Northwest Territory. Results show: (1) *Boloria chariclea* was found sparingly along the Alaska Highway from Whitehorse to the Dempster Highway and ice road north of Inuvik, (2) commonly along the Dempster Highway near Moose Lake and at Wright Pass; and (3) abundantly along the Dempster Highway at Windy Pass. These specimens and others collected from numerous sites in North America support an ongoing taxonomic assessment of the *Boloria chariclea* complex. *Boloria chariclea grandis* flies in most of the survey area, however, integration with *Boloria chariclea arcticus* is evident in specimens from the Northwest Territories and northern Yukon. A secondary objective of this study was to assess other butterfly species from this region. An interesting observation was the presence of *Boloria polaris* in spruce bogs. This is noteworthy because *Boloria polaris* is a tundra species normally found above the treeline. The *Boloria polaris* specimens encountered along the Dempster Highway are larger than those found in Alaska (subspecies *polaris*) and southern Yukon, possibly due to integration with *Boloria polaris stellata*.

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File Number: 12 402 892
Region: SS
Licence No: 15336
Location: Slave River at Fort Smith (fish collections occurred downstream, upstream, and at the outflow pipe of the sewage effluent pond)

Investigation of reproductive effects of Fort Smith municipal effluent on small bodied fish
Sewage effluents are known to contain compounds that can affect fish health and reproduction. This study examined Fort Smith's sewage lagoon effluent and its effect on the general health and reproduction of small-bodied fish in the Slave River in September 2013. Sufficient numbers of two species of fish (spottail and emerald shiners) were captured at the boat launch (clean) and at the outflow pipe of the lagoon (contaminated with effluent) to allow for an assessment of body, liver, and reproductive organ weights, as well as key reproductive hormones (estrogen) in the females. There were no differences found between the fish at the two sites that could be attributed to the effluent. The second part of the study measured specific pharmaceuticals in river water that was sampled at the sewage outflow and in the lagoon effluent. As expected, medications including heart, blood pressure, and antibiotic compounds were detected in the lagoon's effluent but the river water samples did not contain measurable levels of the compounds. A controlled exposure of captured fish to the lagoon effluent was tried, but due to limited samples and difficulty controlling the environmental conditions of the experiment, this work was not finished. Overall, this work is in its early stages and will continue in September 2014.

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File Number: 12 402 492
Region: GW, SA, DC, SS
Licence No: 15335 (Multi-year licence: 3 of 5 years)
Location: Forest stands adjacent to and along Highway #5; around Wood Buffalo National Park; the Dempster Highway between the north shore of Campbell Lake and Rengleng River

Structure, carbon dynamics, and silvichronology of boreal forests
The main objective of this ongoing fieldwork was to collect data in jack pine and black spruce forests on annual movement of organic matter and carbon. During the 2013 field season, researchers continued their study of forest structure and carbon dynamics and their potential changes over time due to warming climate near Inuvik, Norman Wells, Fort Providence, and Fort Smith. Various data were collected to describe the environmental conditions of these sites including air temperature, soil temperature, soil properties, stand data, etc. Particular importance was placed this year on the study of reconstructing growth history of black spruce forests in Norman Wells and Fort Providence. The history of forest growth was estimated for several forest stands in these areas by measuring sizes of currently living trees and by collecting stem samples of several trees in each stand. These data and samples will be analyzed to estimate the number, volume, and biomass of trees that existed for any year in the past by applying a technique called 'quantitative stand reconstruction' (also known as the OAZ method). The tentative results show that growth of forest biomass increased and decreased with several-decadal fluctuation patterns during the past century, and that good growth in biomass matched with cooler air temperatures (while poor growth matched with warmer temperatures).

During the next field season in 2014, researchers plan to start collecting more samples at Inuvik, Fort Providence, and elsewhere, and to examine if the pattern found can be considered to apply in wider regions of northwestern Canada and beyond.

Simmons, Deborah
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File Number: 12 402 882 **Licence No:** 15217 (Multi-year licence: 1 of 5 years)
Region: SA **Location:** K'asho Got'ine; Tulít'a; Déljnę

Sahtú region caribou and moose study

The main objective of this ongoing project is to support the wildlife management initiatives proposed by the Renewable Resource Councils (RRCs) in the Sahtú region through the development of a robust research program that incorporates multiple sources of knowledge into a detailed understanding of caribou and moose populations. This program is designed to monitor caribou and moose health and understand population dynamics and range boundaries using non-invasive sampling methods. This project is the result of collaboration with the RRCs in Fort Good Hope, Tulít'a, Déljnę, and Norman Wells since 2007. This research has been collaboratively developed and implemented. It is dependent on the support and engagement of the communities through the voluntary collection of fecal pellet samples by local hunters and trappers. The RRCs oversee sample collection, data entry and participation. Researchers and community groups participated in many meetings over 2013 to plan and develop continued research. Researchers were in the communities over the winter of 2013 and in September to provide support to the RRCs, participate in harvesting activities, meet with students at local schools and Aurora College, collect caribou genetic samples and health monitoring samples during the hunt, and share information and results with harvesters. A project website has been developed to engage the community in the research:
http://nricaribou.cc.umanitoba.ca/sahturesearch/

Tonn, William
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File Number: 12 402 724 **Licence No:** 15198 (Multi-year licence: 1 of 4 years)
Region: NS, SS **Location:** Small headwater lakes and their outlet streams into Lac de Gras

Improving Habitat Connectivity to Enhance Productive Capacity of Arctic Freshwater Ecosystems

Diavik Diamond Mines, Inc. has undertaken two habitat compensation projects on headwater lake and stream systems near the mine site. Lake outlet streams at two sites were modified to improve fish passage and thus the ecological “connectivity” among these headwater lakes and with Lac de Gras. This is an ongoing project since 2009. In 2013, sampling continued at all reference sites for baseline hydrology, water quality, habitat characteristics, primary producers, invertebrates, and fish. Results from the habitat assessments are similar to previous years, notably stream riparian zones are dominated by shrubs, forbs, grasses, mosses, and boulders, while streambeds are sparsely vegetated and composed predominantly of inorganic fines, boulders, and pebbles. Water quality is similar among all streams, but does show seasonal

variation. Streams have features that obstruct fish movement from Lac de Gras including low, diffuse flows and cascades. Stream electrofishing and hoop netting continues to document low abundances of slimy sculpin, juvenile burbot, and arctic grayling. All sampled lakes are oligotrophic. Riparian zones of lakes are similar to those of streams, and littoral zones are dominated by boulders and inorganic fines. Macroinverebrates data are currently being analyzed. The 2013 field season marked the second season of data collection of the modified lakes. Upstream passage by fish was not detected, although downstream passage by young arctic grayling from the lake was seen in one of the streams with the modified step-pool structures. Similarly, young burbot from the West Island Lake were seen moving down the West Island Stream to Lac de Gras. Samples from the 2013 field season are still being analyzed.

Turnbull, Matthew
University of Western Ontario
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File Number: 12 402 881 **Licence No:** 15197
Region: NS **Location:** Daring Lake

Soil microarthropod community responses to climate change
No research was conducted under this licence in 2013.

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Hatfield Consultants
North Vancouver, BC
jwilcockson@hatfieldgroup.com

File Number: 12 404 791 **Licence No:** 15276 (Multi-year licence: 1 of 3 years)
Region: DC **Location:** Prairie Creek around the mine; Tributaries to Prairie Creek, Wrigley, Clearwater and Cathedral Creek

Prairie Creek Mine - Baseline aquatic monitoring program
The objective of this ongoing research is to collect baseline aquatic data in advance of the development of the Prairie Creek Mine. The 2013 field program, conducted in late July and early August, included assessments of: (1) sculpin health within Prairie Creek and two reference creeks (Wrigley and Cathedral Creeks); (2) juvenile bull trout population (specifically occupancy and density) in tributaries upstream of the mine; (3) benthic invertebrate communities; and (4) algal biomass and diversity. An assessment of mercury and selenium concentrations in arctic grayling, which was originally planned, was not carried out this year, because a similar study was conducted in 2012. It was felt that this study should be delayed to reduce potential impacts on the region's arctic grayling. The assessment of juvenile bull trout required the sampling of two reference creeks from the Wrigley, Cathedral and Clearwater drainages. Unfortunately, it was more difficult identifying creeks having sufficient numbers of juvenile bull trout than anticipated, and fieldwork in 2013 was spent identifying possible locations for future investigation. Three candidate creeks were identified, two tributaries to Clearwater and one tributary to Wrigley. All other components of the study went as planned. Preliminary results suggest a slight enrichment effect in fish (sculpin), approximately 7 km downstream of the mine. An enrichment effect is consistent with previous investigations. However benthic invertebrate richness and density, and algal biomass did not suggest an enrichment effect. Observations during the field investigation, indicated the existence of a localized natural nutrient input via groundwater at the Prairie Creek upstream reference location. This may have confounded the

observed results. Fieldwork performed in the summer of 2014 investigated the potential influence of a natural localized nutrient input.

Contaminants

Blais, Jules
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File Number: 12 404 800
Region: IN, GW
Licence No: 15275
Location: Numerous lakes in the Mackenzie Delta Upland Region

The Arctic in flux: how has recent climate change affected contaminant transport and uptake in aquatic arctic systems?
This project studied how recent and dramatic climate changes in arctic freshwaters are affecting the transport and fate of human-made (anthropogenic) contaminants to aquatic systems. Specifically, this research was designed to: (1) determine timelines of pollutant and organic matter deposition and ecosystem productivity in arctic lakes (strategically selected to span a gradient in climate change), and assess trends over time of ecosystem productivity and structure, as well as organic matter deposition; (2) determine how warming affects dissolved organic carbon in arctic lakes; and (3) determine how warming across the arctic has affected the bioaccessibility of contaminants in arctic waters. The research informs tools to examine how the fate of contaminants is affected in arctic regions under different climate change conditions. Due to limited direct environmental monitoring in arctic regions, researchers used sediment archives to study contaminant cycles in arctic freshwater ecosystems.

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File Number: 12 402 843
Region: NS
Licence No: 15267 (Multi-year licence: 4 of 5 years)
Location: Lac de Gras mine site

Waste rock studies at a Diamond Mine site
This ongoing research studies the processes related to water quality and quantity draining from experimental waste rock piles that are located in areas of continuous permafrost. Waste rock piles are mounds of rock removed from open-pit and underground mines. The quality of water draining from a waste rock pile is determined by: (1) the combined effects of oxygen transport in the air phase; (2) biogeochemical processes that control mineral weathering rates; (3) the release of heat and dissolved materials due to sulfide mineral oxidation; and (4) hydrologic processes that control water flow. The transport of dissolved materials is further affected by the formation and dissolution of secondary minerals. Three instrumented experimental waste rock

piles were built from 2004 to early 2007 at the Diavik Diamond Mine. Instruments in the pile include: basal lysimeters; basal drain; thermistors; time domain reflectometry probes and moisture sensors; tensiometers to measure near-surface infiltration; soil water solution samplers; air permeability probes; air pressure sensors; thermal conductivity access ports; gas sampling ports for oxygen and carbon dioxide; and microbiology access conduit and pyrite growth medium. In 2010, three 40m deep boreholes were drilled into the waste dump and a series of instruments similar to those in the test piles were installed. In 2011 two additional 40m boreholes and one 80m borehole were made and instrumented with similar instruments. Data from these instruments will be compared to data from the test piles to evaluate differences in measurement scale. In 2013 four boreholes were installed within the test piles to get more refined temperature and water movement data. Data collection, analysis and interpretation, including modeling that incorporates climate change, continued in 2013.

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File Number: 12 402 475 **Licence No:** 15178 (Multi-year licence: 4 of 5 years)
Region: SA **Location:** The Nota Creek C-17 wellsite

Phytoremediation study on the CDN Forest et al Nota Creek C-17 wellsite

Phytoremediation is a remediation strategy involving the use of plants to remove contaminants from the soil. In theory, plants take up the contaminant from the soil, are harvested and then removed from the site - taking the contaminants with them. This process is repeated until the soil is remediated to the guidelines. Phytoremediation activities on the Nota Creek C-17 wellsite started in 2009 and have continued since then. In mid-June 2013, pre-planting soil samples were collected and then the site was conditioned, fertilized and seeded. A monitoring trip to the site in mid-August 2013 assessed plant health and vigor. In mid-September 2013, plant and soil samples were collected and growth was harvested from the impacted areas. Results from the 2013 spring soil sampling showed that additional impacted soil could be spread out on-site and integrated into the phytoremediation process. This was completed at the end of the mid-September 2013 visit. Continued phytoremediation of the site is planned for 2014.

Ceschan, Robert
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Port Hope, ON
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File Number: 12 402 887 **Licence No:** 15290 (Multi-year licence: 1 of 3 years)
Region: SA **Location:** On the south shore of the Great Bear River between Bear River Landing and Lower Shipyard

Radiological characterization and delineation study - historical waste contaminated Great Bear River sites

In October 2013, a radiological survey and soil sampling field program was carried out along the Great Bear River at some landing sites, wharfs and haulage trails used in the transportation of uranium ores from the Port Radium mine. The radiation survey program collected more than 140,000 ground (terrestrial) radiation measurements (gamma) covering approximately 20 hectares. The findings were used to select soil sampling locations. Soil was collected from over 200 locations. All samples were screened using an instrument that detects radiation (called an

XRF scanner) and most were sent for laboratory analysis of uranium and arsenic. Leachate toxicity tests were also done on selected samples.

The program results described the extent of the impact on the soil from the former uranium ore transportation and handling activities. Atomic Energy of Canada Ltd. will use this information to assist in the assessment and development of management options for these sites. The data collected was generally consistent with earlier studies of these areas and the findings of the Federal Assessment Report (February 2013) that "potential radiation doses associated with reasonably foreseeable hypothetical exposure scenarios are well below the internationally-accepted public dose limit of 1 mSv/y for members of the public."

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File Number: 12 404 886
Region: NS

Licence No: 15277 (Multi-year licence: 1 of 2 years)
Location: Yellowknife River (near mouth); Yellowknife Bay (near Dettah); Great Slave Lake (near Post Island); Unnamed lake (near Great Slave Lake at John Bay); Unnamed lake (near Great Slave Lake at Wool Bay)

Cumulative impacts of metal deposition in the NWT: using lead isotopes to trace local, regional and long-range sources

The objective of this ongoing study is: (1) to look at environmental processes that may be driving increased metal bioaccumulation; and, (2) to estimate the relative contributions of different sources and how these metals are getting into aquatic ecosystems in the NWT. Fieldwork was conducted in September 2013 on Yellowknife Bay and the main body of Great Slave Lake. Sediment cores, fish, and aquatic invertebrates were collected from the lake, and tree lichens and soils were collected from shoreline sites. A total of 27 burbot and northern pike were caught during the field program. Samples will be analyzed in the laboratory for metal concentrations in the winter of 2013-14. In addition, lead stable isotopes will be measured in samples to estimate metal contributions from: 1) different pathways (watershed inputs vs. direct atmospheric deposition); and 2) local, regional and global lead pollution sources. A field program is expected for the summer of 2014 to continue this research.

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File Number: 12 402 681
Region: SA

Licence No: 15287
Location: Great Bear Lake (near Déljnę)

Monitoring of mercury, flame retardants and other chemicals in lake trout and cisco from Great Bear Lake

This chemicals management plan study is part of a Canada-wide study getting new information on particular human-made contaminants (chemicals) used as flame retardants, surfactants, and firefighting foams. Depending on study findings, the use of these chemicals may require more environmental regulation. Great Bear Lake was selected for the study because it is a large, remote lake with relatively little human presence. It also complements the monitoring occurring (under the Northern Contaminant Program) in Great Slave Lake, which has more direct human

influence. Metals, including mercury, also are being investigated. In 2013, 20 lake trout and 20 ciscoes (lake herring) were given to researchers by Déljnę community members to be studied. Analyses are ongoing but studies to date have shown that concentrations of flame retardants, surfactants and fire-fighting foams are very low. Mercury concentrations remain well below commercial sale guidelines unlike some smaller lakes in the area where concentrations may be higher. As the study continues, mercury concentrations will be tracked over time.

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File Number: 12 402 681
Region: SS

Licence No: 15331
Location: Around Great Slave Lake (the East Arm near Łutsel K'e; the West Basin near Fort Resolution; the West Basin near Hay River)

Spatial and long-term trends in persistent organic contaminants and metals in lake trout and burbot from the Northwest Territories

Researchers are investigating contaminant trends in Great Slave Lake predatory fish caught from the West Basin (WB) and East Arm (EA) of the lake. This study has been ongoing since 1998 with some data available from earlier years. Researchers are given fish from local sources to analyze. In 2013, lake trout and burbot were provided from the domestic fishery at Łutsel K'e (EA), pike and burbot from the domestic fishery at Fort Resolution (WB), and lake trout from the commercial fishery operating out of Hay River (WB). Mercury concentrations are increasing in lake trout and burbot for reasons that are not fully understood, but may involve warming temperatures and/or increased atmospheric mercury inputs from Asia. Mercury concentrations do not appear to be changing in northern pike. Average mercury concentrations in these three species of fish are below concentrations at which health advisories may be considered. Many persistent organic compounds such as HCH and DDT are declining in concentration as these compounds are used less and less in the environment.

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File Number: 12 402 868
Region: IN

Licence No: 15265 (Multi-year: 1 of 2 years)
Location: In and around Inuvik and Tuktoyaktuk; Yaya Lake; Noell Lake; Big Lake; Husky Lakes

CSI Husky Lakes – Evaluation of hydro-climatic drivers of contaminant transfer in aquatic food webs in the Husky Lakes Watershed

The overall objective for this ongoing project is to provide baseline information on contaminant levels along the proposed Inuvik-Tuktoyaktuk all-weather road corridor, which includes a range of information including traditional knowledge. In 2013, salinity data and water samples continued at Husky Lakes. Following a very field intense year (2012), researchers focused on sample and data analysis in 2013. All samples for mercury and food web analysis were sent to Trent University of further study. Preliminary results suggest the mercury concentrations in lake trout were found to be quite low in the samples. The investigation of potential movement of lake trout showed that two types of lake trout may exist in Husky Lakes, an ‘anadromous’ lake trout

that enters Husky Lakes from a nearby freshwater lake, and 'brackish water' lake trout, which may reside in Husky Lakes throughout its life span. Traditional knowledge interviews about the region have been translated and transcribed. Verification by participants is planned for early 2014.

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File Number: 12 402 888 **Licence No:** 15307
Region: DC, NS **Location:** Tom/Ptarmigan Mine; Burwash; Cassidy Point/Tin Mine; Camsell Bend; Sunset Lake Mine

Phase I/II/III ESAs and risk assessment

The purpose of this ongoing research is to assess environmental conditions at four previous mining and fuel storage sites. A Phase I/II Environmental Site Assessment (ESA) was done at four sites: Tom/Ptarmigan Mine, Burwash Mine, Cassidy Point Mine, and Camsell Bend. In addition, a Phase III ESA was done at Sunset Lake Mine. The ESAs were done to determine the environmental and physical condition of each site, including the identification of contamination (if present). Soil, water, sediment, bedrock, and vegetation samples were collected to measure the environmental impacts on-site. A risk assessment was also completed for the Sunset Lake Mine site to study if any contamination on-site would be a risk to human health and/or ecological health. Following the risk assessment report, a Remedial Action Plan (RAP) was written to address the clean-up of contamination at Sunset Lake Mine. The RAP is based on the results of environmental site investigations, risk assessment, best practices in mine closure, traditional knowledge, current use of the area, and community values.

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File Number: 12 402 867 **Licence No:** 15218
Region: SS **Location:** From below the Rapids of the Drowned in Fort Smith; From the vicinity of the Nagel Channel in Fort Resolution.

Effects of Athabasca and Slave River Sediments affected by oil sands operations on embryonic fish

No summary was submitted for this licence. This project is not in compliance with licensing requirements**.**

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File Number: 12 402 664 **Licence No:** 15308 (Multi-year licence: 1 of 3 years)
Region: IN **Location:** South-east of Satellite Bay, Prince Patrick Island

Remediation of the abandoned panarctic satellite F-68 wellsite at Satellite Bay, Prince Patrick Island, Northwest Territories

This ongoing study assesses the contaminants at an abandoned wellsite located near Satellite Bay at the northern end of Prince Patrick Island, known as Panarctic Satellite F-68 (the Site). The well was drilled in 1971 by BP Exploration Canada Limited and abandoned shortly thereafter following limited clean-up. At the site are an airstrip and contaminated materials including soil (impacted by fuel and metals) and solid wastes (*e.g.*, used drums, scrap metal and other debris). In support of future site remediation, a site reconnaissance was done during the summer of 2013. The finished surveys and assessments included: (1) an unmanned aerial vehicle survey to acquire high resolution aerial photographs; (2) a topographical survey for the selection of a landfill location and to allow for detailed engineering; (3) a watercourse crossing assessment to identify potential temporary watercourse crossing locations; (4) a site constructability assessment to identify potential borrow sources; (5) potable water source assessment to identify suitable potable water sources; and (6) an explosive materials investigation to assess quantity and type of potential explosive materials.

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File Number: 12 402 766 **Licence No:** 15182 (Multi-year licence: 5 of 5 years)
Region: NS **Location:** Waterbodies located within the EKATI claim block

EKATI aquatic monitoring program, 2009-2013

In 2013, six monitoring projects were ongoing in the lakes and streams of the Koala, King-Cujo, and Pigeon watersheds, where the Ekati mine infrastructure are located. These were the Aquatic Effects Monitoring Program (AEMP), Surveillance Network Monitoring Program (SNP), the Panda Diversion Monitoring (PDC) Program, the Long Lake Containment Facility (LLCF) monitoring, Annual Waste Rock and Waste Rock Storage Area (WRSA) Seepage Survey and the Air Quality Monitoring Program (AQMP). The objectives of the AEMP were to assess the current conditions in the lakes and streams of the Koala, King-Cujo watersheds and determine whether there have been any mine effects. The objective of the SNP was to confirm compliance with the water licenses. The assessments incorporate some or all of the following: meteorology, hydrology, water quality and physical limnology, phytoplankton, zooplankton, and benthos. Data analyses for the 2013 year are currently being completed. The three-year AEMP Re-evaluation was submitted to the Wek'eezhii Land and Water Board in December, 2012. Results from the past 14 years have shown that the PDC is successfully providing fish habitat and that vegetation is establishing itself along its banks. The PDC Program in 2013 consisted of assessing the success of the instream vegetation mats that were transplanted in 2012 and installing the rock groyne and boulder clusters in reach of the PDC. The LLCF monitoring continued in 2013, monitoring the physical, chemical, and biological environment in Cell D and Cell E of the LLCF. Monitoring of seepage from the waste rock and WRSAs at Misery, Fox and Panda-Koala continued in 2013. Seepage samples were collected in June during snow melt, and again in September before freeze up. The data will show the extent of metal leaching from the WRSA's. Air quality was monitored using high volume air sampling (HVAS), continuous ambient monitors (CAM) and dustfall measurements as a part of the AQMP. Revegetation along the Pigeon Stream Diversion channel also occurred in 2013, in anticipation of completion of the constructed diversion.

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File Number: 12 402 891 **Licence No:** 15319 (Multi-year licence: 1 or 3 years)
Region: NS **Location:** Yellowknife

Toxic legacies: Community perspectives on arsenic pollution at Yellowknife's Giant Mine
The objectives of this ongoing research are: to study the historical impact of arsenic from Giant Mine; and also the best means of communicating with future generations about toxic hazards in Yellowknife. It is a partnership among Memorial University researchers, Alternatives North, and the Goyatiko Language Society. This project is in its very early stages. Thus far, research activities have mostly been related to planning and archival research. Researchers have also begun on-location filming of remediation activities at the Giant Mine site.

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File Number: 12 402 890 **Licence No:** 15318
Region: DC **Location:** RCMP Detachment in Fort Simpson

Phase III ESA - Fort Simpson RCMP detachment
The objective of the Environmental Site Assessment (ESA) was to investigate potential contamination at the RCMP Detachment in Fort Simpson that reported an overflow of fuel. The study focused on an area around a vent pipe of an above-ground storage tank. Areas were identified to determine the extent of impacts, potential for off-site migration, and estimated volume of contamination. Representative soil samples were taken in September 2013 from six test pits that were excavated during the study. A total of 13 samples were analyzed. All samples collected were below the applicable criteria for BTEX and PHC F1-F4. Based on these results, no further investigation in the area of the suspected fuel overflow was recommended.

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File Number: 12 402 889 **Licence No:** 15347 (Multi-year licence: 1 or 4 years)
Region: DC **Location:** Ekali and Sanguez of the "5 Lakes" area around Trout Lake; Kakisa; Trout Lake

The bio-magnification of mercury within fish species of the Deh Cho and their varying levels among lakes
The objective of this ongoing research is to determine why fish mercury levels vary among lakes in the Deh Cho region. Between August 14 - September 5, 2013, researchers collected fish and invertebrate samples from Ekali Lake, Sanguez Lake, and Trout Lake. At Ekali Lake, researchers collected northern pike (25), walleye (25), lake whitefish (14), and cisco (3). At Sanguez Lake, researchers collected northern pike (11), walleye (15), lake whitefish (6) and cisco (1). At Trout Lake, researchers collected lake trout (6), walleye(11), northern pike (10),

lake whitefish (10), cisco (10), longnose sucker (6), and burbot (9). All collected fish were sampled and distributed to elders and community members in Trout Lake and Fort Simpson.

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File Number: 12 402 883 **Licence No:** 15229
Region: NS **Location:** Lac de Gras and surrounding area

Lichen Sampling Program - Diavik 2013

Diavik Diamond Mine Inc. conducts vegetation and lichen monitoring programs to assess if dust deposition from the mine is altering the amount (*i.e*., percent cover) and number of species of local plants. The vegetation monitoring program focussed on permanent vegetation plots, one next to the mine site, and reference plots on the West Island and mainland. The plots represent three vegetation community types: heath tundra, tussock-hummock, and shrub. In 2013, percent cover was estimated for all vascular plant species (such as sedges and grasses) and non-vascular plant species (such as lichens and mosses) at all plots. Overall, the vegetation data suggest that the mine may be having local-scale effects on plants. A distinct pattern of lower ground lichen cover and a higher total number of vascular plant species is emerging on heath tundra and shrub mine plots. While the average dust fall levels at the mine have been declining over time, dust deposition on mine plots is five times higher than reference plots. Effects from the mine are also shown by changes in the percent cover of selected lichens (*e.g.,* snow lichen and reindeer lichen species). Here too, mine plots show lower percent cover than reference plots. Tłı̨chǫ and Łutsel K'e Elders have been observing dust on the lichen near the mine. They stated that the caribou will avoid using the area close to the mine as their migration route because the caribou recognize the difference in lichen quality (by smell and taste). Lichens were collected near and far from the mine site for analysis of metals. The lichen monitoring program was designed to assess whether the increased metals uptake by lichen in the near-field area pose a risk to caribou health. A screening-level risk assessment (using conservative assumptions) demonstrated no adverse effects to caribou health. Additional lichen sampling areas for the future were identified in consultation with Elders.

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Region: NS, SS **Location:** The Outpost Island; Blanchet Island; Copper Pass Mine

Great Slave Lake area mines: 2013 sampling program

The objective of the Great Slave Lake Area Mines 2013 Sampling Program was to assist Aboriginal Affairs and Northern Development Canada (AANDC) with its ongoing work to address abandoned mines across the Northwest Territories. The Outpost Island, Blanchet Island and Copper Pass Mines, are three such sites within the Great Slave Lake area. Sampling activities were conducted July 15-20, 2013 and built upon many years of studies at the former mines. Water and sediment sampling was implemented at all three sites, focusing on information gaps and extending the spatial range of sampling stations. In addition to grab samples of sediments (using a Petite Ponar), sediment core samples were also collected at the

Copper Pass Mine. Soil and vegetation sampling was conducted at two drainage pathways from the mineralized areas at the Copper Pass Mine. The results of this research were added to previous studies to look at the extent of the impacts from mining activities. These results, combined with technical reviews and community feedback allowed AANDC to finish a Remedial Action Plans for these sites.

