Compendium of Research in the Northwest Territories

2014

www.nwtresearch.com

This publication is a collaboration between the Aurora Research Institute, the Department of Environment and Natural Resources, Fisheries and Oceans Canada 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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Foreword

Welcome to the 2014 *Compendium of Research in the Northwest Territories.* This year marked a special anniversary for the Aurora Research Institute and northern research. Fifty years ago, the Inuvik Research Laboratory was built and has served as a hub for research in the western arctic ever since. The Lab, as it was known, was first built as an initiative of the Canadian federal government in the newly established community of Inuvik. It remains on the same site today, but in 2011, a new modern multi-purpose facility opened to continue to support research in the north. We have included a brief history of the Lab and its impact in this edition of the Compendium to mark its long lasting importance to many researchers and community members.

As part of the 50th anniversary celebration, the Aurora Research Institute team undertook a full set of NWT-wide celebrations. We celebrated the history, capacity and growth of research in the NWT that touched all corners of the territory and beyond. We honoured the significant scientific contributions that have taken place in the NWT over the past 50 years, and the role of NWT researchers, technicians and citizens in these accomplishments. It was truly an occasion to showcase northern research across the Territory and promote the importance of northern science well past our borders.

In honouring the past, we also celebrated the advancing research opportunities in this vibrant region. This territory is an emerging strength in global science. Within the pages of this Compendium are researchers that are studying some of the most important global issues of our time. The NWT will continue to be central to many northern research questions and a place where world-class research is done.

Here is to 50 more years of research.

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 2014. 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	Dehcho	**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).

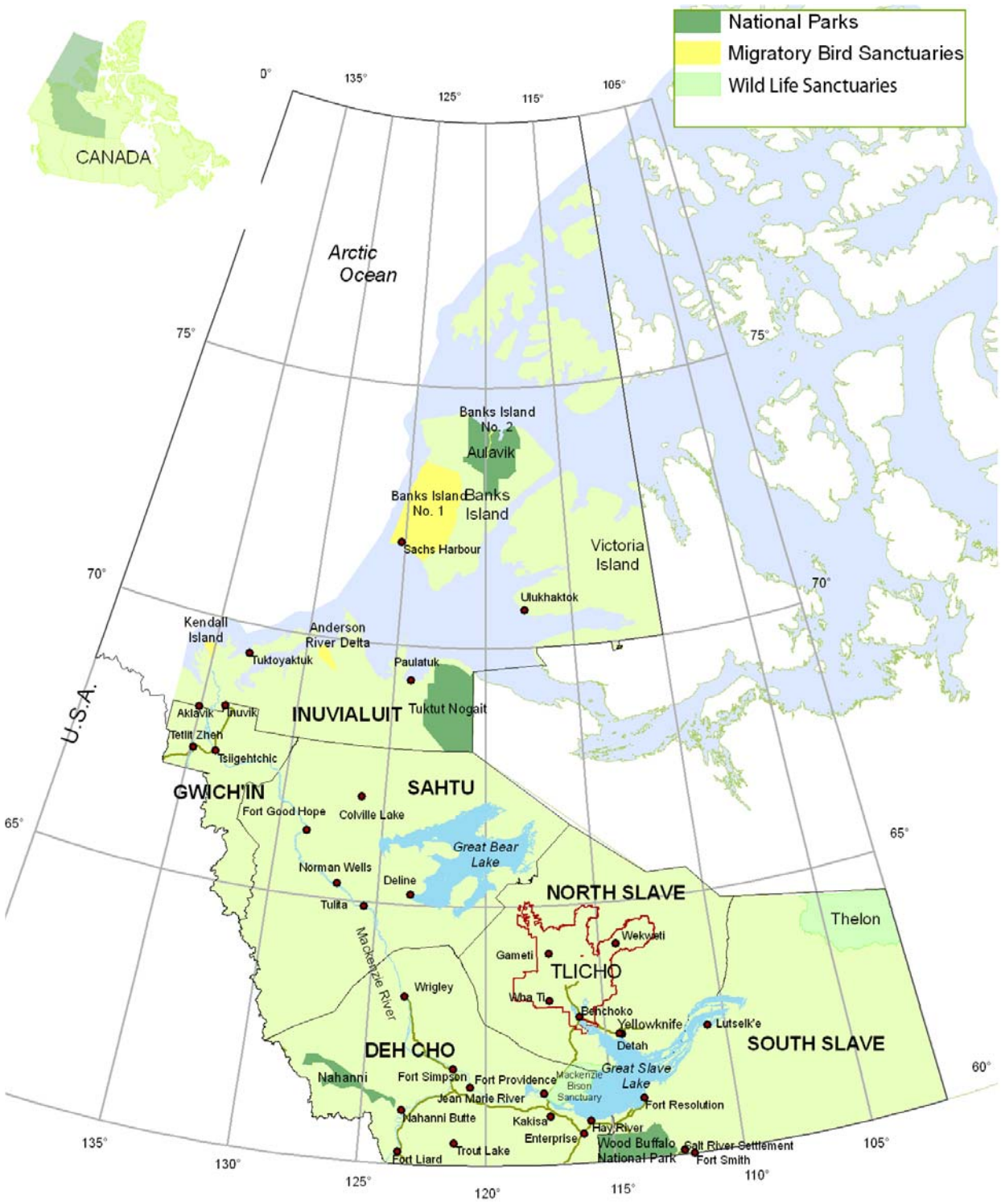

Figure 1. *Land claim regions in the Northwest Territories*

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.

The Aurora Research Institute 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:

Aurora Research Institute
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Website: www.nwtresearch.com

The Department of Environment & Natural Resources

The Government of the Northwest Territories' Department of Environment and Natural Resources 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:

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

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, 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:

- 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: www.dfo-mpo.gc.ca

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:

NWT Cultural Places Program
Prince of Wales Northern Heritage Centre
4750 48th Street
PO Box 1320
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Email: archaeology@gov.nt.ca
Website: www.pwnhc.ca

Biology

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File Number: 12 402 885
Region: SS
Licence No: 15494
Location: Salt River at the mouth, day use downstream, day use upstream; Dog River at the mouth, Dog Falls downstream, Dog Falls upstream

Biomonitoring 2.0: Biodiversity assessment in Slave River tributaries
The goal of this research was to assess the biodiversity – that is, how many different species of plants and animals there are – in the Slave and Dog rivers. The project also explored the use of DNA-based identification of animals, plants and microorganisms. Fieldwork in 2014 was conducted from early July to mid-August at the same six sites on the Dog and Salt rivers that were sampled in 2013. These sites are considered valuable for any future monitoring activities. The following samples were collected at each site: aquatic invertebrates (small animals like insects and worms), surface algae from aquatic plants, water, sediments, and soil. Additional soil and water samples were collected for testing out the DNA analysis – invertebrate samples will be identified with genetic approaches to compare to the identification made by looking at them. Extra samples of plants, animals, and microorganisms from two sites (Dog 2 and Salt 3) were gathered to help the researchers understand the food web, that is, which animals are eating which other animals or plants. Processing of all samples is ongoing, and will be completed by August 2015. Results of this study will provide baseline information for future monitoring studies in the region. Data, including lists/numbers of species, biodiversity information, and water quality will be presented to local communities and stakeholders.

Insley, Stephen
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File Number: 12 402 894
Region: IN
Licence No: 15470
Location: 10 km from Sachs Harbour near Cape Kellett

Acoustic monitoring of marine mammals and ship traffic in the Amundsen Gulf

There were three main goals of this study. The first was to track changes through time and space in the killer whale population to understand its effect on wildlife management and subsistence hunting in the Inuvialuit Settlement Area. The second goal was to monitor the timing and numbers of marine mammals, particularly bowhead whales, in the entrance to the Amundsen Gulf near to Sachs Harbour. The final goal was to monitor the timing and amount of shipping activity, particularly large vessels like freighters in the entrance to the Amundsen Gulf near to Sachs Harbour. The researchers travelled to Sachs Harbour in February of 2014 to discuss plans with the Sachs Harbour HTC. Equipment for the project included a special underwater sound recorder called a datalogger, mooring supplies, and batteries. There was too much ice near Cape Kellett, so the datalogger was placed closer to the town site (approximately 1 km west) at a depth of 26 meters on July 5. The recorder was set to work continuously and take thousands and thousands of recordings of underwater sounds, until it was recovered a month later on August 5, 2014. All the mooring gear was also recovered along with the datalogger. Full analyses are currently being carried out at the University of Victoria and Columbia University, N.Y.

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File Number: 12 402 894
Region: IN
Licence No: 15463
Location: In the south portion of Darnley Bay adjacent to Paulatuk

Darnley Bay seal monitoring

The goal of this research was to design and maintain a long-term, locally-based, monitoring program focused on ringed seals and bearded seals in the Darnley Bay region. Planning for 2014 seal monitoring in southern Darnley Bay took place during the winter and spring of 2014. During February a trip to Paulatuk was made to discuss plans, goals, and research methods with the Paulatuk HTC (PHTC). Although originally a longer field season was planned, in the end the monitoring only took place in September due to limited funding and a funding delay. The fall, particularly September, is as a good time period on which to focus because of a predictable increase in ringed seals in the immediate area and it is an important foraging time for seals prior to the winter. During September, the stomach contents from a total of thirteen harvested ringed seals were collected and sampled by a local field technician. The samples were bagged, labelled, and frozen for further analysis later. Photographs were taken of each seal and of the best examples of stomach contents. In November, the frozen stomach contents were shipped for analysis. Results of the analysis showed that all the seals were mainly eating large quantities of a small shrimp-like animal, the marine amphipod *Themisto libellula*. Project results are expected to be presented to the PHTC in 2015. Follow-up plans for the 2015 field season are underway.