Engineering

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File Number: 12 404 708
Region: NS
Licence No: 15310
Location: Along the proposed transmission line route, which extends east from the existing Snare transmission line to the community of Whatì

Whatì transmission line engineering and environmental study
Trudel Creek and Lower Taltson River Fish Stranding Monitoring: Fish stranding work was undertaken in August 2014 to determine if fish can become stranded during the lowering of flows in Trudel Creek and the lower Taltson River associated with shutting down the powerplant for annual maintenance. Data is still being verified and will be included in NTPC's Aquatic Effects Monitoring Report that will be submitted to the Mackenzie Valley Land and Water Board by March 2015. 2013 activities consisted of a desktop study and reconnaissance field survey.

Mercury in Sediment and Fish Flesh Monitoring: Data was collected on mercury concentration levels within sediment and fish flesh within Nonacho Lake, Trudel Creek and Rutledge Lake. This work was done to assess potential effects on human health and aquatic life, and to analyse the overall trend of mercury concentrations in fish flesh in the study area.

Desktop Fish Mortality Assessment: Work was done to determine the probability of fish being trapped through the unscreened intake at the Twin Gorges Generating Station, and determining the potential harm of fish that may pass though the generating station infrastructure.

Sediment and Erosion Management Plan: In 2013, the erosion monitoring sites established on Trudel Creek in 2008 were revisited and an additional set of low elevation aerial photos was collected along the length of Trudel Creek. A comparison of 2008 and 2013 field observations confirms that erosion is ongoing at the three sites. On Nonacho Lake, erosion is very similar to preproject rates.

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File Number: 12 406 058
Region: IN
Licence No: 15341 (Multi-year licence: 2 of 3 years)
Location: Storm Hills

Wind Energy Monitoring at Storm Hills: 2012-2014
In October 2012, wind monitoring equipment was added to an existing 150 foot communications tower in the Storm Hills area. The datalogger is powered by solar panels, and data is transmitted by a satellite link. Wind speed data will be collected for two years, until winter 2014. It will then be used to assess the feasibility of developing a wind energy project in the area. At this point, researchers have collected just over one year of data and are beginning an interim assessment and report. When completed, this report will be available at www.nwtresearch.com.

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File Number: 12 406 058 **Licence No:** 15354 (Multi-year licence: 1 of 3 years)
Region: GW **Location:** Inuvik High Point

Wind energy monitoring at Inuvik High Point (2013-2015)
During a preliminary wind energy feasibility study, 6.2 m/s average wind speeds were estimated in the Inuvik High Point area, a site located about 6 km northeast of the Inuvik airport. This showed a potentially viable source of renewable energy. The objective of this research project is to measure wind speeds using a monitoring tower at the Inuvik High Point site to verify the estimates made using computer modelling, and then to determine whether it would be economically feasible to build a power-generating wind turbine at the site. To capture wind data at the site, a wind monitoring tower was installed in March, 2014 and will measure wind speeds at 10, 20 and 30 meters above ground level for at least two consecutive years. After this, the tower will be decommissioned and taken down. Preliminary results will be available in 2015, and the final feasibility study will be complete in 2016. All project reports will be made available at www.nwtresearch.com.

Health

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File Number: 12 408 191 **Licence No:** 15353
Region: IN, GW, SA, DC, NS, SS **Location:** Public health providers (employed by the Health and Social Services Authorities and/or the GNWT Department of Health and Social Services) in all communities of the NWT

Community development learning needs: Assessment of the public health workforce in Canada's north
Public health workers must help communities come together and find their own ways to act on health and wellness concerns. This builds healthier communities. Yet few workers are ready for this role. In 2013, the three territorial colleges worked with government to survey health and social services workers. Staff in Northwest Territories (15% response rate) and Yukon (25% response rate) participated in the survey. Results show both workforces are alike. Workers' strengths include: communicating; relationship building; strengthening groups; supporting new ways of doing things; and respecting different values and cultures. Workers also have learning needs. They need to support communities to speak and act for change. They need better skills to help communities work through problems and conflicts. They need to learn to work with communities to gather information. They need to be able to help communities write plans and proposals. They need to be able to help communities find ways to sustain their efforts. The three colleges are building a training module for the Northern health and social services workers. It will be based on the findings. It will make training easier to access.

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File Number: 12 408 190 **Licence No:** 15346
Region: IN, GW, SA, DC, NS, SS **Location:** All areas of the Northwest Territories with telephone service are potentially represented in the sample.

CANPLAY: Child pedometer study: ISR Project Number 252
This survey and participant recruitment is one part of a project to measure physical activity levels of children and youth, and parents' responses of opportunities and preferences for physical activity for their children. Parents (or legal guardians) of children and young adults between 5 and 19 years old across Canada were asked to complete a 15-minute telephone

survey about the physical activity levels of their child(ren) and factors related to physical activity (e.g., participation in organized sport and physical activity, preferences for certain activities, how time is spent after school). Young people who were 18 or 19 were able to respond on their own behalf. They were also asked to allow their child(ren) to have their activity tracked over seven days. Families willing to participate were sent a pedometer that recorded the number of steps the child took each day for seven days. Data is still being analysed. Reports on the findings of this research will be freely available at: www.cflri.ca.

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File Number: 12 408 190 **Licence No:** 15317
Region: IN, GW **Location:** Stanton's and Northern stores; cooking programs; health centre; Moose Kerr School

DREAM-GLOBAL: Planning and implementing a food procurement policy for healthy nutrition

The primary goal of the project is introduce a healthier food program to Aklavik by working with community partners. The DREAM-GLOBAL research team are developing a plan to support programs and policies that will increase the awareness and availability of healthy foods and especially traditional foods, wherever possible. The activities of the team to date include: (1) a site visit to introduce the project to the community leaders/members in order to assess community interest in engaging in the research; (2) a comprehensive review of foods available to be switched to healthier alternatives in the Aklavik stores. This is being completed in collaboration with the food managers for Northern and Stanton's stores/Heart and Stroke Foundation Canada; (3) planning to launch and promote the first five healthier food options in the Moose Kerr School; (4) Developing radio messages for the local radio station to provide information to the community about the Dream Global Program.

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File Number: 12 408 168 **Licence No:** 15219
Region: NS **Location:** Yellowknife

Health systems performance in circumpolar regions: Can regional comparisons support policy and stimulate improvement?

The objective of this project is to inform how circumpolar ministries might best fulfil their obligations to steer their health systems and compile, disseminate, and use appropriate evidence. In 2013, the data collection for case studies from government sources and the literature was started. A review of the literature related to health systems stewardship and performance was done. There were gaps found in the literature in the area of indigenous perspectives and values underlying health systems stewardship. It was also recognized that many experiences with participatory research initiatives in indigenous communities were not published in the literature. To supplement the literature review a face-to-face workshop was held with indigenous scholars who had conducted participatory research, from Alaska, Canada, Norway and Finland. The aim of the workshop was to highlight indigenous values underlying

health systems stewardship. The workshop utilized a mixed methods approach with consensus methods and shared participatory findings from scholars and knowledge holders. Through the process participants identified nine indigenous values that underlie health systems stewardship: humanity, cultural responsiveness, teaching, nourishment, community voice, kinship, respect, holism, and empowerment. This work is now informing the case study analysis and circumpolar values underlying health systems stewardship and performance in circumpolar regions. Data synthesis and collection for case studies is ongoing.

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Region: NS **Location:** Behchokǫ̀; Gamètì; Whatì; Wekweètì

Pregnancy stories across the generations

The focus of this research is to record the pregnancy stories of Tłı̨chǫ women, from different generations and representing the four Tłı̨chǫ communities, to gain insight into factors impacting maternal health and the overall relationship to diabetes. During the summer of 2013, researchers had casual conversations with ten Tłı̨chǫ women of different ages and from different communities about pregnancy. Following the informal discussion, two formal interviews (recorded and transcribed) have been completed. Each discussed traditional knowledge of pregnancy, as well as the women's pregnancy experiences. Recruitment is ongoing as formal interviews will also be conducted at a later date. Following completion of the intended interviews, they will be transcribed and analyzed. Research is ongoing.

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File Number: 12 408 192 **Licence No:** 15364 (Multi-year licence: 1 of 2 years)
Region: SS **Location:** Fort Smith

Telling the story of diabetes care in aboriginal communities: A proposal for a community-based participatory research project in Fort Smith, NWT

This project explores diabetes treatment and care experiences of aboriginal people by collecting stories about their experiences with diabetes. The goal is to find the best balance of western medical diabetes treatments and traditional aboriginal healing, with the hope that this information will result in more effective diabetes treatment programs. The researcher explored narrative analysis and storytelling methods with the goal of understanding aboriginal peoples' experiences of diabetes in Fort Smith. As part of a community-engaged research design, however, the researcher felt that the analysis should reflect local ways of knowing and understanding stories. Using group analysis methods and thematic narrative analysis, the researcher engaged local storytellers and aboriginal people with diabetes in a process of collaborative analysis to develop a model for data analysis that strives for better representation of local understandings.

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Region: IN, GW **Location:** Aklavik; Tuktoyaktuk; Sachs Harbour; Fort McPherson

The Aklavik *H. pylori* Project

The Aklavik *H. pylori* project was developed to address community concerns about health risks from *Helicobacter pylori* (a bacteria that can be found in the gastrointestinal tract) infection. The project was further expanded to other communities in the Beaufort-Delta region at the request of community and regional leaderships. To date, four community projects have been launched in Aklavik (2007), Tuktoyatkuk (2011), and Fort McPherson (2012). In Fort McPherson, as of September 2013, 223 residents joined the Fort McPherson *H. pylori* Project and 214 have completed urea breath test (UBT) screening for *H. pylori* infection. In March 2013, the endoscopy component of the Fort McPherson project was held in the local William Firth Health Centre, where 58 residents underwent upper gastrointestinal endoscopy to examine the overall health of their stomachs and collect gastric biopsies for histopathological and microbiological examination. The treatment component of the project, which is aimed at estimating effectiveness of alternative therapies for eliminating *H. pylori* infection, was also launched that same month and enrolment is ongoing. As of September 2013, 53 residents of Fort McPherson have enrolled in the treatment trial; 24 of them have completed a post-treatment UBT to ensure their therapy was successful. In Tuktoyaktuk, 107 residents have enrolled in the Inuvialuit Settlement Region (ISR) *H. pylori* Project as of September 2013, 104 have completed a UBT, 13 enrolled in the endoscopy component (also held March 2013), and 15 enrolled in the treatment trial. For endoscopy, 13 residents of Tuktoyaktuk travelled to the Inuvik Regional Hospital to undergo the procedure. Planning for expansion to other communities in the ISR is underway. Knowledge dissemination activities were carried out throughout 2013. Research team members travelled to Aklavik, Fort McPherson, and Tuktoyaktuk to host community presentations and radio programs to share research updates and findings**.**

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File Number: 12 408 142 **Licence No:** 15211 (Multi-year licence: 1 of 3 years)
Region: IN, GW, SA, DC, NS, SS **Location:** Blood samples collected for routine prenatal screening at health centre, hospital and clinic laboratories throughout the Northwest Territories

RHD alleles in prenatal patients from northern Canada

The objective of this research is to ensure that current prenatal testing methods are appropriate for prenatal patients in the northern regions of Canada, and to learn more about the RHD genotype in northern populations. This project was initiated in 2006 but participation has been low despite repeated recruitment efforts. Much is known about the RHD genetic make-up of ethnic groups world-wide but this information has never been compiled for the indigenous

populations of northern Canada. The information is important because the test reagents - used for prenatal testing - are largely developed based on a Caucasian population. To date 72 maternal blood samples have been collected, DNA extracted and frozen in the molecular laboratory. A minimum of 80 samples are required to make the results statistically significant. This study will continue until 80 samples are collected.

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File Number: 12 408 187 **Licence No:** 15306 (Multi-year licence: 1 of 2 years)
Region: SS **Location:** Data from Stanton Territorial Hospital

Outcomes of primary maternity care in Fort Smith, NWT
Research ethics approvals were received from all comparison groups and in the process of obtaining the data. No other research conducted under this licence.

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File Number: 12 408 184 **Licence No:** 15209
Region: IN, GW, SA, DC, NS, SS **Location:** All active users of the HealthNet EHR system (approximately 300 individuals)

Evaluation of the electronic health record (EHR) system used in the Northwest Territories
The primary aim of this study was to assess the impact to patient care from the implementation of electronic health records (EHRs). This study conducted an evaluation of a web-based, EHR viewer that allows sharing of patient information across organizational boundaries and clinical information systems. The system was implemented in eight regional health authorities in the NWT in 2009. This study was completed to evaluate system adoption, user satisfaction, and impact to patient care. Quantitative measures were collected by surveying end users and using data from the system logs. The results of the survey indicated that the majority of respondents strongly or moderately agree that the system improves information sharing (78%) and continuity of care (70%). The majority of respondents were satisfied with the system and information. System use has increased significantly year to year. The most common use of the system was to access laboratory and medical imaging results. An outstanding technical issue with system access appears to have hindered adoption and as a result user satisfaction with training and technical support was low. Respondents also rated workflow integration lower and reported concerns with having to use multiple systems to support clinical decision making.

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File Number: 12 408 188 **Licence No:** 15337 (Multi-year licence: 1 of 3 years)
Region: IN, GW, SA, DC, NS, SS **Location:** Registered Nurses, Nurse Practitioners, Licensed Practical Nurses and Registered Psychiatric Nurses across the NWT

Nursing Practice in Rural and Remote Canada II
The objective of this ongoing project is to better understanding nursing in rural and remote regions in Canada to contribute to policy discussions on nurses' practice, recruitment, retention, and education. In 2013, the Rural and Remote Nursing II (RRNII) research team completed an analysis of relevant rural and remote nursing practice literature, relevant documents and web-sites. The results, a Policy Document Analysis, National Database Analysis and 10 province specific reports have been circulated to stakeholders and posted on the website. The national survey tool has been revised and tailored to address key elements as identified by the research team. The Nursing Practice in Rural and Remote Canada II Pilot Study was completed by 89 participants. This was conducted to test the national survey tool that will be distributed in 2014 with the assistance of colleges/associations in every province/territory.

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File Number: 12 408 117 **Licence No:** 15223
Region: NS **Location:** Behchokǫ̀; Yellowknife

Exclusive breast feeding for all Tłı̨chǫ mothers in the first 6 months
The purpose of this study was to develop and implement a breast feeding health promotion tool for Tłı̨chǫ women. This community-based participatory research project included collaboration with a community advisory committee, the community action research team in Behchokǫ̀, and a community elder who translated the photo book. A retrospective chart audit was conducted from records of Tłı̨chǫ women who gave birth during the period of January 1, 2010 to December 31, 2012. Semi-structured interviews with nine Tłı̨chǫ mothers were completed to capture determinants of breastfeeding for Tłı̨chǫ women. Results from the health records (n=198) identified that the rate of exclusive breastfeeding initiation in the Tłı̨chǫ region is less than 30%. Two predominant themes were identified from the interviews with Tłı̨chǫ mothers as a pull to bottle feed and a pull to breast feed. A breastfeeding photo-book and video were produced to address the determinants of breastfeeding identified through the data collection and analysis process. The photo book was developed with local women and will be used within the prenatal program. A video was also developed and is disseminated on the Tłı̨chǫ government web-page.

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File Number: 12 408 186 **Licence No:** 15254
Region: NS **Location:** Stanton Territorial Hospital Emergency Department

Translating Emergency Knowledge for Kids (TREKK) - Professional Survey
The purpose of this study is to determine the knowledge needs of healthcare providers working in general emergency departments. Through an established partnership with 32 general across Canada (representing 9 provinces and 1 territory), TREKK is working with staff, administrators and consumers to understand the existing knowledge gaps, needs and priorities in pediatric emergency medicine. In 2013, a research coordinator from the University of Alberta travelled to

the Stanton District Hospital to administer a needs assessment survey to health care professional. None of the data collected contained identifiable health information. This data will be compiled with all other national data to determine the health information needs of emergency department professional as they apply to the pediatric population. Research is ongoing.

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Region: NS **Location:** Stanton Territorial Hospital Emergency Department

TRanslating Emergency Knowledge for Kids (TREKK) - Consumer survey

Canadian children needing emergency medical care are usually treated in general emergency departments. Translating Emergency Knowledge for Kids (TREKK) is working to bring the best information to general emergency departments and to families to help them give the best care to sick kids. An important first step towards this goal was to learn about the types of information parents wanted about the health of their children and how to care for them when they are sick. To do this, TREKK visited 32 emergency departments across Canada and asked parents to complete a survey. 897 surveys were completed from September 2012 to October 2013. From the surveys, TREKK learned that: (1) 39% of parents looked for health information for their child before coming to the emergency department; (2) Parents normally find health information by talking to trusted professionals (69%) or through internet search engines (53%); (3) 74% of parents prefer to learn health information in-person from a healthcare professional; (4) Parents would like more information including: explanations for their child's illness/condition (47%), information about treatments (44%) and instructions to care for their child at home (42%) when they leave the emergency department. Learning about the information that parents want is helping TREKK to create tools for parents and healthcare professionals. These tools will give them the information they need to give the best care to sick kids.

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File Number: 12 410 963 **Licence No:** 15350
Region: NS **Location:** Stanton Territorial Hospital

TRanslating Emergency Knowledge for Kids (TREKK) - Qualitative Data Collection

Canadian children needing emergency medical care are usually treated in general emergency departments. Translating Emergency Knowledge for Kids (TREKK) is working to bring the best information to general emergency departments and to families to help them give the best care to sick kids. An important first step towards this goal was to learn about the types of information parents and healthcare professionals wanted about caring for sick kids. To do this, TREKK visited 32 emergency departments (EDs) and asked parents and healthcare professionals to complete surveys. The next step was to visit EDs across Canada and talk to people working there. Healthcare professionals talked about the challenges treating pediatric patients and the areas where they would like more information and training. Observations in the waiting rooms helped TREKK to learn about the type of information that is available to families while they are waiting to be seen. All of this information combined is helping TREKK to create tools for parents

and healthcare professionals. These tools will give them the information they need to give the best care to sick kids.

Physical Sciences

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File Number: 12 404 789
Region: DC, SS
Licence No: 15177 (Multi-year licence: 2 of 3 years)
Location: Along the Mackenzie drainage basin at the Slave River Rapids

Big river wood dynamics in the Canadian subarctic

The primary objectives of this ongoing research are to: (1) evaluate fundamental controls on wood dynamics within the Mackenzie; and (2) develop an empirical predictive model to estimate future wood dynamics. In 2013, fieldwork was primarily conducted on the Great Slave Lake investigating permanent wood storage along shorelines. Shorelines appear to be growing outward over time due to the deposit of large, successive parallel berms or mats of driftwood (driftcretions) from ice and wind. This serves as a place for plant succession and land stabilization. Deposition rates (also known as accretion rates) were calculated by estimating tree age from cores of spruce along surveyed transects next to exposed and protected shorelines on Paulette and Moose Deer Islands near the Slave River Delta. Reconnaissance aerial photos were also taken of the Northwest shore of the lake. Timelapse cameras were also set up at Fort Fitzgerald, Hay River, Fort Resolution, Fort Providence, Nduli Crossing, Fort Simpson, Tsiigehtchic and Fort McPherson to capture wood in transport along the Mackenzie and its tributaries. Photos were taken every ten minutes from the end of March through the end of August. The cameras will again be set up for 2014.

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File Number: 12 404 750
Region: NS
Licence No: 15193 (Multi-year licence: 2 of 3 years)
Location: The Great Slave Lake Plain, including the Mackenzie Bison Sanctuary

Landscape scale flooding in the Great Slave Lake Plain

This research project was designed to study the Great Slave Lake Plains. Researchers interviewed twelve residents about their traditional knowledge of the area. Three community workshops to share and verify results and plan follow-up research were held between 2011 and 2013. Land users perceived a combination of things affect water levels in the area: climate

change, increased beaver activity, construction of the Mackenzie Highway, and disrupted natural drainage patterns. Changing water levels affect vegetation and wildlife habitat, which affect bison and moose. Snow and ice conditions are changing with warmer winters, which affect winter travel and traditional land use. Researchers also sampled a number of lakes to take sediment cores that capture the last 200 to 400 years of the lakes' history. Sediment cores are being analysed to learn when lake expansion began and if mercury from previously dry soil is being released into the lakes. Combined with samples from previous years, these will enable researchers to better understand changes in the environment on a landscape scale, as well as how effects may differ among lakes. This project is a partnership with the community of Fort Providence..

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File Number: 12 404 815 **Licence No:** 15244 (Multi-year licence: 1 of 5 years)
Region: SA, DC **Location:** Fort Liard; Wrigley; Tungsten (Cantung)

Yukon-Northwest seismic network: Characterizing earthquakes and earth structures

The University of Ottawa installed 7 new seismograph stations in Northwestern Canada in the summer of 2013 to record earthquakes occurring locally, nationally, and worldwide. The stations will remain in the ground for 5 years. The data are used to produce images of the Earth's deep interior (= 20 km) and provide new insights into earthquake and fault rupture processes. Seismograph stations have a low profile – there is no noise or motion associated with the equipment. To reduce interference from surface vibrations and to protect the equipment, the seismometer is buried 1-2 meters below the ground inside an augered hole. Power will be provided either by solar panels mounted nearby on a pole and rechargeable batteries, or from a direct connection to the power grid. Data are transmitted to a data archiving center via satellite communication systems, where a ~1m dish and enclosure with electronics would be located nearby. The station installation footprint is approximately 3 meters by 3 meters. Stations in the Northwest Territories are located in the Hamlet of Fort Liard and the town of Wrigley.

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File Number: 12 404 371 **Licence No:** 15185 (Multi-year licence: 2 of 2 years)
Region: IN **Location:** The multi-year ice positioned off Sachs Harbour

An integrated sea ice project for BREA: Detection, motion, and RADARSAT mapping of extreme ice features in the Southern Beaufort Sea

No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 404 840 **Licence No:** 15333
Region: SS **Location:** Stark Lake exploration site

Phase III ESA & RAP for Stark Lake exploration site, NT
A Phase III Environmental Site Assessment (ESA) was conducted at the Former Stark Lake Site Exploration Site (SM183). The site is a former uranium exploration and mining site located along the northeast shores of Stark Lake at Regina Bay, east of Łutsel K'e. The ESA was conducted to identify old, unused mining equipment and buildings on site and to quantify any contamination that has been left on site. A risk assessment was completed to determine if any contamination on site would be a risk to human health and ecological health. Following the completion of the risk assessment report, a draft Remedial Action Plan report was developed to address the cleanup of contamination concerns identified in the report.

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File Number: 12 404 828 **Licence No:** 15295
Region: IN, GW, SA, NS, SS **Location:** Sites along the Mackenzie River Basin

Arctic peatland carbon and holocene warm climates
The pristine permafrost peatlands of the northern Mackenzie Basin are common and integral parts of the subarctic and arctic landscape, providing habitat and food for wildlife (*e.g.* caribou) as well as ecosystem services (*e.g.* carbon sequestration and freshwater storage). These peatlands are carbon 'hot spots' where ecosystem processes, including plant growth and soil decomposition, may be highly sensitive to climate warming and disturbance. To better understand the long-term sensitivity of vegetation and carbon, researchers collected dead plants and small peat cores from eight sites from 69^{o}8 to 60^{o}2'N (about 1200km in length) that span most of the climate range of permafrost peatlands in the Mackenzie Basin. Radiocarbon dates show that the ecosystems at these sites have been on the landscape for as long as 9,500 years and for at least 4,000 years. The resilience of the near-surface soil carbon to warming and increasing summer thaw depth is being assessed by laboratory experiments and the monitoring of carbon loss, carbon chemistry, and responses in microbial communities. The sensitivity of vegetation change and carbon sequestration to past warm climate intervals is being studied by reconstructing the carbon accumulation history that is captured in the soils.

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File Number: 12 404 829 **Licence No:** 15296 (Multi-year licence: 1 of 2 years)
Region: SS **Location:** Fort Resolution; Fort Smith

SWEEP - The Slave Watershed environmental effects program
The objective of this ongoing research is to develop a community-based monitoring program to empower communities to collect, interpret and use a system of environmental indicators to address these priorities. The Slave Watershed Environmental Effects Program was initiated in

May, 2013. The research team held information sharing sessions in Fort Resolution and Fort Smith. The researchers held a SWEEP Indicator Workshop (July 11-12, 2013) in Fort Smith. As a result of this workshop, individuals from within the community were identified as participants to be interviewed for gathering of traditional knowledge.

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File Number: 12 404 707 **Licence No:** 15175 (Multi-year licence: 5 of 5 years)
Region: IN **Location:** South Melville Ice cap

Melville Island South Ice Cap mass, balance and snow pollution

The objective of the multi-year project is to measure the changing volume of the South Melville Ice Cap using an automatic weather station and sampling techniques. Measurements of snow accumulation and ice melt were performed at 13 pole locations on the Melville South Ice Cap by from April 28 - 29, 2012. The South Melville Ice Cap is a small plateau ice cap (40 km^2 in size) and is located on the western portion of Melville Island in the Canadian high Arctic. There were no direct wildlife sightings during the visit, but fresh droppings and tracks from a single caribou on and adjacent to the ice cap were observed. Due to an exceptionally warm summer in 2012, many poles on the glacier had melted out and could not be located. New poles were replaced at these sites with the exception of three locations where the ice cap had thinned to less than 2 m and could therefore not be replaced. Pole measurements from this season (2013) indicate a 1.5 metre mass loss over the previous year ending in September, 2012. This is the highest rate of mass loss recorded since measurements began in 1963 and is consistent with the longer term trend of rapidly accelerating glacier mass losses that began in 2005. Temperature data downloaded from the automatic weather station on the ice cap showed that ice losses occurred over a relatively short but intense melt season (~June 10 to ~July 21) during which time on-ice air temperatures reached a maximum of 17.8^oC. This brief melt event was followed closely by two distinct summer freezing periods in mid-July and August during which time 63cm of summer snow fall occurred. The measurements show that the ice cap (as a whole) has lost 0.06 km^3 [or 60,000 metric tonnes] of water equivalent ice mass to the ocean over the past year.

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Region: IN **Location:** Garry Island; Illisarvik; Inuvik; Paulatuk; Bar C

Permafrost and climate change, western Arctic Canada

The objective of this ongoing project is to understand how climate change is affecting permafrost in the western Arctic, particularly in the outer Mackenzie Delta. In 2013 researchers spent two weeks in the western Arctic in late March and then July and August. The 2013 fieldwork focused on taking temperature readings in the permafrost and monitoring how the ground is changing from year to year. These measurements have been ongoing for many years. At Herschel Island, researchers also spent a considerable time studying the ice house, because it has been found to be colder than the surrounding permafrost. Researchers are trying to find out if that is just because it is easier to cool down the air in the cellar, or because the air cools quickly by turning over in winter. At the moment, it seems likely there is little turn over. This

means that if the ice house ever becomes close to thawing, a small chimney or other pipe to the outside in winter would probably keep it stable. At Illisarvik, researchers made the first set of surveys of many benchmarks that they are using to determine how much permafrost terrain is sinking because of long-term increases in thaw depth. Over the last 30 years the active layer has been deepening, but research is ongoing as to how much subsidence this has caused.

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File Number: 12 404 831
Region: SS
Licence No: 15309 (Multi-year licence: 1 of 5 years)
Location: Taltson River; Trudel Creek (approximately 2km from the Twin Gorges Generation Station

Northwest Territories Power Corporation Twin Gorges aquatic effects monitoring plan and sediment and erosion management plan

In the summer of 2013, researchers completed field studies on how the Taltson Twin Gorges Hydroelectric facility may be interacting with the local physical and biological environments. These projects are part of regular and ongoing set of monitoring programs that are a condition of the facility's Water License and are intended to inform appropriate management of the facility. The Sediment and Erosion Monitoring Program (SEMP) resulted in measurements on the rates of bank edge erosion within Trudel Creek and Nonacho Lake (the water bodies that are associated with ongoing operation of the generating station). The Aquatic Effects Monitoring Program is an ongoing set of different studies that track if the aquatic environment is being affected by the facility. In 2013, the aquatic field work included the collection of data on mercury concentration levels within sediment and fish flesh within Nonacho Lake, Trudel Creek and Rutledge Lake. Traditional knowledge was provided by an Elder from the community of Łutsel K'e. His contributions were related to fish species and their locations, hunting and trapping, and knowledge of other individuals visiting the area: his input improved the quality and results of the field work program.

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File Number: 12 404 631
Region: NS
Licence No: 15278 (Multi-year licence: 1 of 3 years)
Location: In and around Wekweètì; Daring Lake

Baseline monitoring of arctic vegetation and snow changes over the Bathurst caribou habitat using satellite remote sensing and community-based field observations

The goals of this ongoing research project are: (1) to fill the information gap on Bathurst caribou summer range conditions using satellite remote sensing data and community-based ground vegetation monitoring; (2) to develop a cumulative impact assessment method that makes cumulative impact assessment possible even if data are incomplete and provides timely feedback for guiding the refinement of monitoring plan; and (3) to assess the impacts of habitat changes on caribou demographic variables (e.g., calf:cow ratios, survival rates, calving time), so that decision-makers can better manage expectation of management. In 2013, researchers selected three sites near Wekweètì and four sites near the Daring Lake for community-based vegetation monitoring in early June. At each site, five permanent plots were set up. Within each plot, average height and percent cover of every vascular plant species were measured and

recorded every five days (from early June onward). As well, specific photos were regularly taken of each plot (down-looking 3-band -- blue, green, and near infrared -- digital photos). Despite many technical issues, researchers have learned quite a lot from community-based monitoring. These data are essential for validating remotely sensed plant growth and seasonality products, as well as investigating the cumulative impact of environmental changes on caribou productivity and population changes.

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File Number: 12 404 827 **Licence No:** 15285 (Multi-year licence: Year 1 of 5)
Region: SA **Location:** Between Norman Wells and Tulít'a (within Husky, ConocoPhilips or MGM's land parcels)

Establishing a watershed framework for assessing cumulative impacts of development
The objectives of this ongoing research project are to develop baseline water quality conditions and to assess the health of stream ecosystems through a collaborative multi-government watershed-based cumulative impact study. In July 2013, researchers visited Norman Wells and Tulít'a to consult with elders, Renewable Resource Councils, Environment and Natural Resources employees and community members regarding the proposed stream sampling program. The purpose of the visit was to ensure areas that are important to the community were also included in the study. In August 2013, a modest field program to measure stream health was conducted in the area west of the Mackenzie River between Tulít'a and Norman Wells with community participation. Data at ten sites in representative streams in areas impacted and unimpacted by development were collected for water and benthic macroinvertebrates (using Environment Canada's CABIN protocol). Analysis is ongoing.

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File Number: 12 404 788 **Licence No:** 15259
Region: IN **Location:** Around Sachs Harbour

Sachs Harbour disposal at sea follow-up study
No research was conducted under this licence in 2013 due to weather issues.

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File Number: 12 404 359 **Licence No:** 15174
Region: IN **Location:** The southern Beaufort Sea

Canada-Korea-USA Beaufort Sea geoscience research program: 2013 Activities
The Canada-Korea-USA Beaufort Sea Geoscience Research Program conducted geophysical surveys, geologic sampling and oceanographic measurements in the Canadian Beaufort Sea September 10 to 24, 2013 from the RV Araon, an ice breaker owned and operated by the

Korean Polar Research Institute (KOPRI). The goals of this research are to acquire geoscience knowledge about the outer shelf of the Beaufort Sea to address knowledge gaps related to thawing of subsea permafrost and dissociation of gas hydrates. The research was carried out in collaboration between the Korea Polar Research Institute, Natural Resources Canada (NRCan), Department of Fisheries and Ocean (DFO), Monterey Bay Aquarium Research Institute (MBARI), and the Alfred Wegener Institute (AWI). The research program focused on the following tasks: (1) Multichannel seismic data, in conjunction with an ocean-bottom-seismometer (OBS) study, were collected to verify distribution and internal structures of the offshore permafrost occurrences. The multi-channel seismic data were acquired on the outer continental shelf of the Canadian Beaufort Sea. A total of 14 lines were collected, with ~435 line-kilometers and ~4,500 shot gathers; (2) Continuous sub-bottom profiler (SBP) and multibeam data were collected along all ship tracks for detailed subsurface imaging of sediment structures and permafrost. More than 3000 line-kilometers of data were collected. These data also assisted in the selection of sites for sediment coring; (3) Heat flow measurements were taken at eight locations. These data will help understand the distribution of subsea permafrost as well as the gas hydrate stability zone; (4) Geological sampling using coring technics was conducted. A total of 33 cores were taken sediment and pore water analyses will be conducted; (5) Water sampling and Conductivity-Temperature-Depth (CTD) profiling was undertaken at core sites to study physical and chemical properties of the seawater; (6) Continuous water-property and atmospheric measurements were also collected when the Araon was underway. All data collected in during the research cruise will be analyzed and interpreted in the coming months.

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File Number: 12 404 641 **Licence No:** 15237 (Multi-year licence: 2 or 2 years)
Region: IN **Location:** Trail Valley Creek; Sitidgi Lake; Beaufort Sea

Airborne SAR and passive microwave measurements over snow covered tundra for CoReH20 retrieval validation and land surface model testing

Snow is an important component of the Canadian landscape, especially in the north, where it covers the land surface, lake ice, and sea ice for many months. On land, snow plays a critical role in the management of water resources, influencing soil temperature, and affecting the ability of caribou and other grazing animals to efficiently forage for food. Most of our information about snow cover comes from satellite measurements. Led by Environment Canada, an international team of scientists measured the snowpack in the Trail Valley Creek watershed during the winter of 2013/14. These observations ranged from simply measuring how deep the snow was, to characterizing the different layers in the snow and the sizes and shapes of individual snow grains. Instruments similar to those orbiting the earth on satellites were installed in a Cessna-208 aircraft, and flights were made over Trail Valley Creek in March and April 2014. These instruments provide the same measurements as from satellites in orbit, but with the added benefit of control over where and when they fly. Combining the snow measurements with the airborne data will help produce better maps of snow cover from satellite data, which will be used at Environment Canada to improve weather forecasts and evaluate the models used to understand climate change. The field campaign was very successful, and scientists from Environment Canada, Canadian universities, and international colleagues have already made good progress in analyzing the data.

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File Number: 12 404 836 **Licence No:** 15315
Region: IN **Location:** Smoking Hills

Reconnaissance study of Smoking Hills
The Smoking Hills is an area of naturally burning shales. Oral history and written records indicate this has occurred over a long period of time. Researchers conducted a one day reconnaissance study of the area. The purpose of the trip was twofold: firstly to collect samples of the rocks to better understand the natural combustion process and the mineral products that are formed, and secondly to explore if any usually microbial life exists in the hot acidic environments near the burning shales. Over 30 rock samples were collected and analyses show that they have very high abundance of organic matter that explains why the shales naturally burn. Work is continuing to identify various uncommon minerals found at the site that form in such unique high temperature environments. The microbial communities were assessed by extracting DNA from the samples and looking for “fingerprints” of particular species. Unfortunately, no DNA was recovered from the hot acidic soil close to the vents, suggesting that the acid gases nearly sterilize the soil. However, bacterial DNA was detected in old, extinct vents and in areas a few metres distant from the active smoking vents. These bacteria are presently being identified.

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File Number: 12 404 555 **Licence No:** 15334
Region: NS **Location:** Peat plateau 6 km west of Yellowknife airport; Peat wetland near Pontoon Lake

Variability in peat plateau energy balance and water chemistry along a warming gradient
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 404 733 **Licence No:** 15191 (Multi-year licence: 3 of 5 years)
Region: SS **Location:** Kirk Lake watershed; Kennedy Lake watershed; Small lakes within the Kennedy Lake watershed

De Beers - Gahcho Kué environmental monitoring program
The purpose of this ongoing research is to build upon current knowledge of the existing environment around the Gahcho Kué Project site including understanding aerial, aquatic, and terrestrial baseline conditions. Gahcho Kué Project studies in 2013 included collecting meteorological, hydrology, water/sediment quality, vegetation and soil, dust, and fish and

aquatic resources data. Air temperature, rainfall, wind speed/direction, and relative humidity data were collected from the site weather station. Hydrometric surveys were performed at 11 locations and included water level surveys, discharge measurements, and retrieving water level logger data. The water/sediment quality component included collecting seasonal physico-chemical profile data and samples in 11 lakes near Kennedy Lake. Water quality parameters included major ions, nutrients, trace metals, and chlorophyll a. Sediment quality parameters included trace metals. The vegetation and soils program included monitoring dust deposition using dust fall tripods, and establishing vegetation and soil monitoring sites to record composition and abundance, and to assess local soil conditions (i.e., soil moisture and temperature). Soil samples were obtained for each soil horizon for pH and electrical conductivity measurements. Fisheries and aquatic resources work included lower trophic sampling (i.e., phytoplankton, zooplankton, and benthic invertebrates) at proposed reference lakes, downstream flow monitoring studies, and fish health and fish tissue collection. Sampling methods included collection of plankton and benthics samples, two-way fish fencing, large and small-mesh gill netting, fyke nets, angling, baited minnow traps, and shoreline electrofishing.

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Region: DC **Location:** Near Etanda Lakes

Liard Basin 2012 - Golata formation fossil

The Northwest Territories Geoscience Office Petroleum Group found an interesting fossil in the summer of 2012 in the Middle Mississippian Golata Formation. The section examined in the field was mainly shale and mudstone. Specifically, the fossil was found ~152 m stratigraphically above the base of the formation. Upon examination the fossil was revealed to be a shark. Preserved elements includes: both upper and lower multipuspid teeth, and remains of calcified cartilage representing an unknown amount of the head. This is fortunate because much of shark systematics is based on tooth and braincase anatomy. Researchers plan to have the specimen CT scanned in order to reconstruct the three dimensional anatomy of the head skeleton. Researchers are waiting on equipment capable of scanning the fossil.

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File Number: 12 404 652 **Licence No:** 15213 (Multi-year licence: 5 of 5 years)
Region: IN **Location:** The Beaufort Sea; Mackenzie Shelf; Amundsen Gulf region

ArcticNet: an Integrated Regional Impact Study of the Coastal Western Canadian Arctic.

The main objective of the proposed research program is to assess the changes occurring in the Canadian Arctic coastal marine ecosystem in response to climate warming. Using the Canadian research icebreaker CCGS Amundsen, sampling operations in the Inuvialuit Settlement Region in 2013 were scheduled to take place September 8 - October 1, 2013. On September 9, the Amundsen's BO-105 helicopter crashed in the icy waters of M'Clure Strait, killing the three passengers. Following this tragic accident, the 2013 Amundsen science expedition was

cancelled and focus was put on the search and salvage operations of the wreckage. Operations in the Parry Channel carried out from the Amundsen on September 8 and 9 included the sampling of seawater, sea ice, sediment, plankton, larval and juvenile fish and the measurement of meteorological parameters. No operations with the Amundsen were conducted in the Amundsen Gulf/Beaufort Sea region. The five mooring deployed in 2012 as part of the ArcticNet-IMG-Golder project funded under the Beaufort Regional Environmental Assessment (BREA) initiative were all recovered using the services of the Canadian Coast Guard icebreaker Sir Wilfrid Laurier. No moorings were redeployed.

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File Number: 12 404 844 **Licence No:** 15352
Region: NS **Location:** Hislop Lake; Marian River (up to 10km downstream of Hislop Lake)

Marian Watershed community-based aquatic effects monitoring program

The Tłı̨chǫ Government has been working to develop and implement the Marian Watershed Community-Based Aquatic Effects Monitoring Program over the past 2 years. It is a program with the intention to build community capacity to monitor and manage Tłı̨chǫ lands and water now and into the future. A first field camp was conducted at K'ea Goti (Hislop Lake) from September 17-20. It was a pilot project organized to conduct baseline monitoring conditions of fish and water in the very important Hislop Lake and Burke Lake Creek area. The importance of this area was expressed during the Fortune Minerals EA public hearings held in the summer of 2012, as well as during a Tłı̨chǫ Wildlife workshop held in Gamètì in the winter of 2013. These samples were collected prior to any development. Therefore, in the future if/when development happens, it will be possible to compare potential changes to this baseline data. This was an opportunity for environmental monitors previously trained by the Department of Culture and Lands Protection (DCLP) to gain field experience. Water samples were collected to test for heavy metals and other contaminants both in the water and also the fish. A results workshop was held with community members in March where results of the year's work were presented and guidance was sought for the next year of the program.

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File Number: 12 404 812 **Licence No:** 15228
Region: IN **Location:** Ballast Brook area; Western Banks Island

Reconstructing pliocene environmental change and landscape dynamics using the Beaufort Formation on Northwest Banks Island, NT

This research was designed to test the hypothesis that the Pliocene (5.6 to 2.6 million years ago) Beaufort Formation in the western Canadian Arctic Archipelago once formed a coastal plain of stream deposits and peats extending from the Yukon to Ellesmere Island. During this time period, the global temperature was about 2 degrees C warmer than today with an average annual temperature in the arctic of 21 degrees (caused by polar amplification of climate change). As part of a larger multi-year investigation to determine the causes and feedbacks

responsible for the rapid deposition and incision of this sedimentary unit, two short-term objectives this summer (2013) were to improve the mapping and description of the deposits on Banks Island, and to date specific layers of peat which, for instance, contain important records of paleoclimate, carbon dioxide, vegetation (including cedar forests), and fauna (including camel fossils). The precise ages, determined with a method known as cosmogenic nuclide burial dating, can improve our ability to correlate the isolated records across different arctic islands. These results will help predict the extent that currently stored frozen sediment can be remobilized and deposited in harbours and lakes throughout the arctic, as well as predict the rates and conditions necessary to have polar forests.

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File Number: 12 404 687
Region: NS
Licence No: 15284 (Multi-year licence: 5 of 5 years)
Location: Daring Lake Terrestrial Ecosystem Research Station

Controls on carbon and nutrient cycling in arctic tundra

The objective of this ongoing research is to substantially advance the understanding of how Canadian arctic tundra ecosystems function and, therefore, how they are likely to be affected by perturbations such as climate change, resource development and extraction, and atmospheric pollution. In 2013, researchers worked most of the summer at Daring Lake collecting a full seasonal set of soil samples down to the permafrost to determine whether there are significant changes in microbial communities with depth, and the relative importance of thaw as compared to biogeochemical characteristics in determining those patterns. Published research on herbivores completed over the past 7 years shows they significantly reduced the leaf biomass of several deciduous and evergreen shrubs. This result is surprising because this effect was observed while caribou population sizes are particularly low.

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File Number: 12 404 797
Region: SA
Licence No: 15253
Location: Area of Exploration Licenses EL 462 and 463

EL462 & EL463 2013-2015 surface and groundwater monitoring program

The goal of the surface and groundwater monitoring program was to continue establishing the groundwater and surface water conditions within the exploration area prior to and during oil and gas exploration activities. Fieldwork was conducted between June and October 2013. It included: (1) the redeployment of 2012 hydrometric stations (water level and barometric pressure loggers) at Bogg Creek, Slater River and Little Bear River; (2) the installation of two additional hydrometric stations at all-weather road crossing at Bogg Creek crossing and at the proposed all-weather crossing on Slater River; (3) three stream flow measurements on Little Bear River, Bogg Creek and Slater River; (4) two surface water quality sampling campaigns at 39 locations within the area; (5) the collection of groundwater samples from five groundwater monitoring wells installed in the winter of 2013; and (6) downloading of data from eight thermistor locations. The results of the hydrometric stations and stream flow measurements

were used to calculate seasonal changes of water flow during the open water season and to estimate the water discharge rates. Results of the program will be submitted to the Sahtú Land and Water Board (SLWB). The surface water and groundwater monitoring study will continue throughout the open water season of 2014.

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File Number: 12 404 797 **Licence No:** 15257
Region: SA **Location:** Within the EL463 and EL462 Husky Oil land use parcels

EL462 & EL463 aggregate and permafrost mapping program
The objective of this research is to provide a better understanding of the permafrost within EL463 and EL462 land areas. Three test holes were drilled using a heli-portable drill. One hole tested a potential source of aggregate with negative results. Two holes were drilled to examine local permafrost conditions. A thermistor was installed in one of the holes to monitor permafrost conditions over the longer term.

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File Number: 12 404 763 **Licence No:** 15214 (Multi-year licence: 3 of 5)
Region: NS **Location:** Fortune Mineral's NICO property; along the route of a proposed all-weather access road from the proposed Tłı̨chǫ Road

Environmental Baseline Surveys of the Fortune Minerals Ltd. NICO Project
The objective of this monitoring program is to collect baseline environmental information for future environmental effects monitoring in the project area. 2013 fieldwork involved constructing waste rock and tailings field cells and sampling the leachate (liquid that passes through the tailings) in June, July and September. Leachate samples were sent for chemical analysis. Analysis is still ongoing. The results of leachate analysis will be used as additional information in the project design.

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File Number: 12 404 787 **Licence No:** 15263
Region: NS **Location:** Dwyer Lake; Brown Lake; Slemon Lake

Seawater and depositional variations across the Slave craton: Insight from banded iron formation and associated rocks
The objective of this research is to conduct detailed field mapping and sampling of the Archean Banded Iron Formation. In 2013, rock samples were collected for further detailed analysis. Ongoing chemistry of the formation shows that elements such as chromium, nickel and the rare

earth elements are similar to the sea-water composition at the time of their formation. This could reflect oxidative weathering of the continent delivering soluble elements to the ocean. On the other hand, found interbedded with the formation are layers of presumably volcanic origin, which could indicate that these elements were instead derived from fine-grained ash-fall debris into the ocean. To answer this question, isotopes of samarium and neodymium have been sampled. Dating of the volcanic layers in the formation has suggested it is likely 2620 million years old. This is when oxygen started to rise on our Earth. Further studies of these rocks are ongoing.

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File Number: 12 404 841 **Licence No:** 15345
Region: SS **Location:** Rocks exposed at the Alexandra and Louise Falls on the Hay River

Hay River vertebrate fossil recovery

There were two goals for the fieldwork on the banks of the Hay River from September 29-October 5, 2013. The first was to collect what was thought to be the preserved rib cage of an early amphibian in rocks that formed 360-370 million years ago in the Devonian Period. This interpretation was based on a photograph seen earlier that summer and, if true, would have been a discovery of major importance. Unfortunately, the specimen turned out to be a section of the shell of a nautiloid, an extinct form of mollusc. The other goal was to expose more of the preserved animal tracks that had been seen the previous year. These tracks are also from the Late Devonian and are interpreted to be those left by a large, 1 – 1.5m long, early amphibian or a large lobe-finned fish moving in shallow water. The rocks were originally lime-rich sands and muds that were part of an ancient intertidal zone of a tropical sea. Evidence for this shallow, inter-tidal environment was the discovery of preserved ancient mud-cracks at several different levels in the rock layers, which show that the muds were regularly exposed to the air and sun for short periods.

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File Number: 12 404 794 **Licence No:** 15274 (Multi-year licence: 2 of 2 years)
Region: NS **Location:** Daring Lake

Impacts from climate change on berry productivity in the Canadian Arctic: Integrating community participation with science

No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 404 493
Region: SS
Licence No: 15222 (Multi-year licence: 1 of 5 years)
Location: Hay River (from the NWT/Alberta Border to Great Slave Lake)

Hay River ice jam study

The goal of this research is to study ice processes on the Hay River in order to continue the ongoing development of computer models to predict them. The 2013 field research program brought 2 members of the University of Alberta team to the Town of Hay River to observe, measure, and document river breakup. Between April 15 and 21, time-lapse cameras and water level sensors were placed along the river upstream of Alexandra Falls and in the delta, to supplement those instruments deployed by the Town of Hay River Flood Watch Committee. During breakup (Apr 30 to May 15) the team measured ice jam formation and release events and worked with the Town Flood Watch Committee to document the river's breakup progression. Operational testing of the University of Alberta ice jam flood forecasting models was also conducted; the timing of the onset of breakup and the time of arrival of the ice runs from upstream were predicted with reasonable accuracy. All the equipment was retrieved in July.

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File Number: 12 404 717
Region: GW
Licence No: 15288
Location: Peel River (at Fort Macpherson); Arctic Red River (at Tsiigehtchic); Mackenzie River (at Tsiigehtchic and Middle Delta Channel)

Erosion of carbon from high-latitude peatlands: Isotopic insight into fluvial transfer in the Mackenzie River Basin

The objective of this research project was to study organic carbon inputs into the Mackenzie and Peel Rivers. In June 2013 the research team revisited major rivers of the Mackenzie River Basin, their fourth year sampling river sediments and river waters in the basin. As in previous fieldwork, river water and suspended sediment samples were collected from different water depths within river channels using custom-built, clean, depth sampler. At the same time, an 'Acoustic Doppler Current Profiler' was used to measure in detail the speed of the water. The interpretation of the data is still ongoing, but results from previous samples were presented recently at: http://goldschmidt.info/2014/uploads/abstracts/finalPDFs/989.pdf. This fieldwork was also the first time the research team sampled the rivers of the upper Peel Basin. The extensive permafrost cover in this basin makes it a very interesting place to study weathering and erosion and river chemistry. Also, the rocks in the basin are very rich in organic matter and sulphide minerals, and when these are weathered they impact the cycle of carbon to and from the atmosphere. A great deal can be learnt from these unique river systems.

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File Number: 12 404 713 **Licence No:** 15186 (Multi-year licence: 2 of 5 years)
Region: NS **Location:** The Mackenzie River (at the Tsiigehtchic ferry crossing)

The arctic great rivers observatory
This project studies the six largest rivers that flow into the Arctic Ocean: the Mackenzie and Yukon in North America and the Ob', Yenisey, Lena, and Kolyma in Russia (see attachment for river watersheds and sampling location points). We are measuring the concentration of naturally occurring chemicals (such as carbon, nitrogen, and phosphorus) in these rivers to obtain baseline information about the flow of these chemicals to the ocean, and to help us understand how climate change is impacting Arctic rivers. Sampling is conducted every second month. During each sampling trip, researchers take eight litres of water, which is transported back to Inuvik for further processing in the lab. Researchers use a hand-held water meter to measure water temperature, pH, conductivity, and dissolved oxygen concentration. This is a 5 year project started in May 2013. Laboratory analyses are underway and preliminary results are available at: http://arcticgreatrivers.org. All data is available for free download.

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File Number: 12 404 808 **Licence No:** 15204
Region: NS, SS **Location:** In and around Snap Lake Mine

De Beers Snap Lake Mine: 2013 wildlife effects monitoring program
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 404 821 **Licence No:** 15270 (Multi-year licence: 1 of 2 years)
Region: SA **Location:** In and around the EL 470 land claim

Environmental studies for EL470
ConocoPhillips Canada completed ongoing monitoring and assessment programs within the boundaries of EL 470 during the period of June 23 to December 31, 2013, including: surface water and sediment sampling, groundwater monitoring, fish and fish habitat assessment, wildlife assessments (including migratory bird and breeding bird assessments), vegetation survey and geotechnical surveys (including localized pre-disturbance soils assessments, gravel and permafrost investigations). Ongoing monitoring and assessments were aimed at collecting local and regional biophysical information to provide baseline survey information and to support ongoing effects assessments. Also completed were summer site inspections program and sampling activities (which focused on sampling commitments made to Aboriginal Affairs and Northern Development Canada and Environment and Natural Resources, Government of Northwest Territories) and the post-drilling inspection program, all of which focused on activities currently undertaken within EL 470. A bear denning survey also took place in December 2013.

Results are incorporated into the Environmental and Socio-Economic Effects Report (ESEER) in the 2014-2019 Multi-well Application, posted on the SLWB site. Results from the surface water and groundwater monitoring programs are available in the 2013 annual program reports, also posted on the SLWB site. .

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Region: SS **Location:** Fort Smith; Fort Resolution

SWEEP - The Slave watershed environmental effects program

The SWEEP program aims to establish a community based environmental monitoring program in the Slave River in partnership with communities. The program is continuing earlier fish health monitoring studies and is also establishing methods to look for changes in the bottom living insects in the river. Fish health is being monitored in four species commonly consumed in the communities: jackfish, pickerel, whitefish and inconnu in the spring and fall and in Loche in the winter. Community members are involved in collecting fish and in the dissection and health evaluation of the fish. The river insects are being monitored by putting cement blocks in the river and monitoring what organisms gather on them. The variety of insects is determined by classes in the schools in the respective communities. In 2013, it was determined that the best length of time to leave these blocks in the river is six weeks. Considerable work was carried out over the winter looking at the dynamics of ice on the river both with on the ground measurements and with satellite pictures.

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File Number: 12 404 825 **Licence No:** 15281
Region: IN **Location:** Offshore between Mackenzie Delta; Amundsen Gulf; Along the continental slope of Banks Island north to McLure Strait

Testing the northern route for Younger Dryas meltwater

The goal of this research is to investigate the origin of the Younger Dryas cooling that began about 13,000 years ago. Analysis of data collected in 2013 is ongoing.

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File Number: 12 404 838 **Licence No:** 15321 (Multi-year licence: 1 of 5 years)
Region: IN, GW, SA, DC, NS, SS **Location:** Aklavik; Inuvik; Fort McPherson; Tsiigehtchic; Fort Good Hope; Norman Wells; Tulít'a; Fort Providence; Fort Simpson; Trout Lake; Behchokǫ̀; Yellowknife; Fort Resolution; Fort Smith; Łutsel K'e; Hay River; Kakisa

Community-Based Water Quality Monitoring in the Northwest Territories
Community groups, community-based monitoring programs, ENR and others partnered in 2013 to implement NWT-wide community-based water quality monitoring at roughly 40 sites in 21 communities. This collaborative monitoring work built on work undertaken by 12 communities and ENR in 2012. The community-driven program builds on priorities raised by NWT communities during the development of the NWT Water Strategy. This program addresses community-driven questions about aquatic ecosystem health and water quality, and builds capacity for communities to monitor their waters. Monitoring equipment was deployed at over 40 sites. Community members were trained on deployment and retrieval of water monitoring equipment. Monitoring equipment included: (1) YSI sondes (at roughly 22 sites) which measure basic water quality parameters, including: temperature, pH, turbidity, conductivity and others, to assess the state of the water and water chemistry; (2) Grab water samples (all sites): measure basic parameters, metals and hydrocarbons (from oil and gas); (3) Polyethylene Membrane Devices (majority of sites) which measure hydrocarbons. These instruments sit in the water for roughly a month at a time and absorb oil and gas chemicals; (4) Diffusion Gradient in Thin films (DGTs) (majority of sites) that measure dissolved metals in toxic form. These instruments sit in the water for roughly 2-5 days and absorb metals. Once analyzed, data will be examined for spatial and temporal trends and assessed, where relevant, against available water quality guidelines. Site comparisons throughout NWT will provide a snapshot of overall basin health. Results will be presented to communities first, prior to use elsewhere. Results will be useful for decision-making at multiple levels.

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File Number: 12 404 824
Region: IN, GW
Licence No: 15280 (Multi-year licence: 1 of 2 years)
Location: The Peel Plateau near the Yukon/Northwest Territories Border along the Dempster Highway; The northern section of Richards Island; Herschel Island

Remote sensing of arctic vegetation biochemistry
The overall goal of this research was to determine the capability of satellite-base, medium-resolution hyperspectral remote sensing for mapping and monitoring lead chlorophyll content of various vegetation types in the Western Canadian Arctic. A combination of remote sensing and field work took place in 2013 on the Peel Plateau and Richards Island. Measurements of chlorophyll, leaf area, leaf angle distribution, biomass and water content were collected along with satellite imagery of the area. Analysis of the data is ongoing.