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File Number: 12 404 897
Region: SS
Licence No: 15478 (Multi-year licence - year 1 of 2)
Location: Hanging Ice Lake

A comparative analysis of *Acorus Americanus* and *Acorus Calamus* and their Application in Traditional Aboriginal Medicine

The goal of this research was to identify the medicinal parts of rat root (*Acorus americanu*s). Rootstocks of the rat root were collected from Hanging Ice River during July 2014. Sampling was supervised by and done in accordance with traditional procedure as directed by a local elder. These samples were shipped to University of British Columbia in Kelowna, BC, where they were examined using a special test that allows the researcher to identify the chemical compounds naturally found in rat root. The elders indicated that some of the roots collected were green, and some were brown. Chemical similarities and differences between the green and brown samples were identified but more samples are needed to verify this observation.

Lavictoire, Michelle
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File Number: 12 402 899
Region: NS
Licence No: 15543 (Multi-year licence - year 1 of 2)
Location: West Channel of the North Arm of Great Slave Lake

Behchokǫ̀ water intake - Aquatic assessment

The goal of this ongoing research project is to gather site–specific fish and fish habitat information around the existing Behchokǫ̀ water intake. Fishes were sampled in late September using minnow traps, seine nets and gill nets. A total of 40 fish were captured. The most common species captured was lake whitefish. Other species included: northern pike (including young-of-the-year), cisco (lake herring), lake chub, burbot and yellow perch (young-of-the-year). Fish captured in the hoop nets and seine nets were released after processing. No fish were captured with the minnow traps. The fish which were injured or killed by the gill nets were given to the community.

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File Number: 12 402 857
Region: DC
Licence No: 15438 (Multi-year licence - year 1 of 3)
Location: At Providence Creek

Enhancement and monitoring of arctic grayling spawning habitat at Providence Creek, NWT

The objective of this ongoing research is to monitor the arctic grayling (*Thymallus arcticus*) population to see if improvements to their spawning area (for example removing beaver dams in the area) increases usable spawning habitat. The 2014 fieldwork was divided into two phases. The first phase was a mark and recapture study that took place in May. Two local team members of the field team spent two weeks at Providence Creek tagging arctic grayling as they went upstream to spawn. A fence was used to funnel fish into a fish box, where they were tagged, weighed and measured for length. Over 100 grayling were tagged and counted this way. This information will be used in the future to determine if arctic grayling numbers go up because of the improvements. The second phase of this project was the continued improvement of the creek including more washed gravel, which was placed in strategic areas of the creek to increase spawning habitat. Two local team members and the Dehcho AAROM coordinator added the gravel by hand and using a small excavator.

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File Number: 12 404 873
Region: SS
Licence No: 15536
Location: Slave River downstream, and upstream of Fort Smith, which includes areas along the mouth of the Salt River, along the shorelines of the Fort Smith sewage treatment lagoon and municipal boat launch.

Development of small bodied fish species as a biomonitoring tool to detect environmental change in northern rivers

Aquatic contaminants and environmental change can affect the health and reproduction of fish. Smaller fish with limited ranges are useful in monitoring to assess site-specific conditions because they tend to stay within a short stretch of the river and their bodies change more quickly if exposed to contaminants. This study examined the health and reproduction of two small fishes, emerald and spottail shiners, in the Slave River captured downstream, upstream and at the outflow pipe of Fort Smith's sewage lagoons. The researchers studied the body, liver, and reproductive organ weights and key reproductive hormones in the fish. There were no differences in reproductive organs or body weights among the fish at different sites, but emerald shiners at the outflow pipe had bigger livers than fish up- and downstream. Both raw sewage and lagoon effluent were also collected to check for water quality including common human medications. These results are pending. Based on two years of fish collections, emerald shiners appear to be present in high enough numbers at these sites to make them useful for future monitoring studies. Additional work is needed to determine the natural variability of these fish, as well as the potential causes of altered liver sizes and hormone levels in the fish at different locations.

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File Number: 12 402 851
Region: GW
Licence No: 15505
Location: Fish Creek and tributaries in the Rat River watershed

Examination of distribution and density of juvenile Dolly Varden char in Fish Creek (Rat River)

The goal of this project was to better understand the habitat requirements for juvenile Dolly Varden in Fish Creek (Rat River stock) and develop a community-based monitoring program to enhance recovery and improve decision-making at the local level. In late August 2014, several sites were sampled using electrofishing for the presence of Dolly Varden. The target life stages were the juvenile fish (age 0-4 years) and residents (char which do not migrate). Some anadromous Dolly Varden in spawning condition were captured too. Researchers observed no accidental mortality and had reasonable catch rates which indicates that electrofishing, when properly conducted, has a minimal impact and is effective for juvenile Dolly Varden collection. Researchers also installed temperature monitoring loggers and a remote camera to monitor habitat conditions. Three other monitoring sites were located nearby to record the small underwater insects living close to the bottom of the river, which are eaten by the Dolly Varden. A total of 165 Dolly Varden were captured at 16 of the 30 sites. Forty juvenile Dolly Varden were sampled for diet and age information.

Overall, Dolly Varden distribution seemed to follow an expected pattern of decreasing population, the further the sampling site was from known spawning habitat and groundwater discharge (such as springs, where ground water flows into the river). It appears that Dolly Varden presence in the upper Fish Creek watershed is strongly associated with groundwater. Data analysis is ongoing and preliminary results were recently presented at several community and regional meetings.

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Yellowknife, NT
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File Number: 12 402 879
Region: NS

Licence No: 15529
Location: Four lakes in the Yellowknife area, near the Giant Mine: Gar Lake, Trapper Lake, Upper Shot Lake, Lower Shot Lake

Bathymetry, aquatics and fisheries data collection for the potential north diversion of Baker Creek, Giant Mine Remediation Project

Between August 2014 and February 2015, Stantec Consulting Ltd. conducted five field surveys in support of the Giant Mine Remediation Project in Yellowknife. The first survey mapped lake depths of four lakes near the Giant Mine (Gar Lake, Trapper Lake, Upper Shot Lake, and Lower Shot Lake). Lake depth information was used to determine the shape of the lake and pick up good areas for sampling water, sediment and fish. The second survey was an aquatic and fish survey in September 2014 to sample water, sediment, phytoplankton (tiny plants in the water), and benthic invertebrates (underwater insects) of these four lakes. The fish survey included studying fish habitat, and nets were set to try and catch any fish that might live in the lakes. All of the four lakes had similar fish habitat, except Gar and Trapper lakes, which appeared to have more underwater plants. The four lakes are all shallow, and have barriers that prevent fish movements, such as incomplete and dry streams. This means that the lakes do not have very good connections to other water bodies with fish. Based on the fish habitat seen, it seems like the lakes likely do not have fish. No fish were captured in the nets in any of the lakes. The third survey was an underwater habitat survey in October 2014. This took place on the west shore of Yellowknife Bay. In this area, underwater habitat had a lot of sand and only a few plants, and looked different from other areas in Yellowknife Bay. The fourth survey took place at the outlet of Baker Creek, behind the breakwater on Yellowknife Bay. Aquatic habitat in this area was examined to identify plants on the shore, and in the water, and measuring the depth of water. In February 2015, a fifth survey of this location collected sediment cores down to two meters deep, to analyze the sediment for metals.

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File Number: 12 402 882
Region: SA

Licence No: 15443 (Multi-year licence - year 2 of 5)
Location: In the K'asho Got'ine, Tulít'a, and Déline Districts of the Sahtú Region.

Sahtú Region Caribou Study

The main goal of this on-going project is to develop a comprehensive understanding of the identities and relationships among caribou populations and Dene people in the Sahtú region, to help with wildlife management. Caribou are very important to the livelihoods and identities of

Aboriginal people. The project brings together traditional knowledge and non-invasive genetic sampling to study caribou. Population genetics allow scientists to understand how different groups of caribou are related to each other in much the same way that humans are related to their extended families. To study caribou genetics, the researchers took DNA from caribou scat samples collected by local community members from all five Sahtú communities and in collaboration with ENR. The researchers held a caribou focus group advisory session in Tulít'a where elders and harvesters provided project guidance and reviewed information from previous studies. The meeting helped to ensure that the genetics results are interpreted within the context of Dene knowledge about caribou in the Sahtú Region. This research has collected 825 samples from woodland and mountain caribou, 269 samples from barren-ground caribou, 151 samples from moose, and 41 from muskox to date. More information is available on the project website: http://nricaribou.cc.umanitoba.ca/sahturesearch/. This project has helped to strengthen the relationships between the ʔehdzo Got'ı̨nę Gotsę́ Nákedı (Sahtú Renewable Resources Board) and the ʔehdzo Got'ı̨nę (Renewable Resource Councils) of Fort Good Hope, Norman Wells, Tulít'a, Délı̨nę, and Colville Lake.

Stevens, Kevin
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File Number: 12 402 898
Region: NS
Licence No: 15515
Location: Bakers Creek, Giant Mine; Throughout Bakers Creek Watershed

Plant communities along Bakers Creek NWT

The goal of this research is to identify vegetation patterns that may be related to Giant Mine operations. In 2014, an assessment of the wetland plant community structure and associated soil fungi was started. Six sites were sampled within the Baker Creek watershed and two sites outside of the watershed. At each site, plants in both the water and on the land were studied. The number and type of plants were recorded, along with chemical aspects of the soil. The plants' roots were examined for beneficial soil fungi. Thirty-two plant groups were identified including nineteen native groups, three introduced groups, eight of unknown origin and two "sensitive" species (*Alisma triviale* and *Potamogeton pectinatus*). The invasive species (*Sonchus arvensis, Melilotus alba* and *Trifolium repens*) and the potentially invasive species (*Phalaris arundinacea*) were only found in one site called Reach 4. Plant community structure at Reach 4, and a reference site at the Yellowknife River differed from all other sites. The differences were correlated with contaminant (arsenic, potassium and orthophosphorus) concentrations. With the exception of Reach 4, levels of beneficial soil fungi were low compared to Yellowknife River. Additional studies are required to determine the mechanisms that cause these patterns.

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File Number: 12 402 724
Region: NS, SS
Licence No: 15417 (Multi-year licence - year 2 of 4)
Location: Eastern Lac de Gras

Improving habitat connectivity to enhance productive capacity of arctic freshwater ecosystems

Diavik Diamond Mines, Inc. has undertaken two projects to improve freshwater habitat as part of their ongoing environmental compensation process. Lake outlet streams at two sites were modified to improve fish passage among small headwater lakes that feed into Lac de Gras. Sampling in 2014 focused on the project at West Island Stream, where a nature-like fishway was constructed in late-2012. The research included water flow, water quality, habitat, plants, invertebrates, and fish. Ten additional streams not modified by this project were also sampled to gather more information about relationships between aquatic invertebrates and habitat characteristics of Barrenlands streams. The information from these ten streams will be useful to compare with our West Island Stream results.

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File Number: 12 402 733 **Licence No:** 15493 (Multi-year licence - year 1 of 5)
Region: IN, GW **Location:** Inuvik

Northern native seed development field trials

The goal of this ongoing project is to assess the performance of native plants in a variety of northern habitats. Over 2,000 native grass plugs were grown and then transplanted into two drainages at the Inuvik golf course. The transplanting took place during a habitat restoration workshop for local youth. Many youth and summer students participated, and will be invited back for annual vegetation monitoring to collect information on plant health, survival, and changes in the habitat overall. These two golf course sites are the latest addition to local field trial sites for the NWT Native Seed Development program. Annual vegetation monitoring at the various field sites did not take place this year.

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File Number: 12 408 195 **Licence No:** 15467 (Multi-year licence - year 1 of 2)
Region: IN **Location:** Hendrickson Island

Beluga lung and ear health

The goal of this ongoing research is to study belugas' health by looking at their lungs and ears, to understand normal functioning, and how disease and human activities may impact belugas in the Western Arctic. Over two years, this study aims to describe the normal ear anatomy of beluga and document any inner ear trauma by examining differences in special cells in the ear that help the beluga to hear, called cochlear cells. The researcher is particularly interested in damage caused by man-made noise. The study will also look at beluga lungs, and how lung function may be limited by respiratory diseases. This year, the researcher worked with community harvesters to obtain the remains of the animals after belugas were harvested and the muktuk and muscle removed. Sampling did not interfere with the normal hunting process. The ears were very well preserved, which allowed the researcher to study them for damage. Some lesions were observed at the top of the cochlea (the place in the ear where the low frequencies are heard) but they were very likely due to the gun noise during harvesting. Beluga's lungs were also studied carefully – many of the features recorded are important adaptations for both diving and breathing

underwater. The researcher found that belugas are able to exhale out much of the air in their lungs, they have smaller, more elastic lungs than expected, and they have a special muscle to close off their airways, among other interesting features.

Blowes, David
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File Number: 12 402 843 **Licence No:** 15363 (Multi-year licence - year 5 of 5)
Region: NS **Location:** Diavik Lac de Gras mine site

Waste rock studies at a diamond mine site
This research studied 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. In summer 2014, one of the test piles (the test pile with the lowest sulfur content) was deconstructed in lifts. Detailed photographs and samples were collected to study how the waste rock changed after being exposed to the atmosphere for almost nine years. Samples were collected for analysis of grain size, microbiology, porewater geochemistry and mineralogy. Data was collected and analyses from the remaining two test piles and the instrumentation in the operational waste rock dump. The data included water chemistry samples from three different scales (pore water, water flowing through the pile and collected at the base in 4 or 16 or 3000 metre squared areas), air pressure, oxygen and carbon dioxide concentrations, moisture content and water flow, the thermal conductivity of the waste rock, and microbiology. Interpretation, including modeling that incorporates climate change, continued in 2014.

Budziak, Jerry
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File Number: 12 402 475 **Licence No:** 15369 (Multi-year licence - year 5 of 5)
Region: SA **Location:** The Nota Creek C-17 well site

Phytoremediation study on the CDN Forest et al Nota Creek C-17 Wellsite
Phytoremediation is a strategy to clean up contaminated soils using plants. In theory, plants take the contaminant from the soil, and are then harvested and removed from the site. This process is repeated until the impacted soil is cleaned to applicable guidelines. As part of this on-going project, there was full-site phytoremediation plantings in both 2009 and 2010 at the Nota Creek C-17 wellsite. Remediation results were encouraging enough that impacted soil which was buried at the site was excavated to be included in the phytoremediation process. The first additional soil was added in 2011. A field crew was sent to the site in mid-June 2014 to continue the phytoremediation work. Pre-planting soil samples were collected and then the soil was prepared, fertilized and seeded. The pre-planting samples confirmed that the contamination of the soil is primarily petroleum hydrocarbon. The plant's health and vigor were measured in mid-August. In mid-September 2014 personnel were at the site to collect plant and soil samples and to harvest the growth from the impacted areas. Continued phytoremediation of the current soil on the site is planned for 2015.

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File Number: 12 404 886
Region: NS

Licence No: 15455 (Multi-year licence - year 2 of 2)
Location: Yellowknife River (62.52°N, -114.32°W); Yellowknife Bay near Dettah (62.41°N, -114.34°W); Great Slave Lake south of Yellowknife Bay (62.26°N, -114.28°W); Unnamed lake near Great Slave Lake at John Bay (62.33°N, -114.91°W); Unnamed lake near Great Slave Lake at Wool Bay (62.30°N, -114.15°W)

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

The goal of this ongoing research is to investigate local and regional metal sources and transport pathways – that is, where and how metal contaminants come from – of metal deposition to the Great Slave Lake. In September 2014, water, sediment cores, fish, and aquatic invertebrates were collected from Yellowknife Bay and the main body of Great Slave Lake near Yellowknife. In addition, tree lichens and soils were collected from shoreline sites. The researchers studied water samples from the lake's surface and near the bottom, looking for metal concentrations and arsenic. Sediment cores are also being studied for metal concentrations. Because cores can tell the story of the lake bottom over time, the researchers can tell if the amount or type of metal flowing into the lake has changed. A total of 86 fish from nine species were collected during the field program. Fish samples were analyzed for metal concentrations. The different forms of lead were measured from various samples, to track how metals move through Yellowknife Bay and to estimate how much of the lead is coming from continuing mine pollution. The lab analysis is ongoing, and further fieldwork is anticipated for the summer of 2015 to continue this research.

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File Number: 12 404 869
Region: SS

Licence No: 15526
Location: Former Weather Station in Fort Reliance

Assessment of groundwater conditions at the former weather station in Fort Reliance, NWT

ARCADIS Canada Inc. (operating as Franz Environmental Inc. at the time of licence application) conducted a field investigation in August, 2014 to assess groundwater and soil conditions at the former Weather Station in Fort Reliance in the area adjacent to Great Slave Lake at the site. The investigation included advancing boreholes and monitoring wells and collecting soil ground water and surface water samples. The results of the sampling program were compared to the previously completed risk assessment for the site, which was updated.

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File Number: 12 402 681
Region: SS

Licence No: 15447
Location: Lakes located at: 61°53 06N, 113°39 55W; 61°22 43.9N, 115°21 24.4W; 61°17 02.6N, 114°40 31.2W; 61°24 55.8N, 114°24 49.6W; 62°23' 56N, 110°32' 27W; 61°16' 23N, 113°35' 51W; and 60°54' 16N, 117°37' 39W

Sediment core studies in Great Slave Lake

This project is a continuation of earlier work by these researchers investigating long-term trends in contaminant deposition to the sediments of western Great Slave Lake; these researchers also are investigating mercury and persistent organic contaminant trends in this lake under the Northern Contaminants Program. In March 2014, researchers revisited two stations and collected a new series of cores. They also collected a series of cores in Stark and Kakisa lakes which are fished by residents of ŁutselK'e and Kakisa, respectively. Cores were collected to investigate the most recent trends in mercury deposition rates to the West Basin of Great Slave Lake and to get the first records of mercury deposition to Stark and Kakisa lakes. This information will be used in the investigations of mercury trends in fish harvested from these and nearby lakes. Sediment core sampling was conducted under Environment Canada's Clean Air Regulatory Agenda, specifically the Mercury Science Program. A core from each lake has been dated and mercury and metal analyses are ongoing. If more funding become available, extra cores were collected from each lake for additional chemical and/or biological analyses.