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File Number: 12 404 545
Region: NS
Licence No: 15201 (Multi-year licence: 4 of 5 years)
Location: Dempster Highway

Evaluating the environmental impacts of permafrost mega-disturbances along the Dempster Highway, NWT

In this multidisciplinary study researchers examined permafrost conditions and landscape change in the Peel Plateau located in northwestern NWT. Permafrost temperatures were assessed in various environments that characterize the ecological transition from the Peel lowlands to the foothills of the Richardson Mountains. The main focus was to investigate the impacts of large retrogressive thaw slumps (10 to 40 ha) on the landscape and streams of the region. Mega slumps displace hundreds of thousands of cubic metres of sediment annually, severely impacting downstream riparian ecosystems and modifying slopes and drainage networks. Analysis of archived Landsat imagery indicates that the abundance, activity and size of slumps throughout the region have increased significantly since the mid-1980s. Data analyses also shows that the recent increase in the frequency of intense summer precipitation events is a major driver of increased slump activity. In summer 2013, the research team continued to investigate the impacts that these disturbances have on stream ecosystems. Data on the primary productivity and benthic community structure was collected to better understand how stream ecosystems may change with an intensification of permafrost thaw. Reporting to the community is ongoing and the team plans to meet in March to discuss results with community partners.

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File Number: 12 404 803 **Licence No:** 15324
Region: IN, GW **Location:** 35 lakes in the corridor for the proposed Inuvik to Tuktoyaktuk Highway

Lake bathymetry survey for the Inuvik to Tuktoyaktuk Highway, 2013

A bathymetry survey of 39 lakes along the Inuvik to Tuktoyaktuk Highway corridor gathered lake bathymetric data to help estimate total available winter water volumes and identify potential water sources for highway construction. The survey was completed over 18 days in August 2013, by a three-person field crew. The lakes were identified during a pre-field map review and helicopter overflight. Bathymetric data were collected from the lakes by boat using continuous depth recordings. A minimum of two longitudinal transects connecting the two farthest shorelines were completed as well as cross transects. Additional transects were run as required to include shape irregularities. Bathymetric data collected during the survey were analyzed using Geographic Information System (GIS) software to calculate lake surface area, total lake volume and under ice volume. The data and results were provided to the Department of Transportation in the NWT.

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File Number: 12 404 819 **Licence No:** 15258
Region: IN **Location:** Inuvik Airport Road; Dolomite Lake; Douglas Creek; Caribou Hills; East Bonnetplume Lake

CaHiGeo Caribou Hills geological history

The Caribou Hills Geological History (CaHiGeo) project objectives were to study the palaeoclimatic record of continental Cenozoic deposits exposed along the McKenzie banks north of Inuvik. Discontinuous but complete exposure allowed the sampling of three series along the Caribou Hills and the Bonnetplume lake. Geochemical analysis of the Caribou Hills paleogene series indicate high contents of immature type II and III (continental and marine) organic matter. Mineralogical analysis reveals high gypsum and clay mineral contents with kaolinite representing up to 80 % locally. In the Bonnetplume miocene series, organic matter is type III with high gypsum contents. These results will be completed the end of 2014 (they include: as well as palynological counting). Precise dating should also be provided by nannofossils as well as absolute dating of ash layers. Eventually the data will be compared with lateral equivalents from northern Yukon and series from the New Siberian Islands, on the opposite side of the Amerasian basin. A more precise depicting of the past warm conditions undergone by northern Canada should arise soon from the study.

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File Number: 12 404 782 **Licence No:** 15266 (Multi-year licence: 2 of 2 years)
Region: GW **Location:** Watersheds of Stony Creek and Vittrekwa Creek

The cumulative impacts of rapid environmental change in the northwestern NWT: Investigating the impacts of mega-slump disturbances on terrestrial and aquatic ecosystems in the lower Peel watershed, NW

From July 23 to August 15, 2013, fieldwork was undertaken on the Peel Plateau (Stony Creek watershed) to continue the study on the impacts of retrogressive thaw slumps on the terrestrial and aquatic ecosystems. Permafrost samples were collected from the headwall of four thaw slumps using a hand-held electrical corer. The samples were collected continuously at 5cm vertical interval from the soil surface to 3m below the surface. The samples will be used to determine the ice content (volumetric ice content and excess ice), as well as the isotope geochemical composition of shallow permafrost. A survey of stream water quality in the Rat River, Stony Creek and Vittrekwa Creek watersheds was also performed. Here, stream water samples were collected at the mouth of Stony Creek, above and below thaw slumps, and from clear tundra streams. The samples will be analyzed for major dissolved ions, trace metals and suspended sediments. The data will allow assessing the impacts of slumps on streams water quality at various sub-catchment scales and will be reported on a GIS platform. During the stream survey, a few thaw slumps were visited to validate remote sensing analyses (the TasselCap index) of slump distribution in the Richardson Mountains. No samples were collected; only observations were made.

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File Number: 12 404 621 **Licence No:** 15339 (Multi-year licence: 4 of 4 years)
Region: NS **Location:** Daring Lake

Exchange of carbon gas fluxes over low arctic tundra

In 2013 our research on carbon fluxes measurements at four arctic tundra sites near Daring Lake involved a continuation of existing measurements and the addition of new ones. As in the past, the field season lasted from instrument set up in early-May through to take-down in late-August. The overall objective of the research is to see if the tundra is taking more carbon dioxide out of the atmosphere by plant photosynthesis than it is releasing by respiration – if more goes in than goes out, the tundra is a sink for carbon. If more carbon goes out than in, it is a source. Measurements at the four tundra sites in 2013 again showed that the tundra was a carbon dioxide sink, despite (or perhaps because of) some very unusual weather during the field season. For the first time researchers instituted a measurement program for examining the carbon exchange of tundra ponds in 2013. Sampling at four ponds of different sizes was conducted from a small inflatable boat. Data is still being analyzed, but preliminary results show that the ponds are sources of carbon to the atmosphere and, more importantly, the source is larger in warm conditions. Overall, this research helps to understand how arctic tundra will influences the amount of carbon dioxide in the atmosphere and thus how it might influence the climate today and into the future.

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File Number: 12 404 795 **Licence No:** 15181 (Multi-year licence: 2 of 3 years)
Region: SS **Location:** Tathlina Watershed

Investigating the cumulative effects of environmental change and human activity in the Tathlina watershed

No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 402 712 **Licence No:** 15187 (Multi-year licence: 2 of 5 years)
Region: IN, GW **Location:** Throughout the Mackenzie Delta; Peel Plateau; 16 sites along the Dempster Highway; 5 Aklavik area sites

A multi-scale assessment of cumulative impacts in the northern Mackenzie Basin

Since 2010, Aboriginal Affairs and Northern Development Canada scientists have been working with researchers at the University of Victoria, and Hunters and Trappers Committees (HTCs) in the Mackenzie Delta to develop a vegetation and permafrost monitoring protocol that can be implemented by a range of users. The long-term goal of this program is to establish and maintain a network of sites to characterize regional environmental variability, and serve as a baseline against which to measure changes resulting from the cumulative impacts of multiple natural and human-caused disturbances. Field sampling in 2013 targeted four site types: spruce woodlands, historical seismic lines, dwarf shrub tundra and catastrophically drained lakes. At all sites in the network, researchers measured: vegetation structure, plant community composition, tree density, the productivity of edible berries, active layer depth, and late winter snow conditions. At core sites researchers also maintain meteorological stations, frost tubes, and

shallow and deep ground temperature cables. Over the long-term, re-sampling these sites will allow researchers to determine if vegetation and permafrost conditions are changing. This monitoring network will also provide a baseline against which to measure changes resulting from the cumulative impacts of multiple natural and anthropogenic disturbances. Preliminary analysis of data collected between 2010 and 2013 shows that natural and anthropogenic disturbances had a significant influence on vegetation structure, composition, and the abundance of edible berries.

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File Number: 12 404 839 **Licence No:** 15332 (Multi-year licence: 1 of 5 years)
Region: NS **Location:** EKATI claim block

EKATI engineering and environmental monitoring programs
The main objectives for research in 2013 were to (1) determine if the Ekati Diamond Mine is having an effect on the surrounding aquatic environment and air quality; and (2) to provide baseline data for areas where mine development may occur in the future. To accomplish these objectives, several concurrent monitoring programs were carried out, including the Surveillance Network Monitoring Program (SNP), Aquatic Effects Monitoring Program (AEMP) and Air Quality Monitoring Program (AQMP), which are designed to ensure that the mine is in compliance with its Water Licence requirements and detect changes in the water and sediment quality and biology of lakes and streams and air quality within the EKATI claim block that may be affected by mine activities. Baseline studies were continued in various sites in the western area of Lac du Sauvage near the outflow of Christine Lake and in lakes southwest of Misery Camp near Lac de Gras. The monitored parameters of all projects were similar and included some, or all of the following: hydrology, meteorology, water quality, limnology, sediment quality, soil quality and vegetation, phytoplankton, zooplankton, benthos, fish habitat (in-stream and riparian re-vegetation success), and fish communities (physical characteristics and sampling of tissue for metals analysis) in the surrounding area.

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File Number: 12 404 822 **Licence No:** 15271 (Multi-year licence: 1 of 3 years)
Region: IN **Location:** The Beaufort Sea; Mackenzie Shelf; Amundsen Gulf

Addendum to ArcticNet licence # 15213
As part of the ArcticNet marine-based research program, the Canadian research icebreaker CCGS Amundsen was scheduled to conduct standard oceanographic and bathymetric sampling operations in the Inuvialuit Settlement Region from September 8-October 1, 2013. In addition to these standard sampling operations, the Amundsen was to conduct an active acoustics survey using the hull mounted SX90 fish sonar in a designated area of Amundsen Gulf and opportunistic surveys along the ship track in the southern Beaufort Sea and Amundsen Gulf. On September 9, the Amundsen's BO-105 helicopter crashed in the icy waters of McClure Strait, killing the three passengers. Following this tragic accident, the 2013 Amundsen science

expedition was cancelled and focus was put on the search and salvage operations of the wreckage. No active acoustic surveys were conducted.

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File Number: 12 404 820 **Licence No:** 15269
Region: SA **Location:** Along the Canol Trail

Supplemental Environmental Site Assessments along the Canol Trail, NT
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 404 378 **Licence No:** 15176 (Multi-year licence: 5 of 5 years)
Region: IN **Location:** Trail Valley Creek; Havikpak Creek

Hydrological studies, Mackenzie Delta Region
With a changing climate and increasing development there is an urgent need for appropriate hydrological information (e.g. snow cover, soil moisture, soil temperature, stream discharge) in the western Canadian arctic. For example, the design of roads and pipelines requires estimates of maximum stream discharge, while rules controlling land access in the fall require estimates of snow cover and whether the soil is frozen. However, with a changing climate, the recent past may not be a reliable guide to hydrological conditions in the near future. As a result, in order to limit the environmental impact of development, better methods to predict future conditions are needed. This research program is aimed at developing such improved methods, and over the last year we have: (1) collected hydrologic data at two study sites in order to extend our 20+ year data set; (2) began enhanced studies of snow accumulation in Trail Valley Creek (50 km north of Inuvik), which included extensive and frequent snow surveys, use of a laser terrain scanner to determine volume of snow held in large valley-side drifts, the addition of a new snowfall precipitation gauge in a forested site, added infrastructure at several of our instrument sites to allow the upcoming installation of new sensors for measuring the amount of water held in snow (not just snow depth), and the continuation of an experiment monitoring multiple snow depths at shrub and tundra locations; (3) continued to develop better methods to predict future changes in snowcover, soil moisture, ground thaw, and streamflow; (4) rejuvenation of the main weather measurement location including the addition of new instrumentation installed in April 2013 to monitor fluxes of carbon dioxide and energy in the basin, as well as cutting edge technology for measuring soil moisture. Recent results consider the factors controlling the thaw of the upper layer of the ground over the summer period. This is an important step towards better predictions of the impact of a changing climate and developments on the hydrology of the region. Other results have considered the role of lakes on the hydrology and ecology of the Mackenzie Delta, combined with the continued analysis of highly detailed maps showing land and water elevations at four large transects across the Mackenzie Delta, with the intent of improving the understanding of arctic river delta water level regimes.

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File Number: 12 404 833 **Licence No:** 15312
Region: IN **Location:** Tuktoyaktuk

Tarsiut Caissons - Removal and remediation plan
On August 30, 2013 ConocoPhillips conducted a pre-salvage bathymetric survey at the Tarsiut Caisson storage site. The intent of the bathymetry survey was to identify any debris around the foot of the caissons and to inspect the caissons to ensure they could be safely removed from the area. Within the area, a number of debris targets were identified (using sidescan sonar mosaic). The debris will be fully identified during next planned field program in the open water season of 2015. Relics and items of historical value will be recorded using a numbering system and exact location. No targets will be removed or disturbed unless they have been identified as debris from the Tarsiut caisson.

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File Number: 12 404 783 **Licence No:** 15232
Region: SA **Location:** Sekwi Brook North; Ingta Ridge

Progressive behavioural innovation in Ediacaran and Cambrian burrowing animals from the Mackenzie Mountains
555 million years ago, soft worm-like animals capable of movement appeared suddenly and worldwide. The purpose of this research was to examine fossils of these early animals to study the evolution of their muscles and brains, as well as their communities. Fieldwork in the summer of 2013 examined the June beds and Blueflower formations at Sekwi Brook North, and the Ingta and Backbone Ranges formations at Ingta Ridge. Researchers returned to these localities because they have beautifully preserved fossils spanning the transition from the Ediacaran to the Cambrian period. Researchers spent two weeks taking pictures and collecting samples from these areas in order to learn more about the movement of early organisms. The fossils of interest were their burrows because their structure and distribution provide clues to the behaviours of the animals that lived in them. The fossilized burrows in the Blueflower Formation to the Backbone Ranges show primitive avoidance behaviour of these ancient organisms. In the Ingta Formation, which is younger than the other formations, the organism’s burrows show more refined avoidance skills with tighter meanders, and new burrowing styles such as probing. These changes occurred in steps, and demonstrate the increasing number of feeding strategies and the development of sensory systems that allowed for guided meanders. Rock samples are being analyzed to determine oxygen levels in the oceans at the time these early animals were living there.

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File Number: 12 404 832 **Licence No:** 15311 (Multi-year licence: 1 of 2 years)
Region: NS **Location:** Caribou Lake

Mineralogy, geochemistry, and fluid inclusions of the Caribou Lake layered mafic-ultramafic intrusion

The purpose of the study was to examine the rocks near Blachford lake lodge to gain a better understanding of how they formed and why there are there. Over the summer of 2013, researchers collected samples from recent diamond drilling in the area of Caribou Lake. Samples of non-mineralized host rocks and of the mineralized rocks containing iron sulphide and copper iron sulphides were collected. Mapping in the vicinity of Caribou Lake proved to be helpful in understanding relationships between the intrusion and the surrounding rocks. Also, relationships between the older parts of the intrusion were observed and showed signs of a high pressure environment with lots of fluid movement. Areas of previous economic interest were observed in the field and documented. These previous areas had been blasted numerous years ago to create a trench and see if more mineralization occurs below the surface exposure. Samples taken from this summer's field season will be made into thin sections to observe the minerals present and also be analyzed for chemistry.

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File Number: 12 404 834 **Licence No:** 15313
Region: NS **Location:** Camlaren Mine; Burnt Island; Goodrock Mine; Kidney Pond / Knight Bay; Tracey Mine / Knight Bay; West Bay – Blackridge Mine; Storm Property; Murray Lake

PWGSC Gordon Lake environmental site assessments

A field sampling program was carried out in 2013 at nine abandoned mine sites on or near Gordon Lake in the Northwest Territories to support the Human Health and Ecological Risk Assessment Report. The nine mine sites were: Burnt Island, Camlaren Mine, Goodrock Mine, Kidney Pond /Knight Bay (Kidney Pond), Murray Lake, Storm Property, Treacy Mine / Knight Bay (Treacy), Try Me and West Bay – Blackridge Mine (West Bay). The fieldwork was conducted from September 25 to October 8, 2013. Soil, groundwater, surface water, sediment, plant and fish samples were collected and analysed for chemicals that may be of concern on the mine properties including metals (for example, arsenic) and fuel compounds (for example diesel fuel). The results were used to assess human health and environmental risk with the ultimate goal of developing a combined cleanup plan for the nine sites. The main human health risk issues were eating food gathered from the sites, exposure to soil with elevated arsenic concentrations and breathing indoor fuel vapours if there were buildings on the site. Most of the identified environmental risk issues were isolated to hot spots at the mine sites which could be managed in the cleanup plan to reduce risks

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File Number: 12 404 779 **Licence No:** 15215 (Multi-year licence: 2 of 5 years)
Region: NS **Location:** Bluefish Lake, Prosperous Lake and Yellowknife River between Prosperous Lake and Bluefish Lake

NTPC Bluefish Hydro Repairs
The objective of this study was to describe and monitor the aquatic environment in the Yellowknife River between Prosperous Lake and Bluefish Lake post-construction of the new dam and spillway for the Bluefish Hydro Plant. During construction, a spawning shoal was created for habitat compensation. In 2013, researchers verified the use of the shoal by spawning fish. Sampling methods included: electrofishing, gillnetting, and deployment of egg nets and minnow traps. Tissue samples from slimy sculpin were also collected to monitor changes in mercury levels. Finally, monitoring was undertaken to document water levels and flows in the Yellowknife River and fish migration up from Prosperous Lake. Results from all monitoring will be presented in annual reports to the Mackenzie Valley Land and Water Board and to Department of Fisheries and Oceans.

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File Number: 12 404 772 **Licence No:** 15188
Region: DC **Location:** Prairie Creek

Hydrothermal event recognition and vectoring to SEDEX ore system in shale basins, Yukon and NWT
The objectives of this research were: (1) to identify minerals and chemical elements that might help identify if rocks in a sedimentary basin are likely to be rich in metals; and (2) to understand how metals are concentrated in rocks of a sedimentary basin; and (3) how metals disperse in the environment once the rocks are weathered. Fieldwork was done from August 15 to 27, 2013. It involved the collection of small representative samples from drill holes stored at exploration sites and from outcrops. Small samples of drill cores were taken and will be analyzed in laboratories for their composition. This analysis will help define the mineral and chemical composition of the rocks.

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File Number: 12 404 810 **Licence No:** 15216 (Multi-year licence: 1 of 2 years)
Region: IN **Location:** Between Inuvik and Tuktoyaktuk, more or less along the alignment of the proposed Inuvik to Tuktoyaktuk Highway.

Inuvik – Tuktoyaktuk Highway 2013-2014 Geotechnical Investigations Program
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 404 842 **Licence No:** 15348
Region: NS, SS **Location:** Taltheilei Narrows (Great Slave Lake)

Geochemistry of paleoproterozoic granular iron formations (East Arm of Great Slave Lake)

A study looking at the sedimentation and rock layers of the granular iron formations and associated rock layers (strata) in the East Arm area of the Great Slave Lake was successfully completed from October 9 - December 31, 2013. The research resulted in a set of diagrams showing the rock layers (called stratigraphic sections) and a detailed geological map. Samples of the bedrock were also collected. These rock samples are currently being analyzed at the University of Alberta (tests include: radiometric dating, geochemistry and petrological studies). Analysis is ongoing. Preparation of the rock samples included: cutting the rocks into relatively thin sheets using a high-speed wheel saw and placing them on glass slides to be looked at under the microscope, pulverized rocks into a fine powder to be analyzed for its elements and age using a set of different instruments in the laboratory.

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File Number: 12 404 817 **Licence No:** 15248 (Multi-year licence: 1 of 2 years)
Region: NS **Location:** The Izok Lake deposit and surrounding area

Geoscientific project to study the application of optical spectroscopic remote sensing to detection of the base metal mineralization in the Izok Lake deposit area

The application of optical reflected light spectra collected from rock outcrops and drill cores in detecting hydrothermal alteration minerals that surround the base metal mineralization was evaluated. Fieldwork was conducted July 3-11, 2013 in the Izok Lake Area while stationed in the MMG Izok Lake camp. Almost 600 optical reflected light spectral measurements were made from non-lichen-covered rock outcrops from 100 field stations from 5 selected areas over a 10 x 8 km area. The spectra collected contain important information about the presence of minerals (particularly white mica and chlorite), their relative abundances and their chemical composition. Certain features of these spectra vary systematically and indicate that the composition of several minerals in the outcrops varies, and these variations are spatially related to mineralization and the mineralization process. The newly collected spectra compare favourably with existing ground, laboratory and airborne data, and indicate that both ground and airborne spectral data are useful in the exploration for additional mineralization in the area (and elsewhere in the north in areas of abundant rock outcrop) in a benign (green) manner.

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File Number: 12 404 826 **Licence No:** 15283 (Multi-year licence: 1 of 3 years)
Region: IN **Location:** In and around Inuvik; Illisarvik; Fish Island area

Soil carbon in the Mackenzie Delta Region
Field and laboratory work have been conducted since June 2013 to examine how landscape processes influence the quantity and quality of soil carbon in the Mackenzie Delta region. The research team has traveled to locations both north and south of the treeline and both on and off the Delta to conduct field investigations. Numerous soil profiles and permafrost cores were examined and described in detail, and hundreds of soil samples were obtained and returned to laboratories in Inuvik and Ottawa for further analysis. Field observations suggest that there is generally less organic carbon per square meter in soils of the Delta than in soils of the adjacent uplands, and that the carbon in upland soils is more concentrated near (within ~1.5m) the soil surface than in Delta soils. Differences in carbon content and depth-distribution are less obvious across treeline, but it is likely that carbon is more deeply distributed into soils south of treeline, especially in the uplands. In the coming months, laboratory analysis will show whether these visually observed trends are apparent in the measured soil properties. Summer 2013 was the first field expedition for this ongoing project.

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File Number: 12 404 742 **Licence No:** 15183
Region: IN **Location:** The shelf edge, from the US/Canada EEZ border to McClure Strait

Assessment of the Western Arctic Boundary Current
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 404 640 **Licence No:** 15190 (Multi-year licence: 5 of 5 years)
Region: IN, GW **Location:** Ulukhaktok

Examining the impacts of climate change on aquatic and terrestrial ecosystems of the Mackenzie region, NWT
The objective of this ongoing research is to document the impacts of changing climate on Husky Lakes, especially the impact of thawing permafrost. Up in the mountains the permafrost is melting and the ground is collapsing. Streams flowing into Husky Lake are carrying sediment from these slumps. In 2013, researchers collected tree core samples from two sites on the Campbell Dolomite upland (south of Inuvik) and from three sites near Husky Lakes (south of the Tuktoyaktuk peninsula). Samples were collected for standard tree ring width measurements and to measure wood density. At each site researchers sampled about 10-20 living trees and upwards of 30-40 samples from dead trees lying on the ground. The objectives for the tree ring sampling are: (1) to develop a reconstruction of summer temperature for the Inuvik region over the past 1000 years using changes in wood density as a substitute (or proxy) for temperature changes, and (2) to determine if there is any change in the relationship between summer temperature and wood density in this region during recent decades. Some of the previous

research using total ring width measurements has shown a change in summer temperature data from Inuvik during recent decades, with the growth of trees becoming less sensitive to changes in summer temperatures. Preliminary assessments of the samples, suggests that living trees at the sites ranged from 250-400 years old. Many of these trees began growing sometime between the years 1600-1750. Researchers believe some of the dead samples may have started growing close to 1000 years ago. Analysis of wood density will be completed at the University of Victoria in British Columbia by late Fall 2013. Researchers had planned to collect lake sediments from several small lakes near Fort McPherson in spring 2013. This work did not take place and is anticipated to now occur in spring 2014.

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File Number: 12 404 823
Region: IN

Licence No: 15272 (Multi-year licence: 1 of 4 years)
Location: East Channel lakes area; Reindeer Station lakes area (Mackenzie Delta)

The ecology and paleoecology of benthic macroinvertebrates in the Mackenzie Delta region

Arctic lakes receive large influxes of water, including particulate and dissolved organic matter and nutrients from the surrounding watershed. This ongoing study examines the effects of permafrost degradation on the transport of terrestrial organic matter and nutrients to lakes in the Mackenzie River Delta region near Inuvik. From July 20-31, 2013, 11 lakes were sampled near Reindeer station, and 10 lakes were sampled within the Mackenzie Delta near Inuvik. Water samples, sediment cores, and shoreline sediment samples were collected. Benthic invertebrates (organisms that live on the bottom sediments of rivers, streams, and lakes) were also gathered in a mesh net and preserved. Water samples were transported to the Canadian Centre for Inland Waters (Burlington, Ontario) for analysis at the National Laboratory for Environmental Testing (NLET). Data such as water temperature, oxygen content, and pH were recorded at the time of field sampling. The organisms collected are presently being identified and will be used to determine which environmental variables are responsible for controlling species distributions and whether any particular species show a preference for certain aquatic habitats. Variation among benthic assemblages in these lakes will allow for future study of food web structure. Analysis of sediment cores allows researchers to study responses of aquatic life (biota) to increased nutrients from the catchment. Preliminary results suggest that the bulk organic content of lake sediments has increased in recent years. The analysis of sediments for subfossil (remains that have not yet been fossilized) invertebrate remains ongoing.

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File Number: 12 404 570
Region: DC

Licence No: 15196 (Multi-year licence: 1 of 2 years)
Location: The Scotty Creek drainage area

Understanding and prediction of permafrost thaw impacts on northern ecosystems and water resources

The focus of this research at Scotty Creek was to: (1) understand the rates and patterns of permafrost thaw, and the physical and biological processes that control it; (2) develop science-based tools to predict the rate and pattern of permafrost thaw; (3) understand and predict the impact of permafrost thaw on ecosystems and water resources; and (4) develop appropriate mitigation strategies. Over the last half century, the permafrost cover in the lower Liard River valley has decreased from over 70% to about 40%. In wetland areas, such as in the Jean-Marie, Scotty, Birch and Blackstone river basins, forest cover has reduced by approximately the same amount over the same time period. Although these changes are driven by a warming climate, this research shows that permafrost thaw also starts where trees are removed by fire, disease or by human activities. In 2013, the research focussed on understanding the behaviour of ecosystems with thawing permafrost, so that predictions of the rate and pattern of thaw and associated land-cover change (*e.g*. loss of forest) can be predicted with confidence. Other studies at the 20 hectare Smithsonian Forest Plot were done (http://www.ctfs.si.edu/). Approximately three quarters of all the vegetation in the plot has been identified, mapped and measured. This will provide important base-line information on ecosystem changes caused by climate warming and human disturbance. This year saw the formation of Taiga Plains Research Network (http://taigaplains.ca/). This has expanded the research scope of the Scotty-based studies to other regions in the Territory.

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File Number: 12 404 761 **Licence No:** 15261 (Multi-year licence: 2 of 3 years)
Region: NS **Location:** Acasta River Region

Petrogenesis of the Acasta Gneiss Complex: Ancient Rocks Revisited

The focus of this ongoing research is a set of ancient rocks called the Acasta Gneiss Complex. Fieldwork during the 2013 field season took place from July 11-August 2. During this time researchers used previously published geologic maps and samples collected during the 2012 field season to locate and document more samples of interest. A small (1 km x 1 km) area - containing units of lower strain gradient than many areas with the Acasta Gneiss Complex - was identified and mapped in detail. Rocks of various ages (4.02-3.5 billion years) are suspected to be in this area. Geochemical analysis is ongoing but preliminary results show that enough good quality rocks (which vary in age), were collected to allow researchers to study environment when and where they were formed. Geochemical analysis will continue in the following months. In 2013, samples were collected from a much broader area within the Acasta Gneiss Complex in order to study the ages of the dominant rock units within the larger complex.

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File Number: 12 404 818 **Licence No:** 15249 (Multi-year licence: 1 of 5 years)
Region: IN **Location:** Aulavik National Park; Mould Bay (Prince Patrick Island)

Thermal state of permafrost
The objective of this project is to continue an ongoing long-term monitoring of permafrost temperatures on Banks Island and Mould Bay. On July 24, 2013 researchers spent approximately four hours at a site near Green Cabin on Banks Island and approximately four hours at a site on Mould Bay. During these site visits researchers made upgrades and repairs to the automated data collection instrumentation and collected data from the sites. The data will continue to be collected remotely via Iridium transceiver once per week. More information and access to the remotely collected data can be found at http://permafrost.gi.alaska.edu/site/bis (Banks Island) and http://permafrost.gi.alaska.edu/site/mob (Mould Bay).