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File Number: 12 402 681
Region: SS

Licence No: 15530
Location: Great Slave Lake East Arm (62° 25.114' N, 110° 50.059' W); Great Slave Lake West Basin (61° 04.926' N, 113° 55.713' W); Great Slave Lake West Basin (60° 59.053' N, 115° 46.442' W)

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

Since 1998, researchers have been testing lake trout (Fort Resolution) and burbot from various locations (Hay River, ŁutselK'e, and Fort Resolution) in Great Slave Lake for mercury, other metals and other chemicals (persistent organic contaminants). This study is part of the Northern Contaminants Program. Many persistent organic contaminants have declined in concentration because agreements such as the Stockholm Convention on Persistent Organic Pollutants have resulted in the reduced production and use of these chemicals. Mercury concentrations remain relatively low (generally <0.2 µg/g) in lake trout and burbot with some evidence of a slight increase in concentration. The researchers are continuing to work with the community of Fort Resolution on a study monitoring long-term water quality and productivity of Resolution Bay waters. They also are investigating mercury concentrations in fish in lakes to the west of Great Slave Lake as part of a country food study conducted by George Low. Results were reported at a workshop (Jean Marie River, August 2014) and have been submitted to Government of the Northwest Territories Health and Social Services. Finally, these researchers are working on a study with Jessica Jumbo (Trout Lake) comparing mercury concentrations and general health of skinny and normal walleye from Trout Lake.

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File Number: 12 402 681 **Licence No:** 15563
Region: SA **Location:** Great Bear Lake (near Délįne)

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

This study was part of a larger program under Environment Canada's Chemical Management Plan to investigate flame retardants, metals, and a type of molecule called siloxanes in Lake Trout. Siloxanes are used in cosmetics, water-repelling windshield coatings, building sealants and lubricants. The research was conducted on a number of lakes across Canada, including Great Bear Lake, western and eastern Lake Athabasca, Cold Lake and Reindeer Lake in addition to Laurentian Great Lakes such as Lake Ontario. Studies to date, based on whole body measurements, have shown that concentrations of flame retardants are very low in Great Bear Lake fish. Mercury concentrations in the fillets also are low, generally <0.2 µg/g. However, very large lake trout (greater than about 35 inches or 900 millimetres) which tend to be very old (greater than 35 years) had higher (0.6-0.8 µg/g) mercury concentrations. Data from this study are being combined with mercury monitoring study results under the Northern Contaminants Program and other programs to understand changes and patterns in mercury concentrations through time, in small, medium and large lakes along the Mackenzie River, including Great Slave Lake.

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File Number: 12 402 900 **Licence No:** 15560 (Multi-year licence - year 1 of 2)
Region: DC **Location:** Kakisa; Jean Marie River

Contaminant biomonitoring in the Dehcho Region: A pilot investigation of the links between contaminant exposure, nutritional status, and country food use

The goal of this ongoing project is to study country food consumption among Dehcho First Nations communities. A Food Frequency Questionnaire, which was adapted from a survey used by McGill University researchers in previous projects, was developed and evaluated via focus groups. This year, University of Waterloo researchers focused on testing the questionnaire in two Dehcho communities. They travelled to Jean Marie River and Kakisa during the first week of December 2015 to ensure the survey made sense and was relevant. Participants from the communities completed the survey on tablets (e.g. iPads) during a set of focus groups. Participants were then asked about how the survey could be made better. This process yielded several valuable suggestions (*e.g.* addition of some commonly consumed foods that had been missing in the survey, addition of preparation methods which had not been initially included, etc.). The survey was updated according to these suggestions. In the second year of the project, the survey will be evaluated in both Kakisa and Jean Marie River through a reliability test.

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File Number: 12 402 857
Region: DC, SS

Licence No: 15420 (Multi-year licence - year 1 of 3)
Location: Cli Lake; Fort Simpson Fish Lake; Greasy Lake; Tathlina Lake; Kakisa Lake; Buffalo Lake; Hay River Reserve

Updating data on mercury levels in food fish species in lakes used by Dehcho communities
The objectives of this ongoing research project are to identify and describe important fish-bearing lakes and conduct research on mercury levels in fish. The researchers collected traditional knowledge information about which lakes are important as food sources to four Dehcho communities and which fish species are used for human food from these lakes. The Dehcho AAROM and Kaa ge tu First Nation collected fish samples in the winter of 2014 from Tathlina Lake. Community monitors were trained and collected fish and other samples according to Environment Canada and Department of Fisheries and Oceans protocols. They provided these fish samples to Environment Canada to study the mercury levels in various species of fish, as mercury levels may have changed since previous studies in the 1990's. The researchers have also assisted other scientists in their investigations about why mercury concentrations are increasing in predatory fish in the Dehcho and elsewhere in the NWT. In the long-term, this research will contribute to the evidence which can be used in national and international negotiations and agreements to lower the levels of mercury and carbon dioxide pollution in the atmosphere.

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File Number: 12 402 409
Region: NS

Licence No: 15370 (Multi-year licence - year 1 of 4)
Location: Diavik Mine, Lac de Gras

Reclamation of disturbed sites research at Diavik Diamond Mine, NWT
The purpose of this ongoing research program is to develop better methods to revegetate disturbed areas around northern diamond mines. Reclamation research in the north over the past 30 years has primarily focused on oil and gas and road corridor disturbances. Ground disturbances caused by building infrastructure and transportation corridors are similar. However, different types of industrial development have unique by-products that determine which reclamation methods are most appropriate to achieve end land use goals and the relative ease of reclamation. To better address the particular disturbances at diamond mines, this project aims to develop soil like substrates on sites where soil has been removed with the use of onsite and commercial materials and to re-establish a diverse native plant community. Several research sites were established at Diavik and assessed through the growing season to determine how micro topography, organic matter and erosion control affected native plants (grasses and forbs). The researchers studied how best to revegetate with mosses and lichen. Samples of eight different types of shrubs were collected in the fall to grow them at the university. Plots that were planted more than ten years ago, in 2004, were assessed to see how the plants were growing and if there is potential for long term revegetation success.

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File Number: 12 402 891

Licence No: 15379 (Multi-year licence - year 2 of 3)

Region: NS **Location:** Yellowknife

Toxic Legacies: Community Perspectives on Arsenic Pollution at Yellowknife's Giant Mine
The objective of this ongoing research project is to record information and communicate about pollution from the Giant Mine. In 2014, the project focussed on several tasks: continuing to gather information about the mine, and creating communication tools about toxic hazards for 'future generations' – that is, people who may come across the mine and the pollution stored below it in thousands of years. Archival research on Giant Mine is ongoing, and researchers started to develop educational materials for use in high schools as part of the Northern Studies Curriculum. In June, researchers shot footage for a film on the issue of communicating with future generations at Giant Mine, titled Guardians of Eternity. They were also involved in many meetings in the region discussing the project and curriculum. A community primer on the issue of communicating with future generations, and a companion two-page summary of the project was produced (available at http://www.abandonedminesnc.com). The researchers are also developing an oral history publication on Giant Mine with the Yellowknives Dene First Nation.

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File Number: 12 402 889 **Licence No:** 15454 (Multi-year licence - year 2 of 4)
Region: DC **Location:** Ekali Lake, Sanguez Lake, Gargan Lake, McGill Lake and Deep Lake in the Jean Marie area; Trout Lake in the Sambaa K'e area; Kakisa and Tathlina Lake in the Kakisa area and Big Island and Mustard Lake in the Fort Simpson area

The bio-magnification of mercury within fish species of the Dehcho and their varying levels among lakes
The objective of this ongoing project is to study mercury levels in fish and fish lakes in the Dehcho region. In 2014, samples were collect by the research team at two lakes in the Dehcho region: McGill Lake and Sanguez Lake. The researchers collected two types of samples: fish, and water. The fish sampling included taking biological samples of a number of walleye, pike and whitefish. The water samples were taken to collect information on water quality and lake productivity. Lake trout samples were also collected from Trout Lake by a local community harvester, and sampled in Hay River. While in the community, the researcher presented project details to interested community members.

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File Number: 12 402 896 **Licence No:** 15473
Region: IN **Location:** Tuktoyaktuk

Measuring changes to persistent organic pollutant bioavailability from preparing marine mammal blubber for human consumption
This goal of this project is to identify how traditional food preparation methods may affect the levels of important nutrients (minerals and fatty acids) and environmental chemicals in traditional food. Researchers specifically chose to examine beluga whale traditional foods, as the different

ways of preparing beluga blubber (raw, cooked, uqsuq) may affect how both nutrients and chemicals are taken in by the people eating it. During the 2014 summer hunting season in Tuktoyaktuk, researchers collected samples of beluga blubber from two whales. These raw blubber, muktuk, and uqsuq samples were analyzed for different groups of industrial chemicals, pesticides, and nutrients. The chemical analysis is ongoing, and results will be shared when the analysis is complete.

Engineering

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File Number: 12 406 058
Region: GW
Licence No: 15390 (Multi-year licence - year 2 of 3)
Location: Inuvik high point, about 6 kilometres NE of the Inuvik airport

Wind Energy Monitoring at Inuvik High Point (2013-2015)
The goal of this ongoing research is to measure the wind energy potential at the Inuvik High Point, this is a high point of land approximately 6 km northeast of the Inuvik airport, for two years. A wind monitoring tower was installed at the Inuvik High Point in March, 2014, in the first year of this study. Anchors and guy wires were inspected in the summer, and information about wind such as wind speed continues to be collected. Existing wind energy feasibility studies for the region will be updated to include this newly captured wind data.

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File Number: 12 406 058
Region: IN
Licence No: 15388 (Multi-year licence - year 3 of 3)
Location: Storm Hills (68°53'1.14"N, 133°56'55.65"W)

Wind Energy Monitoring at Storm Hills: 2012-2014
The goal of this multi-year research study was to measure the wind energy potential at Storm Hills for two years, as part of an alternative energy study for the Inuvik area. Wind data collection finished this summer at Storm Hills, and the equipment was removed from the site. A technical report was prepared based on the data collected, and an updated economic feasibility report and plain language report will be completed in spring 2015.

Health

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File Number: 12 408 194 **Licence No:** 15452 (Multi-year licence - year 1 of 3)
Region: NS **Location:** Yellowknife

Northwest Territory disease registry study
Due to computer coding delays, no research was conducted under this NWT Scientific Research Licence in 2014. Data collection is anticipated to start in 2015.

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File Number: 12 408 193 **Licence No:** 15367
Region: IN, GW, SA, DC, NS, SS **Location:** The NWT

CANPLAY: Child pedometer study: ISR project number 252
The goal of this project was to measure physical activity levels of children and youth, and study how parents respond to various opportunities 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. For example, the parents were asked about such topics as participation in organized sports, preferences for certain activities, and how time is spent after school. Young people who were 18 or 19 were able to respond on their own behalf. Parents were also asked to allow their child(ren) to have their activity tracked over seven days. Families willing to participate were sent a pedometer, which is a small gadget that records how many steps a person takes. The pedometers were used by the parents to record the number of steps the child took each day for seven days. Data are still being analysed, and reports on the findings of this research will be available at: www.cflri.ca.

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File Number: 12 408 193 **Licence No:** 15415
Region: IN, GW, SA, DC, NS, SS **Location:** All areas of the Northwest Territories with telephone service are potentially represented

Physical Activity Monitor (PAM)
The purpose of this research was to try and understand what improves or limits participation in physical activity, that is, how much exercise a person is getting. To understand these things, the researchers used a questionnaire to gather information from northerners using phone interviews. The questionnaire is known as the 'Physical Activity Monitor' (PAM) and it has been in use since 1995. The answers to the questions show how different factors, such as individual, environmental, and social factors, affect physical activity. In 2013/14, the PAM asked about how much exercise a person is getting compared to how much time being inactive, and if this level has changed over time. The questionnaire also had questions about sports, general knowledge about healthy amounts of physical activity, and what helps a person decide to be active. In addition to a set of core questions which were based on specific interest from the Federal, Provincial and Territorial governments, the 2013/14 PAM included an extra set of questions which are only asked every 5 years. Repeating the questions over time allows the researchers to measure change in both physical activity levels, and the factors that change physical activity levels. Ongoing monitoring programs like the PAM also measure whether the activity levels reported by people answering the questions are high enough for a healthy lifestyle. Data are still being analysed, and reports on the findings of this research will be freely available at: www.cflri.ca.

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File Number: 12 408 197 **Licence No:** 15552 (Multi-year licence - year 1 of 3)
Region: IN, GW, SA, NS, SS **Location:** Health Centres in Aklavik, Fort Good Hope, Fort Resolution, Yellowknife

Dialogue and storywork in support of First Nations, Inuit, and Métis cancer patients throughout oncology and primary care transition experiences
No research was conducted under this NWT Scientific Research Licence in 2014. Research planning took place during the end of 2014, which included engaging community organizations about how best to identify people to participate in the study over future years.

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File Number: 12 408 189 **Licence No:** 15503 (Multi-year licence - year 2 of 2)
Region: NS **Location:** Behchokǫ̀; Gamètì; Whatì; Wekweètì

Pregnancy stories across the generations
The focus of this ongoing research is to record the pregnancy stories of Tłı̨chǫ women from different generations and representing the four Tłı̨chǫ communities. The researchers hope to gain insight into factors impacting maternal health, especially diabetes, and how this is due to a history of colonization. During the summer of 2014, the researcher interviewed five Tłı̨chǫ Elders, including a traditional midwife, about traditional knowledge of pregnancy and birth. She also asked about the women's personal experiences of pregnancy and birth. A meeting with the Healing Wind Advisory Committee will be held in summer of 2015 to present a summary of key themes and interpretations of the pregnancy and birth stories. Following this meeting, a summary report and copies of the interview transcripts and audio files of the interviews with the Elders will be given to the Tłı̨chǫ Government as part of a data sharing agreement. In total, casual conversations (non-recorded) or interviews (recorded) were conducted with 15 Tłı̨chǫ women from different generations about their pregnancy and birth stories.

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File Number: 12 408 192 **Licence No:** 15487 (Multi-year licence - year 1 of 2)
Region: SS **Location:** Paul William Kaeser High School, Fort Smith

Evaluating a mandated in-school physical activity intervention for northern youth
The objective of this ongoing research is to explore the impacts of a new health intervention program on the students at Paul William Kaeser High School. During this first year of the study, researchers focussed on creating questionnaires and focus group guides. The questionnaires will be used to ask students and teachers about how the health intervention program is working, and how they feel about it. Data collection will begin in the spring of 2015.

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File Number: 12 408 192 **Licence No:** 15556 (Multi-year licence - year 2 of 2)
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 explored the treatment and care of Aboriginal people with diabetes by collecting stories about their experiences. The goal was to find the best balance of western medical treatments and traditional Aboriginal healing, with the hope that this information will result in more effective diabetes treatment programs. This project has been guided by the advice of several local advisors, including Aboriginal advisors and long-time community members. The researcher began conducting interviews in Fort Smith. Three interviews were conducted during 2014 with Aboriginal people who have diabetes. The researcher also worked with community advisors to identify interview topics that will best reflect local ways of knowing and lifestyles. A total of ten interviews will be conducted and analysis will continue to be a collaborative effort between the researcher and community advisors.

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File Number: 12 408 200
Region: IN, DC, NS, SS

Licence No: 15569 (Multi-year licence - year 1 of 3)
Location: Behchokǫ̀; Inuvik; Fort Smith; Hay River; Fort Simpson; Yellowknife

Translating research in elder care (TREC 2.0): Advice seeking networks in residential long-term care

No research was conducted under this NWT Scientific Research Licence in 2014.

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File Number: 12 408 149
Region: IN, GW

Licence No: 15381 (Multi-year licence - year 5 of 5)
Location: Aklavik; Tuktoyaktuk; Sachs Harbour; Fort McPherson

The Aklavik *H. pylori* Project

Helicobacter pylori is a bacterium that can live in the human stomach. Although most people who are infected with *H. pylori* do not get sick, long-term *H. pylori* infection leads in some cases to peptic ulcer disease, and, more rarely, stomach cancer. In 2007, at the request of northern community leaders and health officials, the Canadian North *Helicobacter pylori* (CAN*Help*) Working Group formed to: investigate health problems related to *H. pylori* infection; identify public health solutions for reducing risks from *H. pylori*; and develop knowledge exchange strategies with community members and health care providers to improve understanding of remaining challenges posed by this infection. The CAN*Help* Working Group has ongoing projects in Aklavik, Tuktoyaktuk and Fort McPherson and Old Crow, YT. As of September 2014, 236 residents of Fort McPherson had joined the local *H. pylori* Project: 228 completed a breath test for *H. pylori* infection; of those who tested positive, 70 enrolled in the treatment trial component of the project and 42 completed a breath test to confirm that their treatment was successful (follow-up testing will continue throughout 2015). In 2014, research staff also reviewed medical charts in Aklavik, Tuktoyaktuk, and Fort McPherson to collect information about participants' antibiotic use. This information will be used to better understand associations between antibiotic use and *H. pylori* resistance to antibiotics. The research team also conducted knowledge sharing activities throughout 2014. In March, two youth from Aklavik visited the University of Alberta in Edmonton. They spoke to several groups across campus about their earlier involvement in a knowledge exchange program with the CAN*Help* Working Group, which had enabled them to learn about diverse research methods and to communicate research findings to residents of their community in a meaningful way. The research team is still working to expand *H. pylori* community projects.