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File Number: 12 404 784
Region: NS
Licence No: 15251 (Multi-year licence: 2 of 3 years)
Location: Mackenzie Delta and coastline between Demarcation Point and delta

Airborne measurements of methane (AIRMETH)
The objectives of this study are: (1) to quantify the surface-atmosphere methane emissions over large areas, and (2) to analyse the influence of different surface and vegetation characteristics on large area methane emissions. During the Airborne Measurements of Methane (AIRMETH) 2013 campaign, researchers spent about 35 flight hours measuring heat, carbon dioxide, and methane exchange between the various surfaces of the Mackenzie Delta, Richards Island, and Yukon Coastal Plain area and the atmosphere. Analysis is ongoing.

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File Number: 12 404 657
Region: IN, GW, SA, DC
Licence No: 15207 (Multi-year project: 5 of 5 years)
Location: Jean Marie River; Fort Simpson; Wrigley; Tulít'a; Norman Wells; Fort Good Hope; Tsiigehtchic; Tuktoyaktuk

Permafrost monitoring and collection of baseline terrain information in the Mackenzie Valley Corridor, NWT
Permafrost monitoring sites throughout the Mackenzie corridor, from Fort Simpson to the Mackenzie Delta (Inuvialuit, Gwich'in, Sahtú, Deh Cho regions), were visited in August and September 2013 to acquire ground temperature and active layer data. Data records for about 40 monitoring sites were extended to: better characterize current permafrost conditions; facilitate understanding of the natural variability in permafrost thermal and active layer conditions; and to ensure availability of regional baseline permafrost information to support land management decisions. Permafrost in the discontinuous permafrost zone, which covers a large portion of the corridor, is generally warmer than –2°C. Permafrost in the continuous zone can be colder than -4°C. Permafrost temperatures generally continue to increase in the region although the rate of increase has been smaller in recent years. Continued data collection is planned to better assess the impact of climate change on the permafrost environment. A detailed report, including

graphical and tabular summaries of data, is in preparation and will be sent to relevant organizations in the region.

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File Number: 12 404 548
Region: NS, SA, SS
Licence No: 15192 (Multi-year licence: 5 of 5 years)
Location: Lac des Bois; Simpson Lake; Whitefish Lake; Hepburn Lake; Sulky Lake; Colville Lake

Teleseismic studies in the Wopmay
This study investigated the structure and composition of the Earth's crust and mantle. The researchers were seeking better methods to describe diamond reservoirs in order to make exploration more efficient and low impact. In 2013 existing teleseismic stations were maintained and data collected via satellite connections from sites at Norman Wells, Sulky Lake, Kugluktuk, near Edzo, near Ulukhatok and at Thor Lake. Stations at Hepburn Lake and Colville Lake did not transmit. Four new stations were installed, each about 50 km from Norman Wells, as part of a cooperative project with Scott Cairns of the NWT Geoscience Office to monitor hydraulic fracturing activity. A station at Horafrost Lodge was removed.

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Licence No: 15179 (Multi-year licence: 5 of 5 years)
Location: LOT 2, Block 107 PLAN 4166, Inuvik

PolarDARN (The northern hemisphere polar portion of the international SuperDARN (Super Dual Auroral Radar)
To measure voltage patterns several hundred kilometers above the ground. These patterns project out into space along the Earth's magnetic field lines. Just as high and low pressure systems drive normal weather, high and low voltages drive space weather. The radar network is designed to measure these voltage patterns several hundred kilometers above the ground. These patterns project out into space along the Earth's magnetic field lines. The resulting information is critical to personnel in space and to maintenance of the satellite telecommunications. The radar installation is rather simple, requiring transmitting and receiving electronics in a small building, and antennas outside. The radar requires a local Field Technical Support Officer (from the Auroral Research Institute) for routine checks and maintenance operations. University of Saskatchewan SuperDARN engineers make periodic trips to Inuvik for routine maintenance or on the rare occasions when problems arise that cannot be handled by the Aurora Research Institute personnel. The Inuvik PolarDARN radar has been in operation since 2007.

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File Number: 12 404 806 **Licence No:** 15200 (Multi-year licence: 1 or 4 years)
Region: DC **Location:** Scotty Creek

Influence of changing active-layer thickness on permafrost peatland trace gas exchanges and carbon balance

This ongoing research studies the net exchanges of carbon dioxide, methane, water vapour and heat on an ecosystem-wide scale (using quasi-continuous, non-intrusive measurement made with the eddy covariance technique). In May 2013, researchers successfully mounted micrometeorological instrumentation on the 15m tower in the Scotty Creek watershed and measurements have been running continuously since. Maintenance on the instruments was done in late July (seven days) and in early September (seven days). The researchers are currently analyzing the first few months of measurements.

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File Number: 12 404 806 **Licence No:** 15236 (Multi-year licence: 1 or 4 years)
Region: GW **Location:** Trail Valley Creek; Havikpak Creek

Quantifying carbon fluxes and budgets of boreal forest-tundra landscapes under the influence of rapidly changing permafrost regimes

This ongoing research studies the net exchanges of carbon dioxide, methane, water vapour and heat on an ecosystem-wide scale (using quasi-continuous, non-intrusive measurement made with the eddy covariance technique). Two micrometeorological towers were set up and instrumented at Trail Valley Creek and Havikpak Creek. At each site, the instruments were installed at the end of April 2013 and have been running continuously since. The instruments were serviced and winterized at the end of August. The measurements taken so far are currently being analyzed.

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File Number: 12 404 805 **Licence No:** 15199
Region: DC **Location:** Prairie Creek Mine; South Mackenzie Mountains

Predicting post-closure water quality at a mine in Nahanni National Park

A sampling program at the Prairie Creek Mine, southern Mackenzie Mountains, was carried out in August 2013. Samples of the local lead and zinc mineralization were collected from rock cores stored at the mine site, from surface showings across the property, and from exposures within the underground workings. The primary focus of the research was on sections showing oxidized alteration with a high metal carbonate and trace metal component. Detailed mineralogical and chemical analyses of the samples were done using a variety of techniques. The elements zinc, lead, silver, arsenic, cadmium, copper, iron, mercury, manganese, and antimony were confirmed to be present at variable concentrations within the zinc and lead metal carbonates. Of note, the presence of arsenates, lead-antimony oxide, goethite, and cinnabar were also identified as minor minerals. Understanding where the metals go and what they appear in during the oxidation process will help in understanding where they are likely to end up

following their processing into mine tailings, and subsequent storage within the underground workings after mine closure.

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File Number: 12 404 757 **Licence No:** 15262 (Multi-year licence: 1 of 4 years)
Region: IN **Location:** In the deep waters of the SE Beaufort Sea.

UpTempO: Measuring the Upper Ocean Temperature of the Arctic Ocean
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 404 830 **Licence No:** 15301
Region: IN **Location:** Along the proposed Inuvik-Tuktoyaktuk highway

Stream crossing assessment of select watercourses along the Inuvik to Tuktoyaktuk highway alignment and rare plant survey of select borrow sources
Sixteen watercourse crossings were assessed along the Inuvik to Tuktoyaktuk Highway alignment between August 2-7, 2013. Four of these assessments were done on short-lived watercourse systems at the request of Department of Fisheries and Oceans Canada. These assessments were conducted at crossing locations where the road alignment had changed sufficiently during the final engineering design phase of the project so that the crossings were now outside the previous watercourse assessment areas. Results of this assessment varied little from the assessments conducted at the original crossing sites for these watercourses. Assessment results may differ for some watercourses due to changes in water flow, timing and location. In 2013, nine borrow sources proposed for development during the construction of the Inuvik-Tuktoyaktuk Highway were surveyed for rare plants between August 14-16, 2013. During the surveys, each borrow source was traversed on foot to identify the plant species present and see if there were areas of higher rare plant potential or uncommon plant communities. While areas of higher rare plant potential were found at all borrow sources, there were no rare plants identified during the surveys. Two borrow sources, however, supported uncommon plant communities where an unusual grouping of plant species were found in comparison with the main vegetation types at those borrow sources.

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File Number: 12 404 785 **Licence No:** 15250
Region: IN,GW **Location:** East Channel (at Inuvik and Big Lake); Point Separation; Aklavik Channel; Middle Channel, mid-Delta; West Channel near mouth; Napoiak; Reindeer Channel;

Middle Channel above Reindeer Channel; East Channel at mouth; Peel River above Fort McPherson

Degradation of dissolved organic carbon in Mackenzie Delta lakes and river channels
Fieldwork during the summer of 2013 took place from June 6 - August 4th. During this time, researchers did two helicopter surveys that involved direct landings on river channel sites throughout the Delta, and a series of samples taken from lake sites along Big Lake Channel directly East of Inuvik. These samples will be used to help researchers understand how river and lake water that is exposed to sunlight (solar radiation) may undergo solar decomposition. The process of solar decomposition can cause organic carbon dissolved in lake and river water to be converted to carbon dioxide, certain nutrients and lake dissolved organic matter to be released as inorganic nutrients that can be used directly by algae and bacteria. While the release of carbon dioxide is important for understanding changes in the global carbon cycle, nutrient release can have important implications for organisms that eat algae and bacteria. The results of the experiments done on the samples suggest that solar degradation is an important process for causing carbon dioxide release in river channel sites, but that bacterial degradation is more important at lake sites. The release of nutrients (phosphorus) following solar degradation was minimal.

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File Number: 12 404 720 **Licence No:** 15340 (Multi-year licence: 3 of 4 years)
Region: NS **Location:** Jean Marie River; Fort Providence

Solar Irradiance Monitoring in Jean Marie River and Fort Providence
The majority of Canada's northern communities are dependent on fossil fuels for electricity generation. Due to their remoteness, the cost of transporting diesel fuel to these communities is a large financial burden on territorial governments and utility companies. Renewable energy offers many potential benefits to northern communities. Using wind or solar power in place of diesel can help to reduce particulate and greenhouse gas emissions which contribute to climate change. Solar energy is of particular interest in the southern parts of the NWT, though little irradiance data has been collected in the territory to date. The objective of this ongoing project is to measure solar irradiance levels in Jean Marie River and Ft. Providence, in order to support pre-feasibility studies on the use of solar energy in those communities. In August 2011, solar irradiance monitoring equipment was installed in Jean Marie River and Fort Providence. The sensors have now collected data for more than two years. Researchers are now compiling the data and working on plain language and technical reports, which will be made available at www.nwtresearch.com.

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File Number: 12 402 842 **Licence No:** 15342 (Multi-year licence: 5 of 5 years)
Region: IN, GW **Location:** In and around Inuvik

Northern Native Seed Development Field Trials
No research was completed under this licence during 2013

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File Number: 12 404 776 **Licence No:** 15256
Region: DC **Location:** Scotty Creek research site

Impact of permafrost thaw on carbon storage in peatlands
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

Turner, Elizabeth
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File Number: 12 404 813 **Licence No:** 15231
Region: SA **Location:** Selwyn Mountains

Stratigraphy of the Hyland Group, Selwyn Mountains
No research was conducted under this licence in 2013.

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File Number: 12 404 585 **Licence No:** 15180 (Multi-year licence: 2 of 2 years)
Region: GW, SA **Location:** Misty Creek Embayment

Stratigraphy of the Misty Creek Embayment
No research was conducted under this licence in 2013.

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File Number: 12 404 801 **Licence No:** 15293
Region: IN **Location:** Fish River

Late Cretaceous Palaeontology of northwestern Northwest Territories, Canada
Over a period from July 13 to 21, a research field team travelled to a number of different rock exposures along the Big Fish River and other nearby rivers along the western edge of the Mackenzie Delta. Researchers worked both in the Northwest Territories and the Yukon (many of the sites were on the border). Despite their goal, researchers did not find any fossils of vertebrates (animals with backbones) from the end of the Cretaceous period (80-65 million

years ago). However, they did recover a number of leaf impressions from along Aklak Creek, as well as several pieces of fossil wood from along Big Fish River. All of the fossils that were recovered in the Northwest Territories will be at the Royal Ontario Museum in Toronto, where they are kept with other fossils collected from previous expeditions to the Northwest Territories. Several of the fossil wood pieces have been sent to a researcher in Germany who works on the microstructure of ancient trees. Work is ongoing to describe these fossils.

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File Number: 12 404 809 **Licence No:** 15210 (Multi-year licence: 1 or 5 years)
Region: NS **Location:** Lac de Gras

Diavik aquatic effects monitoring program
The 2013 aquatic effect monitoring program at Diavik studied the following water parameters: water quality; zooplankton and phytoplankton biomass and taxonomy; benthic invertebrates; and sediment chemistry. This program also included dust monitoring and small and large body fish health (slimy sculpin). The program was successfully completed without incident. Data analysis and reporting are currently in progress. The final report will submitted to the Wek'èezhìi Land and Water Board and published for review on the Wek'èezhìi Land and Water Board public registry.

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File Number: 12 404 843 **Licence No:** 15349 (Multi-year licence: 1 of 5 years)
Region: NS, SS **Location:** Courageous Lake

The Courageous Lake Project
The goal of this ongoing research project is to collect baseline data at Courageous Lake to characterize the environmental (physical and biological), social and economic setting in the proposed project area. In June 2013, the wildlife program included replacing camera cards and batteries in remote cameras around Courageous Lake. Eight remote cameras were successfully set up surrounding the wind tower in August 2013. Four cameras were placed around the base of the tower to provide views of the tower from all directions. Meteorological data, including temperature, pressure, wind speed and direction, precipitation, and solar radiation were collected and downloaded. Water quality sampling was completed in 2012. The cumulative aquatics baseline information was published.

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File Number: 12 404 798 **Licence No:** 15294
Region: IN **Location:** 25 coastal monitoring sites (Shingle Point; Tent Island; Ellice Island; Garry Island; Pelly Island; Hooper Island;

Kendal Island; Taglu; North Head; Pipeline Harbour; Kitigazuit Bay; Pingo Canadian Landmark; Tuktoyaktuk; Toker Point; Drift Point; Atkinson Point; McKinley Bay North; McKinley Bay South; Russell Inlet; Topkak Point; Tuft Point; Drift Point; Warren Point; Pipeline Harbour; Cape Dalhousie)

Beaufort Sea coastal geoscience research 2013
The objectives of this research were to: (1) monitor coastal change along the Beaufort sea coastline; (2) monitor delta subsidence (sinking) in the modern Mackenzie Delta climate change; and (3) expand the knowledge of near shore sedimentation in Kugmallit Bay, in particular the approaches to Tuktoyaktuk Harbour. A small field program was conducted in the summer of 2013 to update rates of coastal change at a number of sites along the Yukon, Richards Island and Tuktoyaktuk Peninsula coastlines. These precisely-positioned RTK-GPS ground measurements are being used to update the coastal monitoring database and highlight processes of change over time at specific sites. A total 17 sites were visited, which included the re-establishment of several sites that have not been visited in over 20 years. The coastal change assessment will provide a valuable baseline for future coastal studies in the region.

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File Number: 12 404 802 **Licence No:** 15252 (Multi-year licence: 2 of 3 years)
Region: NS **Location:** White Truck Site; Boundary creek; Mosquito creek

Carbon Cycling Linkages of Permafrost Systems [CYCLOPS]
The purpose of this ongoing research is to develop, parameterize and evaluate a detailed process-based model of vegetation-soil-permafrost interactions using data collected through directed field campaigns in the discontinuous and sporadic permafrost zones of western Canada. The researcher visited each of the field sites in 2013 to determine the locations where measurements will be taken in 2014. These were marked out with small amounts of tape, and positions recorded by GPS. Soil and air temperature sensors were left at each site to monitor winter conditions.

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File Number: 12 404 811 **Licence No:** 15224
Region: SA **Location:** Mackenzie Mountains

The search for early fossil sharks in Lower Devonian rocks of the Mackenzie Mountains, NWT
Silurian and Lower Devonian rocks in the Mackenzie Mountains yield some of the most important early vertebrate fossils, both those lacking jaws and those with jaws. A University of Alberta field team of six, led by Drs. Mark Wilson and Todd Cook, was in the field July 15–24, 2013, arriving at the staging area near Tungsten by truck and flying into and out of the field area

near the Broken Skull River by helicopter. The fossil site called MOTH is a Lagerstätte (fossil deposit with abundant, diverse, and well-preserved fossils) in the Delorme Group. A special focus was the search for some of the earliest known relatives of sharks, after a few fragments were found earlier. Many new early vertebrate fossils of Late Silurian to Early Devonian age were recovered. They include armoured jawless vertebrates called heterostracans and osteostracans, armoured early vertebrates with jaws known as placoderms, and early fishes known as acanthodians with both jaws and teeth. Although fossil preparation continues, additional relatives of sharks have not yet been found. The recovered fossils are being used in ongoing studies of the anatomy of osteostracans and heterostracans and of growth, development, and function of jaws and teeth in acanthodians.

Wolfe, Stephen
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File Number: 12 404 549
Region: NS

Licence No: 15208 (Multi-year licence: 4 of 5 years)
Location: Ingraham Trail; Baker Creek Watershed; along the Tibbit to Contwoyto Winter Road based out of the Lockhart and Lac de Gras facilities

North Slave permafrost study: Characterizing and predicting discontinuous permafrost for climate change adaptation

The overall objective of this research is to describe and predict the occurrence of discontinuous permafrost in the northern Great Slave Lake region to assist in planning, development and maintenance of community and industry infrastructure. In 2013, the North Slave Permafrost study finished investigations and published results of ice-rich terrain mapping between Yellowknife and Behchokǫ̀, and surficial mapping of Hearne Lake (NTS 85I). Surficial mapping using remote sensing methodologies were done for Marian River and Rae. New ground temperature instruments for monitoring were installed north of Dettah, near the Ingraham Trail (in partnership with the Yellowknives Dene First Nation). Shallow permafrost coring studies were done to investigate variability in near-surface ground ice conditions. Data from all other air and ground temperature monitoring sites along NWT Highway 3 and the Tibbitt to Contwoyto Winter Road were collected. A remote sensing investigation of the historical frequency and distribution of winter overland flow (e.g. icings, naled, aufeis) was started, in addition to monitoring of selected icings.

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File Number: 12 404 837
Region: IN, GW

Licence No: 15316 (Multi-year licence: 1 of 5 years)
Location: Paulatuk; Sachs Harbour

EarthScope Transportable Array

Researchers visited Sachs Harbour from March 27-28, 2013 to find a location for a seismic station. This seismic station (named: A36M) was installed on September 2, 2013 in Sachs Harbour and data collection has been ongoing since. Data from this seismic instrument can be viewed online at: http://rev.seis.sc.edu/stations/TA/A36M. Another seismic station was installed

on August 21, 2013 in Paulatuk. Data collection from this seismic instrument has been ongoing since, and can be viewed online at: http://rev.seis.sc.edu/stations/TA/C36M. Data is available to the public at the IRIS DMC (http://www.iris.edu/dms/nodes/dmc/).

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File Number: 12 404 814 **Licence No:** 15241 (Multi-year licence: 1 of 3 years)
Region: IN, GW **Location:** Trail Valley Creek; Havikpak Catchment

Permafrost regions in transition: controls on carbon cycling and greenhouse gas emissions

This ongoing research tries to understand what factors affect the amount of carbon stored in tundra soils, and the conversion of this soil carbon into greenhouse gases (carbon dioxide and methane). 2013 was the first major field season for this project, and researchers went on four successful field campaigns at Trail Valley Creek between June and September. Each trip was between five to ten days long and included three to five people. The fieldwork involved: (1) measuring net ecosystem exchange (NEE) of carbon dioxide in three vegetation community types; (2) establishing three transects for measurement of plant, soil and active-layer properties; and (3) collecting soil and surface water samples for analysis of carbon fluxes and turnover (cycling) times. The surface water samples have now been analysed for dissolved organic and inorganic carbon content, and oxygen and hydrogen isotopes. The soil samples will be submitted for radiocarbon analysis to estimate carbon turnover times. Researchers have also set-up a weir (V-notch) on Siksik Creek to measure headwater stream hydrology and chemistry. Instruments (loggers) were set-up in key landscape to record temperature, soil and surface moisture. For more information see: http://arp.arctic.ac.uk/projects/hydrological-controls-carbon-cycling-and-greenhous/

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File Number: 12 404 711 **Licence No:** 15194 (Multi-year licence: 3 of 5 years)
Region: IN **Location:** Noell lake

Noell Lake ice study - Hydro-ecological responses of arctic tundra lakes to climate change and landscape perturbation

The objective of this ongoing research is to improve knowledge of lake ice and its effect on food webs and productivity in arctic tundra upland lake systems. Researchers developed a prototype automated ice buoy/subsurface mooring system that measures weather, lake ice, and core water quality parameters. The system was first used in Noell Lake during fall of 2010 for testing and validation. To provide additional information for further validation of the system, 2013 fieldwork included: a detailed ice survey on Noell Lake at the end of winter; and seasonal manual grab samples for standard water quality and aquatic biological parameters. In summer, the monitoring system was removed from the lake and shipped south for servicing (refurbishing and instrument recalibration). Although validation of the system is not fully complete, it is clearly evident that when the system is functioning properly, it is produces datasets as designed. Now

that researchers are confident that all the “bugs” have been worked out of the prototype system, they plan to return the system into Noell Lake. Data collected from the lake monitoring system are already allowing researchers to examine lake ice and its effects on the food web/productivity through the winter, and food webs/productivity during the ice-free season.

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File Number: 12 404 816 **Licence No:** 15246 (Multi-year licence: 1 of 5 years)
Region: IN, SA, DC, NS, SS **Location:** Schools in Inuvik, Aklavik, Tuktoyaktuk, and Paulatuk

Community based permafrost and active layer monitoring program
The objectives of this ongoing project are: (1) to establish permafrost and active layer monitoring sites adjacent to schools and; (2) to acquire data that will be used to develop a circumpolar ground temperature database. In 2013, researchers installed active layer monitoring stations in school properties of the following communities: Aklavik, Inuvik, Tuktoyaktuk, and Paulatuk. Students and science teachers are involved monitoring efforts and will continue to work with the researchers. Data is not being collected yet, but it is hoped to be in 2014. Data from other community sites is available at: http://issuu.com/permafrostbook.

Social Sciences

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File Number: 12 410 975
Region: IN
Licence No: 15430 (Multi-year licence: 1 of 4 years)
Location: Tuktoyaktuk; Ulukhatok

User-driven monitoring of adverse marine and weather states, Eastern Beaufort Sea
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 410 966
Region: IN, GW, SA, DC, NS
Licence No: 15356
Location: Inuvik; Fort McPherson; Tsiigehtchic; Fort Good Hope; Norman Wells; Tulít'a; Fort Simpson; Wrigley; Yellowknife

Northern frontier, northern homeland: An examination of the impacts of the Mackenzie Valley Pipeline inquiry on hydrocarbon development in the Northwest Territories 1977-2013
The objective of this research was to determine how key recommendations from the Mackenzie Valley Pipeline Inquiry have affected oil and gas development in the Northwest Territories over the past thirty-six years. Researchers were involved with setting-up research and consultation in 2013. Specifically, researchers worked with the Gwich'in Social and Cultural Institute to arrange interviews in the region. No interviews were done in 2013.

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File Number: 12 410 941
Region: NS
Licence No: 15212
Location: Yellowknife

Influences on the quality of life of older adults in the Northwest Territories
This objective of this ongoing project is to engage older adults living in the NWT to identify the current actual and potential influences upon and threats to their quality of life. Sampling began with focus groups held at the NWT Seniors' Society's 30th Anniversary Celebration in Yellowknife on February 28, 2013. Approximately 20 older adults representing various communities across the NWT attended. A follow-up focus group and member-checking session was held at the NWT Seniors' Society's Annual General Meeting on September 4, 2013. In addition, the Executive Director for the NWT Seniors' Society, Barb Hood, has been actively recruiting older adult participants from agencies in her established network in the Territory since February. To date, the research team has conducted two focus groups and approximately 8 semi-structured telephone interviews. More interviews are pending. All data is being audio recorded and transcribed. Data collection and analysis are occurring iteratively.

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File Number: 12 410 582 **Licence No:** 15245
Region: NS, SS **Location:** Yellowknife; Enterprise; Aklavik; Fort Liard; Ulukhaktok

Cultural safety of physical activity programming for Aboriginal elders
The objectives of this study were: (1) to understand if and how the Northwest Territories Recreation and Parks Association's (NWTRPA) Elders in Motion program is adapted for NWT communities; and (2) to understand the challenges that program leaders and communities have faced in running Elders in Motion and how they have dealt with these challenges. Nine semi-structured interviews were conducted, seven with program leaders from across the NWT and two with Recreation and Parks' staff. Documents from the NWTRPA were analyzed, including annual reports, previous evaluations, and program material. The findings show that the Elders in Motion program demonstrates an attempt to offer culturally relevant programming for older Aboriginal adults in the NWT. It challenges some colonial practices by: (1) developing program material with a northern theme; (2) incorporating plain language into all documents; and (3) visiting each community that is interested in running the program. There are still some colonial aspects of Elders in Motion, including: (1) few culturally relevant activities for the participants; and (2) little consideration of the diversity of Aboriginal peoples and cultures throughout the NWT. Based on these findings, program recommendations were offered to further challenge colonial practices and be more culturally relevant for its Aboriginal participants.

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File Number: 12 410 956 **Licence No:** 15303
Region: DC, NS **Location:** Trout Lake; Yellowknife

Water and social well-being in the Northwest Territories
During the summer of 2013 a researcher from the University of Waterloo worked with the community of Somba K'e on a water values project. The project involved two sets of interviews – one with community members to better understand the reasons that they value water (other

than economic reasons), and one with decision-makers to better understand how those values can be included in decision-making. The research found that community members valued water more for spiritual, culture and family reasons than for economic reasons. The results from the decision-maker interviews revealed that there are many challenges in the current water-related decision-making system that make it difficult for community members to get their values included. The research found that the most effective way to fix this barrier is to develop a new tool that can be used to help decision-makers better understand the community water values that are not being fully included in decisions. Although ideas about what the tool may actually look like varied among respondents, most people agreed that the tool should be used before public consultation discussions about water take place, in order to ensure that community water values have been investigated and documented.

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File Number: 12 410 942 **Licence No:** 15220 (Multi-year licence: 1 of 2 years)
Region: NS **Location:** First Peoples doctoral candidates who are currently enrolled in various universities throughout Canada

Trajectories of scholastic achievements: An oral history study of lived experiences of selected first peoples doctoral scholars on their path to doctoral education

No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 410 952 **Licence No:** 15279
Region: IN **Location:** Ulukhaktok

Inuit travels in contemporary times

The purpose of the project was to explore Ulukhaktokmiut travels to unfamiliar or less familiar places for a short period of time (2 days to 2-3 weeks usually), for business or leisure, training, visiting, sports events, health care etc. “Unfamiliar” and “less familiar places” are understood as places outside of the traditional territory and that can only be reached by plane. These places could include: other Inuit communities; regional centers such as Inuvik and Yellowknife; southern cities in Canada; and abroad. Over the last 20 years such trips have become part of Inuvialuit people’s lives, yet no-one has ever really looked into it. How often do people take the plane to travel somewhere? Where? For how long? For which purpose? With whom? How is the trip organized and how is it remembered later on? In 2013, a survey and set of interviews was done to examine these questions. It focused on the Inuit adult population, born between 1930 and 1990. The main results showed that 48% of all trips were completed for medical reasons, and that 46% lasted less than a week. They also revealed the importance of sharing and of companionship during travels.

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File Number: 12 410 944
Region: SA
Licence No: 15227 (Multi-year licence: 1 of 5 years)
Location: Fort Good Hope; Chief T'Selehye School and community youth group

Aboriginal youth stories of culture, identity, community and place: A rural/urban educational youth exchange through performing arts and technology

To support the education of Aboriginal learners this study develops a partnership between the University of Alberta, three First Nations community schools: T'Selehye School, Fort Good Hope, Northwest Territories; Tatsikiisaapo'p Middle School, Kainai Reserve, Alberta; Ben Calf Robe-St. Clare School, Edmonton, Alberta; and organizations that support those schools. The partnership will collaborate for curriculum exploration, development and theorizing to support learning for Aboriginal youth to be productive participants in mainstream society, grounded in their Indigenous cultures, histories, languages. We will research promising educational practices using the creative arts and youth exchange through digital technology, for engaging Aboriginal learners across culturally diverse and geographically isolated locations. The study offers a unique opportunity for community partners to work together around shared interests, and for youth to build relationships with youth in other communities, to creatively express their understandings of who they are; to share expressions of pride in cultural identity and give voice to the challenges they face, creating emergent opportunities for them to enhance identity and nurture success. For phase 1 of the project (June 2013-June 2014) researchers traveled to each community and held meetings to gather community input. Phase 2 of the project (August 2014) brought representatives from the three communities together in Edmonton for a meeting and exchange.