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File Number: 12 408 142
Region: IN, GW, SA, DC, NS, SS

Licence No: 15408 (Multi-year licence - year 2 of 3)
Location: Yellowknife; Hay River; Fort Simpson; Fort Smith; Inuvik; Fort Providence; Fort Resolution; Fort Liard; Łutsel K'e; Behchokǫ̀; Whatì; Wekweètì; Gamètì; Wrigley, Tulít'a, Norman Wells; Fort Good Hope; Déljne; Fort McPherson; Aklavik; Tuktoyaktuk; Paulatuk; Holman; Sachs Harbour

RHD Alleles in prenatal patients from northern Canada

There are two objectives for this ongoing study. One is to ensure that the way pregnant women have their blood drawn and tested is appropriate for prenatal patients in the northern regions of Canada, and another is to learn more about the RHD gene in the indigenous populations of the Northwest Territories. The RHD gene controls a person's Rh factor. The Rh factor refers to a special feature of human blood, which allows doctors to classify blood into types, similar to blood type A, B, or O. It is important to study Rh factors in blood, because sometimes a mother's Rh factor will be different than her baby's, and this can cause problems for the baby. Considerable research has been done in other indigenous populations around the world which has been of value in other areas of scientific endeavor including the study of population shifts. Blood group genes differ significantly between populations. With informed consent of participants, samples from routine prenatal testing were shipped from the Canadian Blood Services Laboratory to a specialized molecular testing laboratory in Germany where the DNA was extracted and stored frozen. The plan now is to ensure the documentation and consent forms are in order, and then complex molecular testing will be performed in order to better understand the RHD gene in northern populations. This will be very valuable for ensuring that the tests used for routine prenatal testing are appropriate for the patients in northern Canada. Due to the sophisticated nature of the testing, it will take some time to complete. When results are available, a member of the research team plans to visit the NWT to discuss the findings.

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File Number: 12 408 187
Region: SS

Licence No: 15393 (Multi-year licence - year 2 of 2)
Location: Stanton Territorial Hospital

Outcomes of primary maternity care in Fort Smith, NWT

The goal of this research was to evaluate the safety of the Fort Smith Midwifery Program in which primary care is provided by midwives to healthy women in the community. In 2014, researchers from UBC in partnership with the Fort Smith Midwifery program, compared outcomes from the Fort Smith Midwifery Program between 2005-2011 to outcomes in Hay River where women leave the community for birth and Nunavik, Quebec, where, similar to Fort Smith, healthy women give birth in the community. Researchers looked at outcomes such as transfer rates for labour/delivery, preterm birth, caesarean birth rates, and baby Apgar scores at birth. Forty-five percent of women from Fort Smith delivered their babies in town. The caesarean rate was 15% compared to 20% in Hay River. There were no significant differences in rates of adverse outcomes for babies.

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File Number: 12 408 199
Region: NS
Licence No: 15558 (Multi-year licence - year 1 of 2)
Location: Yellowknife

Mapping social and structural contexts of HIV and STI vulnerability among LGBTQ+ youth in the Northwest Territories
No work had been conducted under this NWT Scientific Research Licence in 2014.

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File Number: 12 408 188
Region: IN, GW, SA, DC, NS, SS
Licence No: 15426 (Multi-year licence - year 2 of 3)
Location: Nurses in the NWT through a mail out via the territorial nursing association

Nursing practice in rural and remote Canada II
The objective of this ongoing research is to study nurses' jobs, how they are recruited, how long they stay at their positions, and how they are educated in rural/remote Canada. The researchers will provide this information for use in policy-making. The first step of the research was to finalize a questionnaire, the Nursing Practice in Rural and Remote Canada II national survey. Survey packages containing the questionnaire were mailed to almost 10,000 rural and remote nurses in every province and territory in Canada, in French and English. Both the survey mail out, and data entry of the returned surveys are ongoing. The research team finished the analysis of information dating from 2003 to 2010 about the nursing workforce in Canada. They also studied current government policy about nurses and the nursing workforce in rural and remote communities. This information was shared in twelve reports, including 10 provincial/territorial specific reports (available at: http://ruralnursing.unbc.ca).

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File Number: 12 408 196
Region: SA, NS, SS
Licence No: 15513
Location: Tulít'a Health Centre; Department of Health and Social Services; Aboriginal Health and Community Wellness Division; Fort Resolution Health Centre; Fort Smith Health Clinic

BETTER 2 (Building on existing tools to improve chronic disease prevention and screening in primary care 2): Qualitative evaluation
BETTER 2 (Building on Existing Tools to Improve Chronic Disease Prevention and Screening in Primary Care 2) is an approach to healthcare that aims to improve chronic disease prevention and screening. This project was aimed at assessing how useful BETTER 2 has been, and to see if it can be adapted and sustained in different settings in the NWT. Researchers will collect the perspectives of health care providers, administrators, and patients who are already involved in the program. The communities of Fort Smith, Fort Resolution, and Tulít'a are included in the project. One-on-one interviews have been completed with two administrators, and Fort Resolution and Tulít'a Health Centres have been provided with the materials needed to obtain feedback from patients. Focus groups with doctors and nurses are planned for 2015.

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File Number: 12 408 196 **Licence No:** 15508 (Multi-year licence - year 1 of 5)
Region: NS **Location:** Yellowknife

Canadian primary care sentinel surveillance network (CPCSSN) project
The goal of this ongoing research is to gather information about health care and treatment for people with chronic diseases. The information will be long-term, that is, include information about treatments and outcomes over a long time-span. The information will be useful for doctors and nurses who are researching how best to treat chronic diseases. In 2014, research agreements/data sharing agreements have been set-up with the Yellowknife Health and Social Services Authority. These agreement ensure that strict codes of confidentiality and privacy are followed in this project. Researchers have started working with the electronic medical records and are expected to continue in 2015.

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File Number: 12 408 198 **Licence No:** 15555
Region: IN, NS **Location:** Inuvik; Behchokǫ̀; Yellowknife

The accessibility of Primary Health Care for indigenous populations living in remote communities in the Northwest Territories of Canada
The aim of this research is to study how accessible the health system is, and document the experiences of the Aboriginal population with the health system. This research is important because there are still differences in health care for Aboriginal people, and a strong primary health care system is important to improve everyone's health. For these reasons, it is valuable to ask Aboriginal people about their experiences of the health care system and try to identify how to improve their experiences. This research will include experiences from the patients, health care providers, and other staff for a broad perspective. Health centers and communities in the Yellowknife, Tłı̨chǫ and Inuvialuit region were included in the research. In total, 20 interviews were conducted in October and November. Interview questions included patient's experience with the accessibility of health centers, their satisfaction with the current system, any changes in health issues in the communities, how these health issues are being addressed, and suggestions that could improve the experience of Aboriginal patients. The interviews took place at any location that was convenient for the interviewee. They were audio-recorded and transcribed. Analysis is ongoing. This research is a part of a 5-year project called: Transforming primary healthcare in remote northern communities: The circumpolar health system innovation team.

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File Number: 12 408 141 **Licence No:** 15539 (Multi-year licence - year 1 of 3)
Region: IN, GW, SA **Location:** Inuvik; Fort Good Hope

Attitudes towards cancer in indigenous communities and examining uptake of screening services: The ACCESS Project

The goal of this ongoing research is to talk to men and women in Inuvik and Fort Good Hope about peoples' knowledge, attitude and behaviors towards cancer screening. A team from the University of Alberta wants to understand how and if people are using the cancer screening services available for three cancers (colorectal, breast and cervical). The team arrived in Inuvik on November 16, 2014 to meet with various community and local government groups and to start talking with community members. Interviews were completed with Inuvik residents discussing: (1) what cancer means to them and what they think causes cancer; (2) their experiences (positive and negative) with cancer in their family and community: (3) opinions on the best way to prevent and/or treat cancer; (4) thoughts and attitudes about accessing and using health services including cancer screening; and (5) suggestions for how clinics can better serve the community so the experience is more comfortable for community members. The same topics were discussed with community members of Fort Good Hope during February and March 2015. The team will be returning to both communities in the fall and winter of 2015/2016 to share what has been learned and to hear community input and feedback to the findings.

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File Number: 12 410 985 **Licence No:** 15466
Region: IN, GW, SA, DC, NS, SS **Location:** Internationally educated nurses in the NWT

Factors that Support the Integration and Retention of Internationally Educated Nurses in the Canadian Healthcare Systems

The goal of this study is to identify how best to support nurses who were educated outside of Canada (Internationally Educated Nurses, or IENs) within the Canadian healthcare systems. The study focussed on how to best integrate these nurses into the Canadian health care system, how to best keep them working here, and how to promote IENs. The study had three phases: Phase I, which was a survey of several thousand IENs working across Canada, Phase II: which included interviews with about 75 IENs, and Phase III: which included interviews with unions, nurses' associations and employers. The study showed that language remains a significant factor that affects IENs' ability become nurses, work and advance their careers in Canada. The study also highlights the importance of seeing integration as a two-way street where both internationally educated nurses and the work environment may need to change and adapt. The research found that an important way to integrate internationally educated nurses is to provide support for them. These supports may include mentoring, taking part in committees or short term projects, and taking time off to return to school or to attend conferences. The study brought to light the fact that the retention is not an issue specific to internationally educated nurses, but is an issue for all nurses. The study highlights specific issues with career development, as some internationally educated nurses may need assistance to promote themselves, and employers may need assistance to provide these nurses with career advancement opportunities. This project is being completed by a team of five researchers at the Université de Québec en Outaouais, Université de Montréal and University of Ottawa.