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File Number: 12 410 940
Region: NS
Licence No: 15206 (Multi-year licence: 1 of 2 years)
Location: telephone interviews with Dechinta graduates

Building Economic and Social Prosperity: Connecting a Northern University Vision Through Dechinta Bush University

No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 410 896
Region: NS
Licence No: 15304
Location: Yellowknife

NWTIS and CFIS Data Study

The Canadian Chronic Disease Surveillance System (CCDSS) is the core system for chronic disease surveillance in the NWT. The CCDSS uses population-based administrative data to identify diabetes and hypertension cases. This study sought to validate the information in the CCDSS using patient charts, and assess whether the Electronic Medical Records (EMR) system could be substituted for the CCDSS in determining chronic disease prevalence. Data was used from patient charts in both Behchokǫ̀ and Norman Wells, and from the Electronic Medical Records (EMR) system in Hay River and Yellowknife. Total agreement and kappa coefficients with 95% confidence intervals were calculated for each community. The strength of agreement between paper charts and CCDSS data was high, while the strength of agreement between CCDSS and EMR data was moderate to low. The difference between the paper charts and the EMR in agreement with the CCDSS registries suggests that using search parameters within the EMR system is not sufficient to identify patients with chronic conditions at present. The CCDSS remains the most accurate tool to calculate chronic disease prevalence statistics.

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File Number: 12 410 951 **Licence No:** 15264
Region: IN, NS **Location:** Inuvik; Yellowknife

Devolution of Power and Aboriginal Education in Canada: The Impact of Structure and Jurisdiction

No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 410 914 **Licence No:** 15282 (Multi-year licence: 1 of 2 years)
Region: GW **Location:** Tsiigehtchic

Exploring the history of education in the Mackenzie Valley Region, 1940-1996

The objective of this research is to examine the history of education in the Northwest Territories from 1940 to 1996. The researcher is developing a historical narrative explaining the changing nature of education over this time. During the summer of 2013, the researcher lived in Tsiigehtchic and maintained an office at the Gwich'in Social and Cultural Institute (GSCI). Formal and informal interviews were done with former students, teachers, and administrators regarding the history of education in the Inuvik Region from the 1950s until the 1990s. Interviews took place in people's homes, at the GSCI office, while taking part in harvesting acts, Dene Nation and GTC meetings, and local cultural activities. An important part of the researcher's approach is to engage with the larger community, meet new people, and strengthen relationships with existing friends and family who live in the region.

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File Number: 12 410 914 **Licence No:** 15298 (Multi-year licence: 1 of 3 years)
Region: IN, GW **Location:** Inuvik

Exploring the history of education in the Mackenzie Valley Region, 1940-1996
The objective of this research is to examine the history of education in the Northwest Territories from 1940 to 1996. The researcher is developing a historical narrative explaining the changing nature of education over this time. During the summer of 2013, the researcher lived in Inuvik and maintained an office at the Gwich'in Social and Cultural Institute (GSCI). Formal and informal interviews were done with former students, teachers, and administrators regarding the history of education in the Inuvik Region from the 1950s until the 1990s. Interviews took place in people's homes, at the GSCI office, while taking part in harvesting acts, Dene Nation and GTC meetings, and local cultural activities. An important part of research's approach is to engage with the larger community, meet new people, and strengthen relationships with existing friends and family who live in the region.

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File Number: 13 410 914 **Licence No:** 15300 (Multi-year licence: 1 of 2 years)
Region: GW **Location:** Fort McPherson

Exploring the History of Education in the Mackenzie Valley Region, 1940-1996
The objective of this research is to examine the history of education in the Northwest Territories from 1940 to 1996. The researcher is developing a historical narrative explaining the changing nature of education over this time. During the summer of 2013, the researcher visited Fort McPherson on several different occasions. Formal and informal interviews were done with former students, teachers, and administrators regarding the history of education in the Inuvik Region from the 1950s until the 1990s. Interviews took place in people's homes, while taking part in harvesting acts, Dene Nation and GTC meetings, and local cultural activities. An important part of research's approach is to engage with the larger community, meet new people, and strengthen relationships with existing friends and family who live in the region.

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File Number: 12 410 914 **Licence No:** 15299 (Multi-year licence: 1 of 2 years)
Region: IN, GW **Location:** Aklavik

Exploring the history of education in the Mackenzie Valley Region, 1940-1996
The objective of this research is to examine the history of education in the Northwest Territories from 1940 to 1996. The researcher is developing a historical narrative explaining the changing nature of education over this time. During the summer of 2013, the researcher visited Aklavik on several different occasions. Formal and informal interviews were done with former students, teachers, and administrators regarding the history of education in the Inuvik Region from the 1950s until the 1990s. Interviews took place in people's homes, while taking part in harvesting acts, Dene Nation and GTC meetings, and local cultural activities. An important part of

research's approach is to engage with the larger community, meet new people, and strengthen relationships with existing friends and family who live in the region.

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File Number: 12 410 959
Region: IN, GW

Licence No: 15329
Location: Online and phone surveys with past and present participants of the Arctic Borderlands Ecological Knowledge Co-op

Arctic Borderlands Ecological Knowledge Co-op: Community and individual Engagement Analysis

No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 410 969
Region: NS

Licence No: 15365
Location: Yellowknife

Mining a better future: Policies to address labour force adaptation concerns and the impacts of resource development on isolated communities in Nunavut

No research was conducted under this licence in 2013.

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File Number: 12 410 906
Region: NS

Licence No: 15184 (Multi-year licence: 3 of 5 years)
Location: 2009 - 2012 Statistical data from the RCMP on all NWT communities based on GIS mapping results of incidents and services for women who experience intimate partner violence

Rural and Northern Community Response to Intimate Partner Violence

The goals of this ongoing research is to: (1) integrate several sources of data to create an action plan that maps the problem of intimate partner violence; (2) create narratives describing community responses to this violence; and (3) to generate a grounded theory as a practical tool to create and sustain non-violent communities. In 2013, data was collected from front line workers in the Northwest Territories addressing the northern and community response to intimate partner violence. A preliminary analysis of the data has been completed and presented at a research team meeting in Regina.

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File Number: 12 410 953 **Licence No:** 15286
Region: IN **Location:** Beaufort region

Suitability of Delphi to address oil and gas development questions in a co-management system
No research was competed under this licence.

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File Number: 12 410 642 **Licence No:** 15166
Region: IN, SS **Location:** Helen Kalvak School (Ulukhaktok); two schools within the South Slave Education District

Young Canadians in a Wired World Phase III
A classroom survey was administered in 2013 to 5,436 Canadian students in grades 4 through 11. Students were recruited through school boards and schools in all 10 provinces and three territories. The survey instrument, consent documents, recruitment text, instructions and method of analysis were approved by the University of Ottawa Research Ethics Board**.**

The purpose of the survey was to explore the benefits and challenges children experience when they use networked devices such as computers, tablets, cell phones and iPods. The survey explored the social codes young people develop with respect to their online social interactions and their attitudes about online issues such as privacy, cyberbullying, sexting and offensive and hateful content. It also explored the ways young people use online media to support their learning (both in and out of school) and to create content. The research findings were released in a series of six reports in 2014. The findings reveal Canadian children and teens are more connected than ever before through a variety of mobile devices and social networking platforms. The study also highlights the important role parents and teachers play in mitigating online risks by educating youth about Internet issues and teaching digital literacy skills. (http://mediasmarts.ca/research-policy).

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File Number: 12 410 883 **Licence No:** 15325
Region: DC **Location:** In and around Jean Marie River

Food security and drinking water vulnerability assessment related to permafrost degradation in the Jean Marie River First Nation
The main objective of this ongoing permafrost project is to provide Jean Marie River with a mapping of permafrost areas (used for subsistence purposes) that are sensitive to permafrost

degradation. The project also assesses our community's vulnerability to food security in relation to country foods, in the context of climate change. The project results show that: (1) significant landscape changes have been observed (ex. many trees are falling and large forested areas are being replaced by wet areas and muskegs); (2) approximately 50% of the study area has a medium to high vulnerability to permafrost thaw; (3) the resulting landscape changes negatively affect the wildlife and their behavior, which also affects hunting and trapping activities; (4) country food supplies are reduced and more difficult to access; (5) the impact assessment on food security shows that these changes have and will have considerable impacts on country food; and (6) the permafrost present on our land is warm and close to degradation. Several areas already are experiencing severe degradation processes. With the ground temperature being close to 0°C, it is possible that the degradation process will be completed in only a few decades. This information gives an approximate timeframe to develop our adaptation strategies.

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File Number: 12 410 648 **Licence No:** 15327 (Multi-year licence: 1 of 2 years)
Region: NS, SS **Location:** Dettah; N'dilo; Yellowknife; Łutsel K'e.

Phonetics and phonology of two northern Athabaskan languages
The objectives of this ongoing project are to produce two published materials, in Tłı̨chǫ (Dogrib) and Dene Sųłiné (Chipewyan): an intermediate-level reader and a verb dictionary. In 2013, researchers continued work on the verb dictionaries in both languages, Weledeh (Tłı̨chǫ/Dogrib) and Chipewyan, as well as transcribing elders' stories. At the request of elders in the community, including especially the late Michel Paper, researchers also began preparing a booklet of hymn songs, based on the 1904 "Prières, Catéchisme, et Cantiques," in both roman script and syllabics. The booklet should be ready sometime in early 2014, and the hope is to begin singing practice in N'dilo, as there are many people eager to learn how to sing the old hymns. Researchers also worked on a bingo game for children, "AEIO", in Chipewyan, with the help of Celine Marlowe from Łutsel K'e, for her to use in her classroom.

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File Number: 12 410 882 **Licence No:** 15305 (Multi-year licence 1 of 3 years)
Region: NS **Location:** N'dilo, Dettah and Yellowknife

Risk communication and trust in decision-maker action: Lessons from First Nations, Inuit and Métis case studies in Canada
Pilot focus groups and interviews were conducted with six members of the Yellowknives Dene First Nation. Data collection has been delayed because of tragedies within the community. It is hoped that focus groups and interviews will be held in 2014.

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File Number: 12 410 882 **Licence No:** 15326 (Multi-year licence 1 of 2 years)
Region: NS **Location:** N'dilo; Dettah

Exploration of physical activity within the sociocultural context of Yellowknives Dene First Nations communities

Physical inactivity is a risk factor for chronic diseases that disproportionately affect Aboriginal populations. Acquiring a culturally relevant view of physical activity is important for developing effective health promotion programs. Addressing physical activity at a community level can have benefits beyond healthy lifestyle, but also community engagement and participation. This research is a collaboration between the University of Alberta and the Yellowknives Dene First Nation (YKDFN) Community Wellness Program, exploring how physical activity is practiced culturally and on a day-to-day basis in the community. The researchers spent three weeks in the community and on traditional land during a cultural camp with 19 YKDFN youth age 8-18. Here they filmed, photographed, edited, and discussed what physical activity means. The videos and conversations with the youth were recorded, transcribed, and analysed for themes. Preliminary versions of the movies were shown to three groups of community members and workers (11 participants). Input about the video content led into a larger conversation about physical activity practices in the community, active living, and healthy lifestyle. Participants shared insights and brainstormed ideas to motivate the community to be active together. These mini focus group discussions were video and audio recorded and transcribed for content analysis. Final videos and research results were shared with community members. The ideas generated by the youth and discussion participants were presented and voted on by the community members; and the Wellness Program will follow through with the top idea in the coming year. This project demonstrates the various ways in which one First Nation community stays active. Traditional physical activity and life on the land are critical for the Dene people's health and wellbeing. This research raises critical consciousness of the communities about physical activity, and empowers communities to take actions themselves to improve engagement and healthy lifestyle. Lessons learned here can benefit health promotion programs in the communities, and contribute to a deeper understanding of community-level physical activity among Canadian Aboriginal peoples.

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File Number: 12 410 882 **Licence No:** 15366 (Multi-year licence: 2 of 3 years)
Region: NS **Location:** N'dilo

Engaging Aboriginal youth in tobacco prevention using social media

This ongoing research explores whether a social media intervention developed by Aboriginal youth (videos to be available through YouTube) using a participatory approach can be an effective means for encouraging smoking prevention and/or cessation amongst youth and others in Aboriginal communities. To date, three teams involving a total of 12 high school students from the K'Álemì Dene School in N'dilo have completed their social media videos aimed at tobacco prevention and cessation. Each team produced, directed filmed and edited their own videos. The youth have showcased their videos to other students, parents, elders and community members at their monthly circle ceremony at K'Álemì Dene School and during the schools' year end celebration. They also came to Edmonton, Alberta to meet the Aboriginal students from the Queen Elizabeth School working on the same project, where they had an

opportunity to learn about each other's cultures and view each other's videos. Together, the K'Álemì Dene and Edmonton youth attended the Youth Day of the Dreamspeaker's Aboriginal film festival to learn more about film production (May 2013). Youth from both locations also attended the Yellowknife International Film Festival (October 2013). To determine youth expectations and experiences group interviews were conducted with the youth at the start of the project (March 2013), after the videos were completed (June 2013) and a longer term follow-up interview after the Yellowknife film festival (October 2013) was completed. One-on-one interviews were also conducted with the K'Álemì Dene School administrative staff participating in the project. Researchers are in the initial stages of interview analysis and will be able to provide final results by the end of the 2014 calendar year.

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File Number: 12 410 962 **Licence No:** 15344
Region: NS **Location:** Yellowknife

Mining Compliance Process in Northern Canada

The goal of this research was to examine compliance processes for mining regulation in the North and identify ways in which they can potentially be improved. The research team (comprised of six young Canadian leaders) hosted a roundtable on August 27, 2013 to meet with northern experts in the mining sector. The event, held at the Prince of Wales Northern Heritage Centre, aimed to engage Aboriginal organizations, local community, government representatives and business leaders to hear their ideas on how mining in the NWT can prosper and benefit the north over the long term. The roundtable was a valuable process and provided an opportunity to be informed by northern leaders. This was a unique opportunity for researchers to deepen their understanding of the issues. The roundtable included discussions on: (1) the compliance process for northern mining regulation; (2) the development of a Heritage Fund in the NWT; (3) the remediation process when a mine plans to close; and (4) identifying opportunities for investment in mining in the Territory.

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File Number: 12 410 955 **Licence No:** 15292
Region: IN, GW, NS, SS **Location:** NWT communities

Gettin' F.O.X.Y: Exploring the development of self-efficacy among young women in the Northwest Territories

The objective of this study was to evaluate the effectiveness of the Fostering Open eXpression among Youth (F.O.X.Y.) intervention, a program designed to empower young NWT women and facilitate dialogues about sexual health issues in the North. Data collection for this study occurred in fall 2013. Over this time, 47 young women in six communities who had participated in F.O.X.Y. workshops (aged 13-17) were interviewed. Data analysis in ongoing and will be made available when completed.

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File Number: 12 410 576 **Licence No:** 15225
Region: NS **Location:** Yellowknife; Behchokǫ̀

Seeking common ground: An ethnographic narrative of professional practices, and the marginalization of community ways of knowing
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 410 946 **Licence No:** 15242 (Multi-year licence: 1 of 2 years)
Region: NS **Location:** Yellowknife; Behchokǫ̀

Geographic information science (GIS) as a health communication tool for consultation with stakeholders in environmental assessment of the Nico Project in the Tłı̨chǫ region
The overall objective of the research is to evaluate the use of Geographic Information Systems (GIS) as a health communication tool for consultation with stakeholders in environmental assessment of the Nico Project in the Tłı̨chǫ Region. By documenting stakeholder's evaluation of GIS in the environmental assessment, the research will help to inform best practices and procedures for communicating about health impacts in future environmental assessments, and promote meaningful consultation during regulatory approvals for potential natural resource developments. The research aimed to support regional stakeholders and parties to environmental assessment in the Mackenzie Valley to evaluate the potential for using GIS to assess health impacts during environmental assessment. The fieldwork took place May to October 2013. A set of semi-structured interviews with stakeholders in the Nico environmental assessment including the Tłı̨chǫ Government, the Government of the Northwest Territories, Fortune Minerals, Golder Associates, the Wek'èezhìi Land and Water Board, and the Mackenzie Valley Environmental Impact Review Board was completed. Participants were provided with their transcripts, a research report, and knowledge translation materials, to facilitate the opportunity for their review and revision. Analysis is complete, and research has moved into the publication stages.

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File Number: 12 410 958 **Licence No:** 15323 (Multi-year licence: 1 of 2 years)
Region: SA **Location:** Tulít'a

Youth-led adaptations for healthy Sahtú Communities in an uncertain era of climate change

The objectives of this ongoing project are: (1) to build the foundation for a support network amongst Sahtú communities; and (2) to help strengthen all of the communities' resilience in addressing the challenge of health risks related to climate change through establishing health programs that proactively address climate change and reflect the holism of Dene stories. In 2013, field activities included a planning workshop in Tulít'a in September. Participants included six knowledge holders (four Elders and two harvesters), together with the local Health and Climate Change Research Coordinator Intern, the Executive Director of the Sahtú Renewable Resources Board, and co-investigator Tee Lim. The discussion focused on the need for careful, advance planning of trips out on the land with groups of youth, which informed the on-the-land learning component. In mid-September, the project supported youth participation in the community fall hunt at Caribou Flats, as a means of on-the-land learning. Interviews or other formalized research activities did not take place.

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File Number: 12 410 961 **Licence No:** 15343
Region: NS, SS **Location:** Yellowknife; Fort Smith

The prospects for collaborative approaches to transboundary water governance: the Mackenzie River Basin

No research was conducted under this licence in 2013.

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File Number: 12 410 968 **Licence No:** 15362 (Multi-year licence: 1 of 2 years)
Region: DC, SS **Location:** Kátł'odeeche First Nation; Hay River Reserve; Yellowknife

Community technology development and use in Kátł'odeeche First Nation

No research was conducted under this licence in 2013.

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File Number: 12 410 522 **Licence No:** 15221 (Multi-year licence: 1 of 3 years)
Region: IN, NS **Location:** Inuvik; Yellowknife

Global Citizens in the Arctic

The recent growth in mining, oil and gas extractive industries in the northern territories has exposed labor shortages and/or employment opportunities in both low-skilled and high-skilled occupations. As the extractive industries mature by stimulating the service industry, more employment opportunities become available in the retail sector and hospitality sectors as well.

The attraction to these economic opportunities is driving population in-migration, attracting both domestic labor from Canada's South and transnational labor from countries outside Canada. This study was designed to elicit social adaptation to the northern economy by newly settled transnational households in Whitehorse and Yellowknife. Specifically, the study examined the significance of global and local networks of sharing and caring in sustaining the livelihoods of these transnational newcomers to the region. Fieldwork was conducted in the two cities during the period November 22, 2012 to February 2013 during which 40 narrative interviews were obtained from newly settled transnational families having resided in the northern territories for an average of 5 years. SPreliminary analysis indicates that even though promising economic opportunities ultimately played a significant role in motivating the transnational move from various countries of the Global South to the northern territories, transnational families tended to, and preferred to live in the territories long after economic rationale waned. Surprisingly, this was reportedly due to deep connectedness to the open natural landscape, and the high value placed on the local sharing network circles forged upon settlement in the north.

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File Number: 12 410 522 **Licence No:** 15240
Region: IN, NS **Location:** Yellowknife; Inuvik

Global Citizens in the Arctic: Learning to live in the NWT, Yukon and Nunavut
No research was conducted under this licence in 2013. See Licence No 15221 for research results.

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File Number: 12 410 954 **Licence No:** 15289
Region: SA **Location:** Déljnę; Fort Good Hope; Norman Wells; Tulít'a

Social and political perceptions of environmental resources extraction projects in the Sahtú Settlement Area
Canada's sovereignty is being re-asserted in the High North through a strategy of socio-economic development based on resources exploitation. This research used qualitative methods to study the perceptions of resources exploration and extraction activities in the Sahtú region. Researchers investigated the role played by the environmental impacts caused by resource activities in fuelling discontent in Indigenous communities and in favouring the desire for political changes. The results reveal four contradictory patterns: (1) the high socio-economic expectations placed on oil extraction by Aboriginal respondents; (2) a strongly entrenched belief that resources development remains yet another colonial strategy led by the Federal and Territorial authorities; (3) mired with a growing conviction – particularly among those who benefit the least from the hydrocarbon booms - that this development is encouraged by local Aboriginal leaders who have a vested interests; (4) a shared commitment to the continuation of the ongoing self-determination process (with limited control as regards the access and management of resources) but with no desire for complete autonomy.

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File Number: 12 410 943 **Licence No:** 15226 (Multi-year licence: 1 of 3 years)
Region: IN, NS **Location:** Ulukhatok; Whatì

Northern men's research project
The first stage of the research project included interviews with men in Whatì and Ulukhaktok. The interviews were conducted by community researchers, hired and trained for this project. Each interview was about an hour long and could be done in the language of choice for the participant. Before interviews began, NWT Literacy Council staff visited the communities to help the community researcher and meet with stakeholders. A total of five interviews were completed, and transcribed. The project goal is to have five interviews from each community, so the interviews will continue in the second stage of the project. These interviews have been analyzed, along with the interviews completed in the Yukon, Nunavut and Newfoundland and Labrador. This preliminary analysis was presented at a community feast in Dawson City, Yukon and has shaped the survey to be a part of the second stage.

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File Number: 12 410 847 **Licence No:** 15273 (Multi-year licence: 2 of 2 years)
Region: NS, SS, SA **Location:** Former Pine Point mine/townsite; Fort Resolution; Hay River; Giant and Con mine sites; Yellowknife; Dettah; Déljnę; Port Radium mine/townsite

Abandoned mines in Northern Canada: Historical consequences and mitigation of current impacts
The ongoing Abandoned Mines Project looks at how mineral development impacted the social life, economic prospects and local environments of Northern communities throughout the twentieth century, considering carefully the connections between social justice and environmental change that were produced by historical mining practices in the region. Research was done on the historical and contemporary impacts of abandoned mines on three NWT communities: Pine Point, Yellowknife, and Port Radium. Results and ongoing publications can be found at: www.abandonedminesnc.com. To date, investigators have conducted oral history research, and are arranging for deposit of transcripts in community archives.

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File Number: 12 410 940 **Licence No:** 15202
Region: NS **Location:** Yellowknife; Behchokǫ̀

A language survey of Michif in the North Slave region
The aim of this project was to determine the current status of the Michif language in the North Slave region by surveying Métis community members to find out their level of fluency, their attitudes toward Michif, and their goals for the future of Michif in the community. Twenty-five individuals in Yellowknife and Fort Providence were asked about their family language history, and their languages. It was found that the variety of Michif spoken most widely in this region is Métis-French, which is a variety of French. The language is most fluently spoken by Métis people who are over 60 years old. There are a number of people between the ages of 30 and 60 who understand the language and speak it a bit, albeit less fluently. Only a few people below the age of 30 are able to speak it. All people who were interviewed stated that they believe that if no efforts are made to revitalize their language, it will be lost within 20 years. Some members felt there was nothing to be done, that the language was lost already, while others expressed interest in revitalizing the language in some way. A few people suggested holding a conference specific to Métis languages where Métis people across the territories could come together to talk about their language.

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File Number: 12 410 210 **Licence No:** 15205 (Multi-year licence: 1 of 4 years)
Region: NS **Location:** Behchokǫ̀

Tłı̨chǫ dictionaries, placenames, and their stories
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 410 965 **Licence No:** 15355
Region: IN, NS, SS **Location:** Offices of the Northwest Territories Power Corporation within Hay River, Yellowknife and Inuvik.

Initiating a new era of organizational human capital development
The research and analysis of this report provided recommendations and implementation strategies for the Northwest Territories Power Corporation (NTPC) to strengthen its human capital. NTPC is faced with the problem of how to best combat external threats and competition for employees while correcting internal gaps between its human resources procedures and industry best practices. Academic and industry research show that reductions in human capital levels can weaken an organization's performance and competitiveness because of constraints on productivity, efficiency and innovation. Higher employee turnover, increased retraining costs, delays in growth, and reduced operating hours are indications of declining human capital. To grow or remain competitive in an industry, organizations must seek to place an increasing amount of resources on improving its human capital, while making sure the changes meet the organization's strategic direction. A holistic strategy is proposed to NTPC containing multiple recommendations that target employee recruitment, retention and development improvements.

Gaps between NTPC's current operations and current best practices provide the basis for suggesting the recommendations.

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File Number: 12 410 964 **Licence No:** 15351 (Multi-year licence: 1 of 3 years)
Region: DC, SS **Location:** DehGah School (Fort Providence); Deninu School (Fort Resolution)

Evaluation of the Fort Providence pilot project: Physical literacy assessments

Many things influence whether or not children participate in physical activity. Physical literacy, which is a combination of physical skill and knowledge, is thought to be important for physical activity and elite sport. The purpose of this ongoing study is to evaluate a program that is designed to enhance the physical literacy of children attending the DehGah School in Fort Providence. For comparison, tests were also done on children and youth in the Deninu School in Fort Resolution. A team of four researchers visited the schools. Physical skills, knowledge, and physical activity were measured in children in grades 4 to 7, and physical activity was measured in youth in grades 8 to 12. These tests were conducted on approximately 100 children and youth in November 2013. More tests are expected in 2014. To date, no differences were observed in physical skills and knowledge between the children at the two schools at the start of the physical literacy program. Future evaluations will show if the program has had any impact. The evaluation study will continue until the Fort Providence Pilot Study comes to an end in 2015.

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File Number: 12 410 950 **Licence No:** 15260 (Multi-year licence: 1 of 2 years)
Region: GW **Location:** Fort McPherson

THS-SOW Women's barrier to economic development

No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 410 945 **Licence No:** 15233
Region: NS **Location:** Behchokǫ̀

Tłı̨chǫ Dene foodways

Research on Tłı̨chǫ foodways was conducted in Behchokǫ̀ during the winter and late summer of 2013. This research collected data on relationships with the environment through the lens of traditional food practices: the acquiring, sharing, and returning of food. A study of environmental

relationships with a focus on the necessity of food showed nuances to the practices, rituals, beliefs, and culture surrounding food. These findings add to the many studies on Dene relationships with their environment, and give a deeper understanding to these complex and dynamic interactions. A variety of Tłı̨chǫ and Tłı̨chǫ-Métis individuals participated in the study as teachers, consultants in informal interviews, and participants in trips on the land to acquire food, including: hunting, trapping, and fishing. Analysis is ongoing and results will be provided to communities upon completion.

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File Number: 12 410 700 **Licence No:** 15238 (Multi-year licence: 1 of 3 years)
Region: NS **Location:** Behchokǫ̀; Yellowknife

Light verbs and predicate types in Tłı̨chǫ Yatìì

In Tłı̨chǫ Yatìì (Tłı̨chǫ language), there are two copulas (words similar to English 'be'). The choice of which copula to use depends on whether one is assigning a temporary or permanent property to the subject of the sentence. So "Michel IS (acting like) a caribou" can be expressed as "Mishe ekwo ELI", but "Michel IS a Dene person" is "Mishe Done HOT'E." The research studies whether this distinction carries over to verbs other than BE (for example: "Mishe HAS a cold" would be expressed differently from "Mishe HAS brown eyes"). Several native language speakers of Tłı̨chǫ Yatìì translated English sentences to Tłı̨chǫ Yatìì and looked at translated sentences in Tłı̨chǫ Yatìì, to evaluate the appropriateness of the verb's use. At the current stage of the research, results have been inconclusive. It is currently very difficult to tell whether the grammatical difference between ELI and HOT'E has counterparts among other verbs. Research is ongoing.

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File Number: 12 410 960 **Licence No:** 15338
Region: NS **Location:** Yellowknife; Gamèti; Behchokǫ̀; Wekweèti; Whatì

Revisiting the "Scottish Project"- Tłı̨chǫ and museum exhibition

This research asked: What was the importance of 'De T'a Hoti Ts'eeda: We Live Securely from the Land' exhibition that was shown in Yellowknife? This exhibition was a collaboration between the Prince of Wales Northern Heritage Centre, the National Museums of Scotland and the Carleton University Art Gallery over 2006 and 2008. In 2013, a researcher travelled to Yellowknife from October 6-19, 2013. The research was done at the Prince of Wales Northern Heritage Centre. The researcher had many good conversations with staff at the museum and did four recorded interviews over the course of two weeks. She also looked at the museum's records of the "Scottish Project," including the gallery signs, photos and videos. The researcher also took a single day trip to Behchokǫ̀ and was invited to sit in and observe a number of meetings in order to get a better understanding of politics in the Northwest Territories. The results of the research found that the exhibition was important because the Dene objects were a source of great pride, and inspired intergenerational learning.

Traditional Knowledge

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File Number: 12 410 948 **Licence No:** 15247 (Multi-year licence: 1 of 5 years)
Region: GW **Location:** In and around Fort McPherson

Arctic Domus

This ongoing research examines the relationships between Indigenous people and a wide variety of animals, and also the relationships between animals. It challenges the lack of attention that fish and dogs have had in the literature and provides a historic background for future ethnographic research planned in 2014. Fieldwork took place in 2013 with the Teetl'it Gwich'in in the communities of Fort McPherson and Old Crow. Researchers investigated relations between dogs, Gwich'in, fish and caribou. During interviews and time spent out on the land, it became apparent that the use of dogs for the transport and procurement of food and goods has historically entailed fishing throughout the year to feed the dogs, while meat would be given to the dogs during successful hunting trips. Archival research looked at the history of dogs and fish in relation to the fur trade, RCMP, fishing, and hunting. This research confirmed that fishing is directly connected to the economics of hunting and trapping, and at the same time forms a set of practices that are important for Gwich'in society.

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File Number: 12 410 486 **Licence No:** 15320
Region: SA **Location:** Along the Keele River

Tulít'a mooseskin boat project

In August, two reserachers camped with 45 Shúhtagot'ine residents from Tulít'a at a location on the Keele River in order to document the construction of a traditional mooseskin boat. The boat, 32-feet in length, was constructed over a three-week period. During the first two weeks, the men fashioned the wooden members of the boat frame, while the women, children, and elders prepared moose sinew and, later, used it to sew seven raw moose hides together for the boat skin. Once all the parts were ready, the boat was assembled over a two day period. The boat was carried to the river, loaded, and a crew of five sailed it back to Tulít'a via the Keele and Mackenzie Rivers, taking 3 days for the trip. The boat arrived to a great celebration as the Sahtú

regional assembly was underway in Tulít'a. The hides were removed from the boat and the frame was moved to the airport for visitors to see in future.

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File Number: 12 410 697 **Licence No:** 15358 (Multi-year licence: 2 of 2 years)
Region: NS **Location:** Aklavik; Fort McPherson; Tsiigehtchic; Inuvik;

Building capacity and documenting traditional knowledge on Species at Risk in the Gwich'in Settlement Area 2012- 2014

The Gwich'in Renewable Resources Board and the Gwich'in Social and Cultural Institute partnered together on an initiative to record and present Gwich'in traditional knowledge of two key species – grizzly bears and wolverine – in the Nin Nihlinehch'i`' – Li' ha`h Guk'a`ndehtr'inahti`i (Animals at Risk – animals we are watching closely) Project. The interviews were structured to suit Gwich'in values and traditional knowledge-sharing practices, while focusing on the specific types of biophysical information required for species at risk assessments and planning. Select interviewees were invited to a validation session of the draft reports in each community. Final reports detailing Gwich'in knowledge and stories of grizzly bears and wolverine are now publicly available and were distributed to community, regional, territorial, and federal resource management and species at risk organizations. The reports will be of use in management planning, recovery planning, species assessments, and can be used as educational tools as well. The reports will be available on the GRRB website (http://www.grrb.nt.ca/traditionalknowledge.htm).

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File Number: 12 410 873 **Licence No:** 15234
Region: SS **Location:** Fort Resolution

Dene-water Relations and hydroelectric dams: Confluence and contestations in the Mackenzie River Basin

The goal of this anthropological research was to document how issues and practices of trans-boundary water security and river resource developments affect local Aboriginal communities in the South Slave Region and the Peace Region. Ethnographic fieldwork for this project was completed in 2012. Analysis of the interviews was the majority of the work done in 2013. Final community visits are likely to be conducted to follow-up with research participants. This work is being completed as part of the researcher's doctoral work.

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File Number: 12 410 866 **Licence No:** 15360
Region: IN **Location:** Tuktoyaktuk

Beaufort Sea joint venture drilling program: Tuktoyaktuk TEK collection program
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 410 947 **Licence No:** 15243
Region: SA, DC **Location:** Norman Wells; Tulít'a; Wrigley; Fort Simpson; Jean Marie River; Trout Lake

Enbridge Pipelines (NW) Inc. Traditional Knowledge Study - Continuation
The objectives of this project were: (1) to inventory the historical and ecological resources in the area, including past, present and future uses of the area by community members; and (2) to identify the potential impacts of use of the land use areas supporting access and maintenance (i.e. camps, trails, buffer areas and work areas).This traditional knowledge study involved interviews in communities in the Sahtú and Deh Cho regions that are along the Enbridge Pipeline route. This study was part of Enbridge Pipelines' Land Use Permit renewal application for the land use features associated with Line 21 Pipeline. A summary of the study was submitted to the Mackenzie Valley Land and Water Board in December 2013.

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File Number: 12 410 967 **Licence No:** 15359
Region: GW, DC, NS, SS **Location:** Fort McPherson; Jean Marie River; Behchokǫ̀; Hay River; Fort Resolution; N'dilo; Yellowknife

A capable person – Long ago and today: A narrative inquiry focusing on the stories of Northwest Territories Elders' traditional Aboriginal pedagogies and comparing them to contemporary educational app
This research concentrated on the central concept of "a capable person," which is a term highlighted in the Department of Education, Culture and Employment's Dene Kede Curriculum (1993) that mandates culture-based education in the NWT. This project aims to explore education in both the traditional and modern worlds through the following research questions: (1) What is a capable person from the perspective of NWT Elders and from the perspective of modern educational theory and research? (2) How do the Elders' and contemporary educational approaches compare? (3) How might the traditional pedagogies inform the more modern approaches to effective teaching and learning? (4) How might this combined knowledge benefit Aboriginal children in small community schools in the NWT? To date, the researcher has completed the qualitative data collection consisting of NWT Elders' stories regarding their traditional ways of teaching and learning. Twelve Elders from the communities of Fort Smith, Hay River, Fort Resolution, Jean Marie River, Behchokǫ̀, N'dilo, and Fort McPherson took part in semi-structured interviews, agreeing to use their own names in the research, rather than pseudonyms. The researcher has explored the modern approaches to 21st century education in the form of learning "competencies" that promote the knowledge, skills and attitudes necessary for learners to be "capable" as they navigate, narrate, and negotiate in today's digital world. The

theoretical framework of the medicine wheel will be the lens through which to select the contemporary methods that honour the traditional Aboriginal perspective of mind, body, emotions and spirit dialogue inherent in all learners.

Kelvin, Laura
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File Number: 12 410 949 **Licence No:** 15255
Region: IN **Location:** Sachs Harbour

Working towards a community-based archaeology of Banks Island, NWT

The objective of this ongoing research is to document traditional knowledge of Banks Island; and to identify similarities and differences between Inuvialuit and archaeological values, priorities and understandings, in order to develop culturally appropriate questions about Banks Island's past that can be addressed through future archaeological research. In July 2013, the researcher conducted ethnographic research in Sachs Harbour to determine how the Ikaahuk Archaeology Project can best address community concerns and involve community members in research. Community members identified three major concerns with archaeological research. First, community members are worried that archaeologists will disturb gravesites. The Ikaahuk Archaeology Project does not intend to study or disturb gravesites. Second, community members want access to excavated artifacts but NWT law states all recovered artifacts must be submitted to the Prince of Wales Northern Heritage Center. Although not a permanent solution, there is community interest in archaeologists making physical and digital artifact replicas for the community. Third, community members are concerned that there would be no community involvement or consultation during the research and that research results would not be shared with the community. Community members suggested that the project involve community members through community meetings, the use of local and traditional knowledge, and the hiring and training of local youth. They indicated that the best ways to communicate research results are Facebook, interactive websites, portable archaeological guides that can be brought on the land, and community meetings. This preliminary research will guide the following two field seasons.

Lantz, Trevor
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File Number: 12 410 906 **Licence No:** 15195 (Multi-year licence: 3 of 5 years)
Region: IN, GW **Location:** Husky Lakes; Hendrickson Island; Areas East and West of Tuktoyaktuk; The Mackenzie Pipeline Corridor; The Inuvik - Tuktoyaktuk road corridor; Aklavik Mountain Road; The Peel Plateau / Dempster Highway

Using Inuvialuit and Gwich'in observations to monitor environmental change in the Mackenzie Delta Region

The objective of this ongoing research is to document Inuvialuit and Gwich'in observations of the environment. To accomplish this, researchers combined participatory photo mapping (PPM) and video with semi-structured interviews that focus on participants' knowledge of the land. Participant observations, photos, videos, and interviews are organized into web-based maps

maintained by the University of Victoria (http://gwichin.kwusen.com/ and http://inuvialuit.kwusen.com/). Between 2010 and 2013, researchers worked with 52 monitors to record observations at more than 270 sites in the Inuvialuit and Gwich'in settlement regions. In 2012/13, monitoring focused on: permafrost degradation, changes to fish habitat, drained lakes, muskrat declines, culturally important places, berry health and abundance, declining traditional activities, water quality, changing vegetation structure, weather, and ice conditions. Thus far, this approach is making a significant contribution to regional environmental monitoring and research. In 2013, researchers also made several important changes and additions to the program. First, they updated the web-based map to a more functional and secure platform. One of the benefits of this new system (Knowledge Keeper) is the capacity to host and display a wide range of geospatial data sets (road networks, animal distributions, seismic lines, culturally significant places, air photos, etc.) alongside observations made by program monitors. Second, they developed a simplified version of the PPM method that can be deployed by the Hunters and Trappers Committees and Renewable Resource Councils. By asking individuals who are planning trips onto the land to participate in monitoring, this approach has potential to considerably reduce the overall cost of monitoring.

Pearce, Tristan
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File Number: 12 410 650 **Licence No:** 15189 (Multi-year licence: 2 of 3 years)
Region: NS **Location:** Ulukhaktok

Inuit traditional knowledge for adapting to the health effects of climate change (IK-ADAPT)

This ongoing research is part of the Inuit Traditional Knowledge for Adapting to the Health Effects of Climate Change (IK-ADAPT). IK-ADAPT is a 3-year project that works closely with 6 communities across the Canadian Arctic (Ulukhaktok, Inuvik, Igloolik, Iqaluit, Rigolet, Nain) to identify how Inuit traditional knowledge can help enhance health in light of a rapidly changing climate. Current research topics include: (1) identify and characterize the determinants of food insecurity among Inuit in Ulukhaktok; (2) document the economic costs of subsistence hunting; (3) examine the transmission of knowledge and skills related to fur and meat preparation among Inuit women; and (4) document and describe the implications of climate change for wildlife and effects for Inuit health. Project work is ongoing.

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File Number: 12 410 650 **Licence No:** 15328
Region: IN **Location:** Ulukhaktok

Nunamin Illihakvia: Learning from the Land

The Ulukhaktok Community Corporation launched the Nunamin Illihakvia: Learning from the Land project in August 2013. The project aims to bring together young Inuit with experienced hunters, sewers and Elders to learn how to build hunting tools and equipment, travel on the sea ice and hunt seals in the winter, how to prepare seal skins for sewing, and how to sew traditional seal skin clothing. During August and September, researchers worked with the

Community Committee to develop an introduction video for the project, host a project launch, hire project staff (including a local coordinator and skills teachers), communicate with Health Canada regarding funding and deliverables, and initiate skills classes. Surveys were conducted by local researchers with community members to identify what skills projects they would like to learn. The results of the surveys informed the focus of the skills classes. Research questions related to the project were also identified and include: (1) what implications, if any, does the formalization of traditional skills teaching have for traditional learning processes? (2) what are the perceptions of learning success among younger generation Inuit and how do these compare with Inuit and southern educators? and (3) what is the role and importance of seal in the lives of Ulukhaktomuit? The introduction video is available online: http://www.youtube.com/watch?v=pD_YihObIukPlease join the Nunamin Illihakvia Facebook group to follow project activities.

Rice, Keren
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File Number: 12 410 957 **Licence No:** 15322 (Multi-year licence: 1 of 2 years)
Region: SA **Location:** Dél̨ı̨nę

Mapping, language and stories in Dél̨ı̨nę
This ongoing project explores the role of language, music and place as foundations for what it means to Be Dene. The aim is to create resources that can be used by present and future generations of Sahtúot'ine. Under the guidance of Dél̨ı̨nę Elders and leadership this project uses modern technologies to make and store recordings on Dene language, music and cultural practices. In addition to acquiring new materials and allowing in-depth analysis of these materials, older recordings are also analysed. Community researchers are trained in using different tools to actively support the project.

Archaeology

Bussey, Jean
Points West Heritage Consulting Ltd.
Representing: Tibbitt to Contwoyto Winter Road Joint Venture

Permit Number: 2013-002
Region: NS
Class: 2
Location: Linear Corridor from Tibbitt Lake, NT to Contwoyto Lake, NU

Tibbitt to Contwoyto Winter Road Project
In 2013, Points West Heritage Consulting Ltd. conducted an archaeological inspection tour on behalf of the Joint Venture (JV) that operates the Tibbitt to Contwoyto Winter Road. The objective of this work was to monitor the protected archaeological sites that have been identified through past fieldwork in the area.

The Tibbitt to Contwoyto winter road runs from the south end of Tibbitt Lake near Yellowknife to almost the north end of Contwoyto Lake in Nunavut. In the past, the ice road was utilized every winter, but since the winter of 2008-2009 it has not been routinely constructed past the north of Lac de Gras due to a lack of mining activity. Because of this, the 2013 archaeological investigations were limited to the portion of the ice road south of Lac de Gras.

In previous years, a number of archaeological sites located near the winter road or its associated developments (such as gravel pits and camps) were marked by stakes to ensure avoidance during winter activities. The archaeological investigations associated with this permit involved visiting the marked archaeological sites and inspecting their condition as well as the condition of their markers. In total, there are seven sites along portages or near camps that are protected from accidental impact by the installation of markers, including one site in Nunavut. Whenever possible, these markers are at least 30 metres from the sites, but in some instances this is not possible because road development occurred prior to archaeological investigations. Five of these sites are south of Lac de Gras and were revisited in 2013; an unmarked site near an exhausted gravel source was also revisited. In addition, at three gravel sources, the maximum extent of borrowing has been defined by markers and these locations were examined from the air and/or ground.

At each location where there are archaeological sites that might be affected by ongoing winter road activity, damaged or insecure stakes were replaced and the tops of all markers were sprayed with fluorescent paint to make them more visible in winter. The markers at one developing gravel source were also examined and repainted. The only concern identified involved a site near Lockhart Lake camp and that issue has been resolved by the proposed installation of an additional cement barrier to protect KjPa-1.

Bussey, Jean
Points West Heritage Consulting Ltd.
Representing: De Beers Canada Inc.

Permit Number: 2013-003 **Class:** 2
Region: NS, SS **Location:** Snap Lake to Kennedy Lake area

Gahcho Kue Project
Points West Heritage Consulting Ltd. Conducted archaeological investigations for De Beers Canada Inc. at Kennady Lake, the location of the proposed Gahcho Kué Mine. The project area is approximately 280 km northeast of Yellowknife and 140 km north of ŁutselK'e.

The objectives of the 2013 field investigations were to complete as many of the recommendations identified in the 2012 Gahcho Kué Archaeological Management Plan as possible. The archaeological management plan provides recommendations on the type and level of archaeological investigation required at specific sites in advance of mine construction. This document was prepared in consultation with the territorial archaeologists at the Prince of Wales Northern Heritage Centre. It identified a need for further work at 13 of the 80 sites in the Kennady Lake area. These sites are within the mine footprint and represent locations that range from low to high archaeological significance and have high impact potential. A dyke near KiNp-76 – one of the sites of high concern – is no longer required because of development revisions.

In 2013, the investigations recommended in the management plan were completed at nine of the 12 sites of concern: KiNp-7, KiNp-8, KiNp-16, KiNp-32, KiNp-33, KiNp-34, KiNp-37, KiNp-38 and KiNp-74. Archaeological investigations ranged from surface collection to excavation. Each of the sites was assessed previously through surface examination and subsurface testing, which involved varying numbers of 50 centimetres by 50 centimetre units. In 2013, systematic surface collection was undertaken at seven sites suggestive of low archaeological significance; these sites were characterized solely by surface artifacts with no subsurface archaeological material. At most of the seven sites, additional subsurface testing was also completed to ensure that no subsurface archaeological material was evident. More intensive investigation involving 1 metre by 1 metre excavation units was completed at KiNp-16 and KiNp-32 and initiated at KiNp-15; these sites have moderate to high archaeological significance. At KiNp-16, eight units were completed and all visible surface artifacts were collected; little subsurface archaeological material was encountered, in part because of the shallow soil deposits on the bedrock based knoll. At KiNp-32, 27 excavation units were completed and a representative sample of the subsurface archaeological material was recovered. In addition, all visible surface artifacts were systematically collected. At KiNp-15, nine excavation units were completed. Additional work will be undertaken in 2014 because the variety of stone material warrants further investigation. Archaeological investigations are also proposed in 2014 at KiNp-27 and KiNp-35, both of which were assessed previously as being suggestive of moderate archaeological significance. During the winter of 2013-2014, analysis of the collected archaeological material will be completed.

Friesen, Max
University of Toronto

Permit Number: 2013-001 **Class:** 2
Region: IN **Location:** Inuvialuit Settlement Area

Arctic Cultural Heritage at Risk: Climate Change Impacts on the Archaeological Record in the Western Canadian Arctic

The Lower East Channel of the Mackenzie River, including eastern Richards Island and the north coast of the Tuktoyaktuk Peninsula is home to many archaeological sites which tell an important part of the history of Inuvialuit life over many centuries. This includes the major settlements of Kitigaaryuit (Kittigazuit), Kuukpak, and Nuvugaq (Atkinson Point), as well as many other winter villages, smaller camps, and areas which saw specialized hunting and fishing. These sites are now threatened by climate change, which is causing erosion of the coasts where Inuvialuit built their largest villages. For example, the site of Nuvugaq – which once held at least 17 large sod houses – is now completely destroyed by erosion. In addition to significant coastal erosion, warmer temperatures are also causing the permafrost to thaw, so delicate artifacts that have been frozen for centuries are now rotting and being destroyed.

This project – known as the "Arctic Cultural Heritage at Risk" (Arctic CHAR) – is a collaboration between the University of Toronto and the Inuvialuit Cultural Resource Centre. It is designed to reveal which parts of the coast are being eroded most quickly, and which heritage sites are being destroyed. Once researchers understand which sites are most at risk, they will decide which should be excavated, in order to save their contents before they are destroyed. The work, was completed in July of 2013. A 3-person survey team (archaeologist Max Friesen; Inuvialuit environmental technician Lawrence Rogers; PhD student Mike O'Rourke) spent six days visiting the most important archaeological sites by helicopter. Their main goal was to determine which sites are most at risk of destruction over the next 10-20 years. All of the major coastal sites are showing signs of destruction through erosion, but some sites are in much worse shape than others. For example, the following provides short descriptions of three sites, to show examples of the survey results:

- The McKinley Bay site is located near the east end of the Tuktoyaktuk Peninsula, and contains 11 sod houses. It is around 500 years old, and is located in an area where Inuvialuit hunted bowhead whales. During 2013, we compared the current status of the site to maps by Matthew Betts in 2004. In the 9 years since then, the bluff has been eroding at a rate of almost a metre per year. One of the 11 houses has been mostly eroded (only part of it remains), and another is on the very edge of the bluff and may be destroyed next time there is a major storm. The field crew hammered in two rows of stakes at the site, so erosion could be measured accurately next time we visit.
- The Kuukpak site is one of the two largest and most important Inuvialuit beluga whale hunting sites. It stretches for over 1 km along the shore of Richards Island, and in the 1800s it would have held hundreds of people. Our survey revealed that some areas of the site are eroding very rapidly, with house timbers, beluga bones, and large numbers of artifacts washing into the ocean.
- The site of Kitigaaryuit (previously known as Kittigazuit) has been designated a national historic site because of its importance to Inuvialuit history. This means that special care must be taken to make sure the site is understood, and protected. During our 2013 visit, most of the site appeared to be stable, with minimal erosion. The only exception is on the narrow neck of land at the north end of the site, though the speed of erosion is not clear. One important factor is that vegetation, and especially willows, are growing at a very rapid pace on the site. Plant roots, combined with melting permafrost, are likely destroying the very large, and important, Inuvialuit sod houses on the site.

In the summer of 2014, the Arctic CHAR team plans to return to the Mackenzie Delta and begin salvaging information from these threatened sites.

Gray, David
Grayhound Information Services

Permit Number: 2013-005 **Class:** 1
Region: IN **Location:** Banks Island

Commemorating the Canadian Arctic Expedition of 1913-1918
The objective of this project is to locate, document and film the camps and artifacts of the Canadian Arctic Expedition of 1913-1918. In July 2013, Mitzi Dodd and David R. Gray, with Kyle Wolki as the bear monitor, spent a week investigating the Canadian Arctic Expedition headquarters at Mary Sachs Creek which was occupied by the Northern Party between 1914 and 1917. Researchers measured, mapped, photographed, and documented the major structures and artifacts. There are six major components of the site: the main sod house foundation, three tent platforms, and two other building remnants (including the Mary Sachs wheelhouse). The major large artifacts at the site are: a ship's water or fuel tank, three engine heads from the Mary Sachs, a portion of a propeller shaft, cast iron stove parts, and several brass or iron spikes and bolts, likely from the Mary Sachs. Researchers also documented a large cross-cut saw that was found on the beach below the site after a storm before our arrival. Small artifacts on the surface of the site include rifle and shotgun shells, pottery and glass fragments, nails and bolts, mammal bones and wood.

The expedition vessel, the motor-sailor Bernard Explorer, en route from Alaska, was held up by ice and prevented from reaching the land party at Sachs Harbour. This meant the planned ship voyage to the northwest corner of Banks Island was not possible. Instead, researchers attempted to reach Terror Island, about half way up the west coast, by small boat. On August 3, with three local assistants, they set off from Sachs Harbour in two 18-foot outboard aluminum boats. Unfortunately it was not possible to get around Cape Kellet. The ice had moved in with the westerly winds, blocking the shore and extending well out to sea.

After a trial day trip to Cape Kellet in an ATV, researchers set out overland on a three-day trip to try to reach at least some of the CAE northern coastal sites using an ATV and a Polaris Ranger. They reached and documented major historic sites at Sea Otter and North Star Harbours, and saw Terror Island and Storkerson Bay. They also found and documented several small unrecorded archaeological and historic sites both on the coast and inland. Following the return to Sachs Harbour, researchers completed a one-day trip to Blue Fox Harbour where they documented several historic sites on the coast and places visited by the CAE, and located the grave of Fred Wolki, a young member of the CAE in 1918.

In Sachs Harbour researchers also documented an historic site east of the hamlet and interviewed a number of CAE-related people, both Elders and youth. Documenting the Mary Sachs site was of great satisfaction as this important Canadian historic site is steadily being washed away due to coastal erosion.

Bob Bernard and Paul Krejci on the Bernard Explorer eventually made it as far east as the Horton River on their second attempt, but were unable to cross the Northwest Passage to Banks Island because of the heavy ice. They documented several CAE sites in Alaska, including the CAE's Collinson Point 1913 winter headquarters, and Pipsuk's 1918 grave on Barter Island. As well as hundreds of photographs, over 10 hours of high definition video of the sites, wildlife and research activities were collected. Findings and photos are available at the Canadian Arctic Expedition website at www.canadianarcticexpedition.ca

Hodgetts, Lisa
Western University

Permit Number: 2013-006 **Class:** 1
Region: IN **Location:** Banks Island

Ikaahuk Archaeology Project
This summer, the fieldwork concentrated on the south coast of Banks Island, on sites relatively close to Sachs Harbour. No digging was done. Mapping and geophysical surveys were conducted at four different sites were completed. One (OkRn-2) is a camp site near Emegak Lake. It has many caches and tent rings and is perhaps a few hundred years old. The other three are Thule Inuit sites, occupied in the period between roughly 1200 and 1600 AD. Each has the remains of multiple large houses made of sod and whale bone.

At each site, a surveying instrument called a total station was used to map the size and location of the features. A geophysical survey using a gradiometer and a magnetic susceptibility meter to measure tiny differences in the magnetic properties of the soils across each site was also used. These techniques can indicate the presence of buried archaeological features that are not visible on the ground surface, since human activities such as burning, garbage disposal and digging can affect soil magnetism. The two techniques can potentially identify different types of features and are therefore best used together rather than separately. While neither technique was very effective on the exposed gravel surface at OkRn-2, both identified areas of higher magnetism next to several of the dwellings on the Thule Inuit sites. Researchers suspect that these areas may be middens; places where people disposed of animal bones and other waste.

At each site, Colleen Haukaas, a Masters student at Western University, photographed all of the archaeological features so that three dimensional computer models can be created to document and share the sites with the public. Community members in Sachs Harbour have said that they would like access to artifacts removed by previous archaeologists who worked on Banks Island. Because objects are fragile once removed from the ground they require controlled temperature and moisture conditions, and under NWT law they are cared for at the Prince of Wales Heritage Centre in Yellowknife. Some older collections are also at the Canadian Museum of Civilization in Gatineau, Quebec. Researchers have arranged to borrow some of these objects so that they can create computer models and also some actual copies to share with the community.

A lot of erosion of the ground surface at all sites, except OkRn-3, was observed. This is exposing relatively large amounts of animal bone which was formerly buried. Researchers collected a few pieces of unworked land mammal bone from each site so that it can be radio-carbon dated in order to determine when and for how long people used these sites. Twelve samples are currently being analyzed at the University of Arizona.

More information and links to some of the 3D models are available at: http://www.facebook.com/pages/Ikaahuk-Archaeology-Project/611819408850030

Kristensen, Todd
University of Alberta

Permit Number: 2013-011 **Class:** 2
Region: NS, SA **Location:** Selwyn Mountains

O'Grady Lake Archaeology and Ice Patch Monitoring Project
A collaborative team from the University of Alberta, the Prince of Wales Northern Heritage Centre, and the Tulita Dene Band continued their research of pre-contact and historic

adaptations to the Selwyn Mountains of the Northwest Territories. This year's goals were to dig at several previously identified archaeology sites around O'Grady Lake and to do traditional knowledge interviews with Tulita Elders about mountain living. From mid-August to early September Courtney Lakevold, Glen MacKay, Mike Donnelly, Sarah Bannon, John Kristensen, Bob Dawe, and Todd Kristensen dug at four sites and uncovered a variety of stone tools and cooking areas. A survey team also visited neighbouring ice patches as part of an ongoing program to monitor ice features that have produced well-preserved caribou hunting weapons. Additional canoe surveys around the lake and in neighbouring areas led to the discovery of six new archaeology sites in 2013. Four Elders were interviewed in Tulita and an additional four are planned for 2014.

Excavations produced a number of interesting tools including a large stone knife, scrapers, cores, microblades for making small cutting tools, and a burin for engraving wood and bone. The raw materials that people used thousands of years ago include local cherts, as well as obsidian (likely from the Yukon or British Columbia) and a fused clinker from the Mackenzie River region. The presence of these materials indicates long distance trade or seasonal movements.

Ice patch finds in 2013 include several small rodents, caribou bone, feathers, and a piece of wood that may have been part of an ancient weapon. Laboratory analyses will reveal more about the ages and the types of animals that visited the Selwyn Mountain ice features over the past six thousand years.