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File Number: 12 408 166
Region: NS
Licence No: 15457 (Multi-year licence - year 1 of 3)
Location: Yellowknife

Review of medical travel in Nunavut and the Northwest Territories
No research was completed under this NWT Scientific Research Licence in 2014. All activities involved planning for the data collection in future years.

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File Number: 12 408 166
Region: IN, GW, SA, DC, NS, SS
Licence No: 15564 (Multi-year licence - year 1 of 3)
Location: With health care providers in health units, health centers, clinics and regional hospitals across the NWT

Survey of primary care providers and managers in the NWT
No research was conducted under this NWT Scientific Research Licence in 2014. All activities related to this study were planning for data collection starting in 2015.

Physical Science

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File Number: 12 404 846 **Licence No:** 15376 (Multi-year licence - year 1 of 3)
Region: IN **Location:** Kuujjua River; Thomsen River

Assessing the impact of small, Canadian Arctic river flows to the freshwater budget of the Canadian Archipelago

There are two primary goals of this ongoing project. The first is to determine whether relatively small Canadian Arctic rivers significantly contribute to the total volume of freshwater that drains through Davis Strait, which is between Greenland and Baffin Island. The second is to determine if these small rivers are chemically different from larger North American rivers such as the Mackenzie and Yukon rivers. To achieve these goals the research team will collect water samples from seven different rivers and their estuaries from all over Nunavut and the NWT over a three-year study period. During the 2014 fieldwork in June and July, the research team and flight crew traveled to five Nunavut communities and two NWT communities and worked from these towns to either sample rivers easily accessible from town (Coppermine and Clyde rivers) or prepare for flights to more remote locations (Ellice, Back, Kujjuua, Cunningham, and Thomsen rivers) to collect samples. Between four and six liters of water were collected using an extendable pole with an attached bottle. In addition to river water samples, temperature, acidity, and conductivity measurements were made using a portable probe, and a few pounds of mud were collected at each site to determine their mineral content. The mud helps the research team to determine what sources (rocks, soil, etc.) contribute to the dissolved components measured in the river waters. Samples were chemically analyzed to identify and study the chemical components of the water, including nutrients. Analysis is ongoing.

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File Number: 12 404 789
Region: DC, SS

Licence No: 15398 (Multi-year licence - year 3 of 3)
Location: The Slave River Rapids near Fort Smith; the shores of the Great Slave Lake, Liard River near Fort Simpson; Hay River near Hay River

Big river wood dynamics in the Canadian subarctic

The primary objective of this research is to evaluate how, why, where and when driftwood moves in waterways within the Mackenzie Basin, with a focus on the Slave River and its Delta. As a continuation of the work done in 2013, in 2014, all the shorelines of the Great Slave Lake were photographed from an airplane, at a low angle. The goal was to be able to see the amount of driftwood, and describe the distribution of driftwood around the lake margins. Driftwood along the lake shores impacts how the landscape looks, and it can support many small patches of different habitat along the shore. This work was presented at the Slave River Delta Partnership meeting in Fort Smith in January 2015. In addition to the Great Slave Lake work, moving driftwood was monitored using time lapse cameras at Fort Fitzgerald, Hay River, and Fort Simpson. Wood movement was also studied by looking at pictures of river flows Islands on the Slave River taken from 1983 to 2014 by the Pelican Advisory Circle in Fort Smith. A short video with focus on this research can be found at: vimeo.com/117998780.

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File Number: 12 404 750
Region: DC

Licence No: 15375 (Multi-year licence - year 3 of 3)
Location: The Mackenzie Bison Sanctuary and areas to the west to Mills Lake and northwest to Birch, Fawn, Sharun and Second Lakes which lie in the south of the Wek'èezhìi area. Tree core sampling took place at selected sites along the highway 3 corridor between Behchokǫ̀ and Fort Providence

Landscape scale flooding in the Great Slave Lake Plain

This project was designed to study changes in water levels of lakes on the Great Slave Lake Plain. Fieldwork included tree core and lake sediment sampling, and documenting changes to the water levels in lakes. The research team also studied lake level and size changes by looking at aerial photographs and satellite images, and interviews with land users and traditional knowledge holders. Interviews were completed by 2013. Workshops were in held in March of each year since 2011 to share and verify results with the community of Fort Providence. The final workshop was held in March 2014 to summarize and verify findings from laboratory and traditional knowledge research. This project was a partnership with the community of Fort Providence.

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File Number: 12 404 815
Region: SA, DC

Licence No: 15389 (Multi-year licence - year 2 of 5)
Location: Fort Liard; Wrigley; Tungsten (Cantung)

Yukon-Northwest seismic network: Characterizing earthquakes and earth structures
The goal of this ongoing project is to use seismographs, which measure movements in the earth, to study the inside of the earth more than 20 kilometres below the surface, and to record earthquakes. 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 new stations have doubled the area which can be monitored and studied for earthquake activity in the NWT. These stations will record all movement in the ground, including earthquakes, until at least 2018. The stations will also help the researchers to understand a special zone inside the earth, about 35 or 45 kilometres below the surface. This zone is where the outer surface or crust – which is like a skin over the earth – meets the mantle, which is a thick solid layer. Information from the seismograph stations is being used to map where and how the crust and the mantle meet. This part of the inside of the earth limits how the tectonic plates of the earth can move. The research project is also studying how magnetised minerals in the earth's crust are oriented, for example, pointing north or south. The orientation of these minerals inside of rocks helps the researchers to understand how the surface of the earth moves over geological time. Finally, the researchers are trying to automatically detect and locate earthquakes in the NWT.

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File Number: 12 404 855 **Licence No:** 15475 (Multi-year licence - year 1 of 2)
Region: NS **Location:** From Behchokǫ̀ to the end of the Ingraham Trail

Ground ice - vegetation relationships in the North Slave region
The focus of this ongoing project is to study the soil and plant conditions of any area to see if these predict whether or not there will be ground ice near the surface. The researchers will assess the physical and chemical properties of the soil, and study the types and number of plants. An improved understanding of the relationship between ground ice and vegetation could help improve how permafrost researchers understand how the whole permafrost system – living and not. In 2014, the research team took samples of permafrost and set up long term research plots at seven of the 30 planned sampling sites. The plots were set-up following a set of rules known as the National Forest Inventory protocols, so this research will be comparable to other projects looking at the relationship between forest plants and ground ice. Analysis is ongoing. Samples are being processed to find out how much carbon there is within each of the permafrost layers, to measure how big the particles of sediment are, and to measure soil nutrients. Numerous other chemical tests will be carried out on the soil as well. Research will continue in 2015.

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File Number: 12 404 855 **Licence No:** 15502 (Multi-year licence - year 1 of 2)
Region: IN **Location:** Trail Valley Creek; Havikpak Creek

Responses of trees and shrubs to climate warming at high latitudes
The goal of this ongoing project is to understand changes in where and how trees and shrubs are growing. Two sites were studied: Trail Valley Creek and at Havikpak Creek. Trail Valley Creek is at the taiga-tundra border between Inuvik and Tuktoyaktuk, where researchers have noticed that there are increases in the size and density of shrub patches. Havikpak Creek is just outside of

Inuvik below the treeline. It has continuous forest cover. The researchers took soil samples and tree core samples from black and white spruce trees at both Havikpak Creek and Trail Valley Creek. The samples will help the researchers to understand changes in how the forest is growing at and below the treeline. The changes are due to recent climate change. Analysis of these samples is ongoing. Researchers also placed special tubes in the ground to gather information about plants' roots. The tubes were placed in both shrubby and tundra locations and the researchers will return and gather information from them in the summer. They will also study sample plots of both shrub and tundra vegetation to see how well the plants are growing, and why. The research team collected a large number of alder seeds to plant next year. In addition to this field-based research, the research team is studying the relationship between the type and size of shrub, snow drifting, and the landscape to see why shrubs are expanding into some areas where they were not found in the past. It looks from this research that that the fastest growing patches and newly shrubbed areas are in drainage channels and along the base of hills, which means that moisture in the soil is an important factor in shrub growth. Research will continue in 2015.