The team also dug a core of lake-bottom sediments containing pollen and microorganisms that will indicate the types of environments that existed at O'Grady Lake since the first human colonization of the area. This core will also reveal the impact of a large volcanic eruption from southwest Yukon that blanketed the general area in ash. The team was interested in understanding what effect this eruption had on local people, plants, and animals. This ongoing research project is the basis for a PhD dissertation currently being written by Todd Kristensen at the University of Alberta.

MacKay, Glen
Prince of Wales Northern Heritage Centre

Permit Number: 2013-007 **Class:** 2
Region: NS **Location:** Yellowknife Bay

Yellowknife Bay Archaeology Project

In 2013, Glen MacKay from the Prince of Wales Northern Heritage Centre continued an archaeological survey of the Yellowknife Bay area in collaboration with the Yellowknives Dene First Nation. The goal of the project is to record archaeological sites in and around Yellowknife Bay, which will facilitate their protection when land use activities are proposed in the area, and to learn more about the culture history of the region. Participants in the project included Fred Sangris, Sarah Black, and Randy Freeman from the Yellowknives Dene First Nation. Kevin Durkee and Kaitlyn Menard, summer students at the PWNHC, and David Finch also helped with the project.

This summer the survey efforts focused on the lower Yellowknife River and the east side of Yellowknife Bay. Nearly 30 new archaeological sites were recorded, including pre-contact stone tool scatters, historic Yellowknives Dene villages, graves, tent rings, and other features. This work is planned to continue in future summers.

MacKay, Glen R.
Prince of Wales Northern Heritage Centre

Permit Number: 2013-008 **Class:** 2
Region: DC **Location:** Jean Marie River

Jean Marie River Archaeology Project
This permit was cancelled.

Mooney, James
SLR Consulting Ltd. And Northern Contaminated Sites Group of PWGSC

Permit Number: 2013-013 **Class:** 2
Region: NS **Location:** Gordon Lakes

Gordon Lakes Archaeological Impact Assessment
This permit was cancelled.

Murphy, Brent
Golder Associates Ltd.
Representing: Aurora Geosciences Ltd.

Permit Number: 2013-015 **Class:** 2
Region: NS **Location:** South of Lac de Gras

Archaeological Overview and Impact Assessment near Courageous Lake
During September of 2013, Golder Associates Ltd. conducted an Archaeological Impact Assessment on behalf of Aurora Geosciences Ltd. of the Dominion Diamonds and North Arrow, formerly Harry Winston and North Arrow-Harry Winston Project Area, south of Lac de Gras. The project is located approximately 280 km northeast of Yellowknife, southwest of the Diavik Diamond Mine. The Project area encompasses approximately 1,485 km^2 between 64°01'36"N to 64°28'31"N and -109°57'36"W to -110°47'31"W. The closest communities to the Project area are the Tłı̨chǫ community of Wekweètì and the historic Inuit outpost of Pellatt Lake.

The objectives of the Archaeological Impact Assessment were to conduct an overflight of the entire project area to ground truth areas that were identified as having high potential for archaeologıcal sıtes and to conduct a limited survey on foot of locations that have been impacted by camp construction and that may be impacted during future development.

The field assessment was conducted over three days in September 2013, with the participation of Elder Nic Football from the Tłı̨chǫ First Nation. The final day of fieldwork included the participation and insight of Elder Alfred Balongous from the Yellowknives Dene. Both Elders assisted during the field program and provided advice on the cultural significance of the landscape we travelled through during the investigation. The field studies included low and slow helicopter overflight and some survey on foot. The foot survey of the existing camp area and the five high potential locations resulted in the identification of 11 new archaeological sites. All of the sites consist of small lithic scatters or isolated lithic artifacts. The identified sites will be avoided during the proposed drilling program and further studies will take place before any additional drilling or other mine developments are conducted.

Ross, Julie M.
Golder Associates Ltd.
Representing: Dominion Diamond Ekati Corporation

Permit Number: 2013-012 **Class:** 2
Region: NS **Location:** Misery site at Ekati Mine

Archaeological Assessment for DDEC - Misery site at Ekati Mine, focused at Lac du Sauvage and Lynx Lake
No summary was submitted for this permit.

Ross, Julie M.
Golder Associates Ltd.
Representing: Aurora Geosciences Ltd.

Permit Number: 2013-014 **Class:** 2
Region: NS **Location:** Chedabucto Lake

Archaeological Overview and Impact Assessment near Chedabucto Lake
This permit was not issued.

Seip, Lisa
Rescan Environmental Services Ltd.
Representing: Seabridge Gold Inc.

Permit Number: 2013-004 **Class:** 2
Region: NS **Location:** Courageous Lake

Courageous Lake Project
Rescan Environmental Services Ltd. conducted an archaeological impact assessment for Seabridge Gold Inc.'s Courageous Lake Project. These investigations were a continuation of baseline studies conducted in 2010, 2011 and 2012 (under Northwest Territories Class #2 Archaeologist's Permits 2010-015, 2011-006, and 2012-002, respectively). Lisa Seip directed the field work and was assisted by archaeologist Sheriff Hossain, also of Rescan Environmental Services Ltd., and by Ernie Sangris of the Yellowknives Dene. Investigations focused on the assessment of three proposed drill target locations.

The objective of the investigation was to identify sites that may potentially be impacted by proposed drill targets. Pedestrian surveys were conducted, focusing on areas considered to have moderate to high archaeological potential.

A total of 15 archaeological sites were identified within the drill target areas. Nine of these sites were previously recorded sites (LbNw-1 LaNv-4, LaNv-11, LaNv-21, LaNv-43, LaNv-47, LaNv-48, LaNv-89, and LaNv-90), and six were recorded under permit 2013-004 (LaNv-102, LaNv-103, LaNv-104, LaNv-105, LaNv-106 and LaNv-107).

Of the 15 archaeological sites in the area examined in 2013 ten are prehistoric and include one resource gathering site (LaNv-47), five sites consisting of lithic material (LaNv-11, LaNv-43, LaNv-89, LaNv-90, and LaNv-106) and four markers (cairns and inuksuit; LaNv-48, LaNv-103, LaNv-104, and LaNv-107). Three historic sites (LbNw-1, LaNv-4, and La-Nv106) have been recorded including a campsite, and mineral exploration campsite, and a windbreak for a hearth feature in close proximity to core boxes. Two sites, both markers (LaNv-21 and LaNv-102) are of undetermined antiquity.

The selection of proposed drill pad locations within the drill target areas will take into account the location of the archaeological sites and avoid them. No impacts to any of the sites are anticipated.

Seip, Lisa
Rescan Environmental Services Ltd.
Representing: Sabina Gold and Silver Corp.

Permit Number: 2013-009 **Class:** 2
Region: NS **Location:** Proposed Black River Winter Roads

Black River Project Potential Winter Roads
This permit was cancelled.

Smethurst, Naomi
Kleanza Consulting Ltd.
Representing: North American Tungsten Corp.

Permit Number: 2013-016 **Class:** 1
Region: DC **Location:** Cantung Mine Site

Archaeological Assessment of Cantung Mine Site
This permit was cancelled.

Wickham, Michelle
Bison Historical Services Ltd.

Permit Number: 2013-017 **Class:** 2
Region: SA, NS **Location:** Southeast of Norman Wells

Vermillion Ridge Quarry Development
On behalf of HRN Contracting Ltd., Bison Historical Services Ltd. Carried out an archaeological survey for heritage sites southeast of Norman Wells in October, 2013. The objective of the investigations was to conduct a pre-impact examination of all areas that may be impacted by the 2013/2014 Vermillion Ridge Quarry Development and to ensure that any unrecorded heritage resource locations will be avoided by current development activities.

Michelle Wickham and Joe Moravetz of Bison Historical Services Ltd., carried out the investigations and were assisted by (Stormen) Norman McDonald of Norman Wells, who acted as a wildlife monitor and local advisor. Fieldwork was based out of Norman Wells and was carried out by helicopter and on foot. Investigations focused on high potential areas within the proposed quarry area footprint, as well as along the proposed access road.

The helicopter landed on or near landforms or drainages that were deemed to have moderate to high potential for undisturbed cultural resources; these areas were then systematically examined on foot and judgmentally shovel tested.

The quarry and access road were repeatedly overflown at low elevation and slow speed to facilitate the identification of any possible heritage concerns. Given the lack of topographic relief, the observation of muskeg, black spruce, and in some cases standing water, or existing disturbance (along existing seismic lines) these locations were identified as possessing low heritage resource potential. As such, the over flights and photographic documentation were deemed to be an appropriate level of assessment.

Pre-field investigations consisted of a review of known site data to ensure that no previously recorded sites were jeopardized by the planned development. Areas that were identified as high potential from the air and pre-field map analysis were well drained areas with topographic relief, glacial landforms (eskers and drumlins), areas with the potential for soil development, and areas where the access road crossed drainages, as well as the entire quarry area were further assessed through pedestrian and subsurface testing. Pedestrian survey and subsurface testing was conducted at four locations within the Vermillion Ridge Quarry Development; 44 shovel tests were excavated, all yielded negative results. No known sites are located within 1 km of the proposed quarry and access road; no previously un-recorded heritage sites were identified during these investigations. The proposed Vermillion Ridge Quarry Development will not impact any known heritage sites.

Youell, Alan
Kavik - Stantec Inc.
Representing: Northwest Territories Department of Transportation

Permit Number: 2013-010 **Class:** 2
Region: IN **Location:** Proposed Inuvik to Tuktoyaktuk Highway

Inuvik to Tuktoyaktuk Highway Borrow Source Investigations Program
On behalf of the Department of Transportation, Government of the Northwest Territories, Kavik-Stantec Inc. conducted an archaeological impact assessment of the Inuvik to Tuktoyaktuk Highway Borrow Source. The specific purpose of the archaeological component of the Inuvik to Tuktoyaktuk Highway Borrow Source Investigations Program was to identify archaeological, historical, palaeontological and traditional land use sites at the proposed gravel borrow source locations. These borrow source locations are situated within the Inuvialuit Settlement Region east of the east channel of the Mackenzie River and south from Tuktoyaktuk to Inuvik.

To conduct the assessment, archaeologist Alan Youell, field technician Enoch Pokiak and wildlife monitor Lucky Pokiak conducted field surveys of the proposed development areas. The field survey was done on foot and involved an intensive examination of the surface area to determine the presence of unrecorded archaeological or cultural sites.

The areas investigated included the assessment of seventeen borrow source locations. No historical or palaeontological sites were located, however, two new archaeological sites (NfTq-6; historic campsite and NgTq-2; isolated lithic find) were recorded and one previously recorded site.

Wildlife

At the time of publication, the Department of Environment and Natural Resources have not submitted their 2013 permitting information. Updates will be published when information is made available.

Fisheries Permits

At the time of publication, the Department of Fisheries and Oceans have not submitted their 2013 permitting information. Updates will be published when information is made available.

Glossary

Abiotic – Not living

Active layer -The area where the soil continually freezes and thaws above the permafrost

Adaptation - A process by which a living organism (human, animal or plant) changes to become better suited to a new environment. This generally on an evolutionary timescale however, in the human context, it may be over a short period.

Adipose - Of, relating to, or composed of animal fat; fatty

Aerial - In the air

Aeromagnetic survey - Surveys from aircraft that make use of the magnetic field caused by magnetized rocks in the Earth's crust to make estimates about underlying geology of a given area such as distribution of potential resources

Algae - Simple living aquatic single or multi celled plant organisms that contains chlorophyll

Algorithm - A procedure or formula for solving a problem

Alkali - A basic substance that can range in strength

Analytical - A detailed examination of the structure or some other parameter of a substance or thing

Anoxic - A situation where oxygen is present in very low amounts or not at all, common in water

Annual - Occurs every year

Anthropogenic - Caused by a human action

Anthropology - The study of the human beings including their origins, cultures, evolution

Aquatic - Of water

Aquatic Biota - All living organisms in the aquatic environment

Arable - Land fit to be cultivated

Archaeology - The study of past human life and culture by looking at remains and artifacts like tools

Archean - A period of geologic time from about 3.9 billion years to 2.5 billion years ago

Archival - Pertaining to a collection of documents, normal over long periods of time

Arsenic - A chemical element that is gray in color and that is highly poisonous with no taste

Artifact - A historical tool, weapon or other human-made object that can be studied

Asexual - An organism that reproduces without the aid of a partner and who passes on all of its genetic information

Atmosphere - The layers of gases that surround and protect the Earth

Attributed - To explain by indicating a cause

Avifauna - the birds of a particular region or period

Bacteria - A large and varied group of single-celled microorganisms

Baseline - A set of information and data serving as a basis for comparison into the future

Bathymetry - Underwater topography. Mapping the underwater contours of the bottoms of water bodies

Beaufort Gyre - The major ice and ocean current circulation of the Arctic Ocean

Benthos - The bottom of the ocean or body of water

Biochemistry - The study of chemical processes in living organisms

Biodiversity - Pertaining to the variety of species in an area

Biogenic - Produced by living organisms or biological processes

Biogeography – The study of the geographical distribution of organisms

Biomass - The total amount of all living material within a specific volume of the environment

Biomes - Distinct areas of the Earth that are common in climate conditions, life forms and physical features like the tundra or woodland

Biostratigraphy - Identification and differentiation of rocks based on the types of fossils they contain

Biotic - Having to do with living organisms

Boreal - Relating to the forest areas of the Northern Temperate Zone that are dominated by coniferous trees such as spruce, fir and pine

Brachiopods - Any of various marine invertebrates of the phylum Brachiopoda, having bivalve dorsal and ventral shells enclosing a pair of tentacled, armlike structures that are used to sweep minute food particles into the mouth. Also called *lampshell*.

Breccia - Rock composed of sharp-angled fragments embedded in a fine-grained matrix

Brunisol Soil - soil type that is associated with forest vegetation. It is usually poorly developed and immature

Carbon^{14} – A radioactive isotope of carbon used to date ancient rocks and artifacts

Carnivore - A flesh/meat eating animal

Characterized - To describe an object or idea

Chlorophyll A - A pigment in plants that give them their green color and which absorb energy from the sun. Plants use Chlorophyll to change carbon dioxide and water into food and oxygen

Classification - Organize into groups or categories

Climate – Typical weather patterns of a region over long time periods

Community - All organisms in a particular environment

Comprehend - Being able to understand

Comprehensive - Conveying or including everything or almost everything

Coniferous woodland - A wooded area that is dominated by evergreen trees

Conifers - A group of woody plant commonly known as evergreen trees such as pine, spruce or fir that bears cones

Connectivity - As something is able to connect or relate with another thing

Core - A part removed from the interior of a mass especially to determine the interior composition

Correlated - A mutual relation between two comparable things

Cretaceous - Of or belonging to the geologic time, system of rocks and sedimentary deposits of the third and last period of the Mesozoic Era, characterized by the development of flowering plants and ending with the sudden extinction of the dinosaurs and many other forms of life

Crustacean - any mainly aquatic arthropod usually having a segmented body and chitinous exoskeleton

Cryosols - Cryosols are characterized by frozen soil within 1 metre (39 inches) of the land surface and by waterlogging during periods of thaw. They often show disrupted soil layers, cracks, or patterned surface features such as frost mounds, caused by the physical actions of ice formation and melting. Cryosols may be either mineral soils or humus-rich materials

Cryosphere - frozen water in the form of snow, permanently frozen ground (permafrost), floating ice and glaciers

Cumulative - Objects or ideas that add together

Cyanobacteria - predominantly photosynthetic prokaryotic organisms containing a blue pigment in addition to chlorophyll; occur singly or in colonies in diverse habitats; important as phytoplankton

Deciduous – A plant that lose their leaves during one season, usually winter

Deducing – To draw a conclusion

Deformation - A measurable change in structure, normally for the worse

Degradation - To reduce something or to place something at a lower level

Delta – The land formed where a river deposited silt as it enters into a larger water body, classic example, the Mackenzie Delta

Dendrochronology - A system of dating wooden objects by studying the tree growth rings

Density - A quantity of mass per unit volume

Devonian - Of or belonging to the geologic time, system of rocks, or sedimentary deposits of the fourth period of the Paleozoic Era, characterized by the development of lobe-finned fishes, the appearance of amphibians and insects and the first forests

Discontinuous – Not continuing or linked

Diurnal - Relating to or occurring in a 24-hour period; daily. Occurring or active during the daytime rather than at night

Diversion - A changing of the direction an object is going

Ecology - The science that deals with how living organisms live in relation to each other and their environment

Ecological integrity - Ensuring the relationship in plant and animal communities remains healthy

Ecosystem – The organisms present in a defined area and how they interact with the non-living surrounding (the biotic and the abiotic)

Effluent - A pollutant that flows out from a main source, such as sewage or waste matter

Ekman Grab - A box core type of sediment sampling device.

ELC data - Ecological Land Classification data

Electrofishing - Using electricity to stun and kill fish, usually used during scientific scenarios

Electromagnetic - Magnetism that is caused by electricity

Emissions - A water product that is radiated outward or discharged from a source

Endocrine – 1) designating or of any gland producing one or more hormones 2) designating or of such a hormone

Endophyte - An organism, especially a fungus or microorganism, that lives inside a plant, in a parasitic or mutualistic relationship

Environment – An organism's physical surroundings

Epoch - A period of time during which something important developed or happened

Erosion - Group of natural processes (weathering, disintegration, abrasion, corrosion, transportation) where the Earth's surface is worn away and removed

Eskers - A long, narrow ridge of coarse gravel deposited by a stream flowing under a decaying glacial sheet of ice

Estuary - A place where coastal seawater comes into contact with the current of a freshwater stream

Eukaryote - any member of the *Eukarya*, a domain of organisms having cells each with a distinct nucleus within which the genetic material is contained. Eukaryotes include protoctists, fungi, plants and animals

Eutrophication – The enrichment of aquatic systems, promoting dense algal and plant growth in a body of water, depriving the water of oxygen and forcing change in species composition

Evaporites A sedimentary deposit that results from the evaporation of seawater

Evolution - A process where different species come into existence by differentiation and genetic mutations from common ancestors over a long period of time.

Excavated - Extracting or revealing something by removal of the surrounding earth

Fauna - Animal life of a particular region, environment, or geological period

Fault - A fracture in a rock along which the rocks move; the place of origination of seismic activity; types include: strike-slip and thrust

Fecundity - Ability to reproduce

Fen - Low, flat, swampy land; a bog or marsh

Flora - The plants of a particular region, environment or geological region

Fluvial - Pertaining to something's existence or growth around a stream or river

Fossil -Trace of an organism of a past age, embedded and preserved in the Earth's crust

Fry – Infant fish

Fungi - A kingdom of heterotrophic organisms that produce spores

Fyke - A long, bag-shaped fishing net held open by hoops

Gas hydrates (clathrates) – Crystalline water based solids physically resembling ice, in which small non polar molecules (typically gases) are trapped inside "cages" of hydrogen bonded water molecules

Gender - One's characteristics or traits determined socially as a result of one's sex

Genetic - Pertaining to an organism's traits or characters being linked to genes

Genera - A group of organisms that share common characteristics

Geochemistry - The science that deals with the chemical composition of and chemical changes in the solid matter of the Earth

Geochronological - The chronology of the earth's history as determined by geologic events and not by human history

Geomorphologic - Pertaining to the physical features of the Earth's surface

Glauconite - A greenish mineral of the mica group, a hydrous silicate of potassium, iron, aluminum, or magnesium

Gonad - a gland in which gametes (sex cells) are produced

Grams (g) - A unit of measurement for mass

Habitat - A place where organisms live

Hepatic – (Anatomy) of or relating to the liver; (Botany) *botany* of or relating to the liverworts

Heterogeneous - A situation where something is in a mixed composition

Holocene - The most recent 11,000 years of the Earth's history starting at the end of the last major iceage, which has been relatively warm

Hydraulic - Pertaining to movement caused by water

Hydroacoustic survey - An echo-sounding (SONAR) survey used for measuring such things as fish stocks, water velocity, etc.

Hydrocarbon – A molecule containing hydrogen and carbon, often petroleum, natural gas and coal

Hydrograph - A graph showing the water level, discharge, or other property of river volume with respect to time

Hydrology - Science dealing with the properties, distribution and circulation of water

Isotope - Atoms that have nuclei with the same number of protons (as the atomic number) but different numbers of neutrons

Igneous - A rock or mineral that solidified from molten or partly molten material, i.e. from magma; one of three rock types with metamorphic and sedimentary

Implement - To put into effect

Iron - A metallic element used for making tools and essential for all living organisms' survival

Jarosite - a yellow to brown secondary mineral consisting of basic hydrated sulphate of iron and potassium in masses or hexagonal crystals

Kimberlite – An igneous that forms in volcanic pipe, an indicator of diamond deposits

Larvae - A premature stage for an insect where it feeds before becoming a pupa

Latitude - A measurement of the from the equator to a given point on the Earth's surface in the north and south direction

Laurentide Ice Sheet - Principal glacial cover of North America during the Pleistocene Epoch (2.6 million – 11,700 years ago). At its maximum extent it spread as far south as latitude 37° N and covered an area of more than 5 million sq mi (13 million sq km). In some areas its thickness reached 8,000 – 10,000 ft (2,400 – 3,000 m) or more

Ligotrophic (oligotrophic) - The opposite of eutrophic. Waters having very low levels of primary productivity and (usually) low concentrations of nutrients; good, clear water quality

Limestone - A sedimentary rock that contains mostly calcium carbonate and can be formed by either inorganic or organic processes

Limnology - The scientific study of the life and phenomena of fresh water, especially lakes and ponds

Lithic - Of, like, or made of stone. Archaeological artifacts made of stone

Meristic - Having or composed of segments; segmented

Mesic - Of, characterized by, or adapted to a moderately moist habitat

Metabolism - The chemical processes occurring within a living cell or organism that are necessary for the maintenance of life. In metabolism some substances are broken down to yield energy for vital processes while other substances, necessary for life, are synthesized

Metamorphic rock - Any rock derived from pre-existing rocks by changes in response to environmental factors such as temperature and pressure over a long period of time; one of three types of rocks with igneous and sedimentary

Methane - The simplest hydrocarbon that is the main ingredient in natural gas (CH_4)

Microclimate - The climate of a small area that is different due to changes in geography

Microorganisms - Organisms that must be viewed under a microscope, such as bacteria or a virus

Migration - The long range movement of a group of animals based on the seasons

Molecular analysis - A detailed look at the chemical structure and properties of a molecule

Moraine - A mound of rock debris carried and deposited by a glacier

Multicellular – Composed of more than one cell

Nutrient – Any chemical that an organism removes from the environment to aid with growth and development; common nutrients include nitrogen and phosphorus

Otolith – A part of a fish's inner ear, often used to determine the age fish

Organic - Material pertaining to plants or animals

Outcrop - A portion of bedrock or other stratum protruding through the soil level

Overlie - Sedimentary or volcanic rock that lies on top of older rock

Paleoecological - A relationship or study of ancient organisms and how they related to their ancient environment

Paleoenvironmental - An environment that existed in the past

Parr - a juvenile fish

Parameter - One set of measurable factors, such as the temperature and pressure that define a system and determine its behavior and are varied in an experiment

Pelagic - Relating to or living in or on oceanic waters. The pelagic zone of the ocean begins at the low tide mark and includes the entire oceanic water column

Permafrost – The permanently frozen layer of soil that characterizes the Arctic's ground; there are two various types: continuous and discontinuous

Pertinent – An object, idea or concept that is relevant to the topic

Phylogeography - the study of the historical processes that may be responsible for the contemporary geographic distributions of individuals

Phylum – (Biology) a major taxonomic division of living organisms that contain one or more classes. An example is the phylum *Arthropoda* (insects, crustaceans, arachnids, etc., and myriapods)

Physiological - Pertaining to the physical structures and functions of living organisms

Phytoplankton - A group of plant-like plankton that all sea animals depend on either directly or indirectly

Pingo – A large frozen mound covered with vegetation in permafrost areas

Pleistocene - An age of notable ice ages and development of humans between 2,000,000 and 10,000 years ago

Postglacial - Relating to or occurring during the time following a glacial period

ppm – An abbreviation of parts per million

Precipitation – Water (in the form of rain, snow hail, etc.) falling from the atmosphere

Prokaryote - An organism of the kingdom Monera (or Prokaryotae), comprising the bacteria and cyanobacteria, characterized by the absence of a distinct, membrane-bound nucleus or membrane-bound organelles, and by DNA that is not organized into chromosomes. Also called *moneran*

Qualitative – A complete detailed descriptions usually taken from a small sample that allows for distinctions to be drawn from the data

Quantitative - Use of large amounts of data where statistics can be applied to interpret the data

Quaternary - Of or belonging to the geologic time, system of rocks, or sedimentary deposits of the second period of the Cenozoic Era, from the end of the Tertiary Period through the present, characterized by the appearance and development of humans and including the Pleistocene and Holocene epochs

Qiviuq - The soft downy undercoat of muskoxen

Radiocarbon dating - The determination of the approximate age of an ancient object, such as an archaeological specimen, by measuring the amount of carbon^{14} it contains

Raptor - A bird of prey such as an eagle, falcon or osprey

Regolith - The layer of loose rock resting on bedrock, constituting the surface of most land. Also called *mantle rock*

Regosol - a type of azonal soil consisting of unconsolidated material derived from freshly deposited alluvium or sands

Remote Sensing – A technique used to study locations using technology that does not require the researcher to be in the field

Revitalization - To give new life or vitality to something

Riffle – a) A rocky shoal or sandbar lying just below the surface of a waterway b) A stretch of choppy water caused by such a shoal or sandbar; a rapid

Satellite imagery - Computer images generated by a satellite which allow researchers to look at a specific area and monitor surface features such as vegetation

Sediment - Solid fragment material that occurs from the weathering of rocks. In water it is material that has settled from a state of suspension

Sedimentary rock - Rock derived from loose particles that have accumulated over time

Sedimentation - The process where small particles are moved and deposited to accumulate into layers

Seine - A large fishing net made to hang vertically in the water by weights at the lower edge and floats at the top

Seismic - Pertaining to vibrations in the Earth, both natural and induced

Shovel testing - A simple test where a sample of ground is taken by use of a shovel and examined

Species - A group of organisms that share common characteristics that group them together and also distinguish them from others

Stone flakes/chards - debris left over from a rock while making tools

Stratified - A system that is set up in layers or strata

Stratigraphic - Formation of rock where different layers can be picked out based on type and age of the rock

Subsidence - The shifting of the Earth's surface downwards (compared normally to sea-level)

Succession - A progressive change in the biological community as a result of a response from species to the changing environment

Surficial - Pertaining to something that is on the surface

Suspension - A situation where the medium is able to support the weight of the particles trapped inside it, example: silt in a river.

Symbioses – An interaction between two or more organisms that usually benefits both

Sympatric - Occupying the same or overlapping geographic areas without interbreeding. Used of populations of closely related species

Systematic - Done according to a plan

Taxonomy - The classification of organisms in an ordered system that indicates natural relationships

Thermokarst - Sinking holes, caves and underground drainage that are produced in regions with permafrost from melting of ground ice and settling of the remaining ground

Theodolite - a surveying instrument for measuring vertical and horizontal angles. Also called (in the US and Canada) ***transit***

Thermocline - Layer in a large body of water that sharply separates regions differing in temperature. An abrupt temperature gradient in a lake

Topography - A description of the surface of a given area

Trace metals - A metal that is not essential in the sample but is found in small quantities

Transect - An imaginary line across a surface where observations are made

Tributary - A stream or river which feeds into a larger body of water

Turbid - Stirred up material suspended in a medium leaving it unclear and opaque

Ungulate - Hoofed animals

Velocity - Rate of change of position; quickness of motion

Volatile - Unstable; a substance that easily vapourizes

Watershed - A region draining into a river, river system, or other body of water

Weather – Daily variable changes in temperature, precipitation, wind and other atmospheric conditions

Zooplankton - Microscopic animal organisms floating in water

210-Pb Method - is used to determine the accumulation rate of sediments in lakes, oceans and other water bodies. It is used for over a period of 100 - 200 years

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