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File Number: 12 404 852
Region: NS

Licence No: 15444 (Multi-year licence - year 1 of 5)
Location: Kennady Lake and associated small lakes in the Kennady Lake watershed; the wildlife program will take place between coordinates 63°23 – 63°38 N, 109°-110° W (includes both the Gahcho Kué Project site, and the winter spur road connecting the site to the Tibbitt to Contwoyto winter road)

De Beers - Gahcho Kué 2014 Environmental Monitoring Program
This ongoing project relating to monitoring the environmental effects of the Gahcho Kué mine many components: water, water quality, fish and the condition of their habitat, dust, vegetation, soils, and weather. Winter ice surveys were performed at 10 locations near Kennady Lake to measure how the water was flowing under the ice, and to measure ice thickness. For the water quality component, water samples were taken from six lakes near Gahcho Kué, in different seasons. These samples were analysed for nutrients and quality. To monitor fisheries and fish habitat, the researchers took samples of the tiny plants and animals that fish eat at four lakes near Gahcho Kué, monitoring the water flow downstream of Area 8 (a dammed off portion of Kennady Lake east of the mine), and collecting some fish from Kennady Lake to sample and tag them. The researchers collected fish by using two-way fish fencing and large and small-mesh gill netting. The vegetation and soils program included monitoring the amount and type of dust using special jars which were placed around the area to collect dustfall. They checked the dust for metal content. The researchers also revisited monitoring sites that were assessed before, to record which plants were there and how they were growing. The researchers took samples from these plots, including lichens, mosses, and soil. The soil samples were tested for their chemical and physical properties. Finally, the researchers recorded air temperature, wind speed and wind direction.

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File Number: 12 404 800
Region: DC, NS

Licence No: 15450
Location: Lac de Gras; Slipper Lake; Queen's Lake; various lakes in Yellowknife (Niven, Frame, Long); Ingraham Trail

Impacts of recent climate warming on Canada's northern aquatic ecosystems

This research determined how the recent and dramatic climate changes in Arctic and sub-Arctic lakes and rivers have affected how contaminants move around and are eventually deposited. These are two of the largest concerns facing northern communities and their lands. The research approach was to see if there was a relationship between contaminants being deposited in lake sediments on the one hand, and changes in lake conditions on the other hand. The change to the lake conditions was measured by studying the algae that was preserved in lake sediments. The researchers gathered samples from lakes from many areas across the Arctic in a wide path, to see if they could map out changes across the landscape that might be due to recent warming and industrial development in Canada's Arctic environment. The changes might include increases in mercury and other chemical contaminants. Activities focused on five major regions: (i) The Cameron Hills (NWT); (ii) Tathlina Lake Region (NWT); (iii) Fort McMurray in Northern Alberta; (iv) Cold Lake in Central Alberta; and (v) The Mackenzie Bison Sanctuary (NWT). Each region has had a slightly different climate change history, and each one has also had different amounts and types of industrial development. The researchers looked at one specific type of contaminant from the oil and gas industry and found that there has been large increases in the Fort McMurray region since the 1970s, but contamination in the other oil producing regions (Tathlina Lake, Cameron Hills) was very low. The early results from the project show that most regions have mostly contaminants which are produced from wood fires and engine, with the exception of the lake sediments from the Athabasca oilsands region, where the contaminants are from the oil and gas industry (bitumen). These results will be helpful for government decision-makers who need to identify sources of these chemicals in the environment. Analysis of the lake sediment for other information about climate change is ongoing.

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File Number: 12 404 854
Region: SA

Licence No: 15465
Location: Mackenzie River in Norman Wells

River ice study

No research was conducted under this NWT Research Licence in 2014. Due to weather and ice conditions, this project was delayed until January 2015.

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File Number: 12 404 848
Region: IN, GW

Licence No: 15407
Location: Tuktoyaktuk (airport vicinity)

Aerosol chemical composition in the arctic (ACCA), a subproject to RACEPAC
The goal of this research was to measure the number, concentrations, optical properties, and chemical make-up of very small (3 nanometers and 10 micrometers) particles in the atmosphere, called aerosols. In 2014, the RACEPAC research team used a instrumented measurement container in Tuktoyaktuk as a ground station for air quality measurements. The instrument collected a range of data on weather, aerosol size, chemical make-up, measurements of soot and black carbon and the concentration of particle that help in cloud formation (cloud condensation nuclei). The POLAR 6 airplane, an airplane with similar instruments on it as the ground station, flew two vertical paths over Tuktoyaktuk to ensure similar measurements were taken as high as 4000 metre above the ground. The early results from both, the aircraft and the ground station, show that the general background aerosol concentration level is around 200 particles per centimetre cubed. This is significantly higher than the earlier reported background concentrations. It is likely that the local communities are the source of many of these aerosols.

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File Number: 12 404 707
Region: IN
Licence No: 15412 (Multi-year licence - year 1 of 5)
Location: The Melville South Ice Cap

Glacier mass balance of the Melville South Ice Cap
The goal of this ongoing project is to measure the health – that is, the amount of growth or decay – of the Melville South Ice cap on Melville Island. The researchers measure the amount of snow that accumulates over the winter, and the amount that the ice cap melts in the spring, by using special poles. These poles are drilled into the ice cap and then the researchers return to them to measure change. The ten poles that could be found were measured showed that the ice cap thinned in the 2012-2013 year. The thinning of the ice cap was interesting in that it was at a slower rate than the fifty year average, and at a much slower rate than the much faster thinning that has happened over the last ten years. An automatic weather station on the ice cap indicated that melt induced lowering of the ice cap surface extended from late June to mid-August, followed immediately by snow fall events to mid-September that would make up almost the entire snowpack for the 2013-2014 winter period. Results from this work has shown that while in absolute terms the Melville South ice cap experiences higher rates thinning compared to all other reference glaciers across the Canadian high Arctic, the overall trend is similar. This information helps scientists understand climate change and predict sea-level change in the future. Direct wildlife sightings during the visit were limited to 2 snow buntings on the ice cap. Fresh fox tracks were observed at a few locations across the ice cap while ptarmigan tracks were observed near the hut.

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File Number: 12 404 325
Region: IN
Licence No: 15545 (Multi-year licence - year 4 of 5)
Location: Garry Island; Mackenzie Delta area; Illisarvik, western Richards Island; Inuvik, near the Dempster highway; Paulatuk; near the Community Red Lake; Bar C; Seal Lake; Dennis Lagoon

Permafrost and climate change, western Arctic Canada
The objective of this ongoing research is to understand how climate change is affecting permafrost in the western Arctic, particularly in the outer Mackenzie Delta. In summer 2014, researchers made three sets of investigations in the western Arctic. In the first case they spent 10 days on Garry Island, studying how the degradation of so many ice wedge polygons is taking place. They are measuring the temperature at the top of each wedge and seeing if the water above the wedge freezes back completely. The second set of measurements was near Inuvik Airport, where the research team is studying the degradation of permafrost. They are trying to understand how quickly the ground is falling into the ice wedge troughs, which are the channels around the edges of ice wedge polygons. The third study was at the Illisarvik site on Richards Island. This is the drained lake where researchers are examining many aspects of the ground and the surrounding tundra. In 2014, observations of a pond in this area show that it developed in a degrading ice wedge on a hillslope. The ice wedge runs across the slope.

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File Number: 12 404 837 **Licence No:** 15394 (Multi-year licence - year 2 of 5)
Region: IN, GW **Location:** Paulatuk; Sachs Harbour

EarthScope Transportable Array
The goal of this ongoing research is to study the structure of the inside of the earth, how the continents slowly move or drift across the surface of the earth, where earthquakes occur, and movements in the earth's surface that are the result of human activity. To learn about these topics, this project uses almost 300 ground motion sensors throughout Alaska and western Canada, including 44 in the Yukon Territory and 9 in the NWT. Each station senses the ground movement from distant earthquakes and sends data by satellite or radio modem to a central point in San Diego. Three of the stations were visited and maintained in 2014. Data collection is ongoing and can be viewed at: http://ds.iris.edu/ds/nodes/dmc/earthscope/usarray/. More information about the project is available at: http://www.usarray.org/alaska.

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Region: NS **Location:** 10 kilometres north of the City of Yellowknife

City of Yellowknife Gold Project
The goal of this project was to do initial environmental baseline work, and expansion of research programs to establish sufficient study for possible future Environmental Impact Assessment of potential mine development if exploration activities are successful. The Yellowknife City Gold Project Phase I drilling program began in March 2014. At the request of TerraX Minerals Inc., ERM Consultants Canada Ltd. (ERM Rescan) visited their Northbelt Property in April 2014. The sampling program main objective was to characterize water quality from eight lakes near the three Phase I target zones and assess the toxicity of drill return water in the target zones. The Yellowknife City Gold Project targets gold and base metals (zinc, lead, copper, and molybdenum) along the Yellowknife Greenstone Belt (the Belt). Historically, exploration drilling has occurred

along much of the Belt as part of the historic Giant and Con mines. The Phase I drilling program was carried out entirely in areas that have been drilled by previous owners and targeted three zones: The Homer Zone to the north and the Barney and Crestaurum zones to the south. ERM Rescan visited lakes on the property to collect water quality samples and to conduct physical limnology profiles. In addition, drill return water was collected on April 14, 2014 for acute toxicity testing.

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File Number: 12 404 631 **Licence No:** 15396 (Multi-year licence - year 2 of 3)
Region: NS **Location:** 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 goal of this ongoing project is to see if the decline in the Bathurst caribou herd is related in part to changes in snow or vegetation. It is unclear what has caused the 93% decline in the Bathurst caribou's population since 1986. Many factors could have contributed to this significant decline -- habitat, harvest, predators, diseases and parasites, extreme weather, climate change, industrial development, and/or pollution. In this Cumulative Impact Monitoring Program project, the researchers estimated the availability and quality of forage (i.e. vegetation used as food by the caribou) over the Bathurst herd summer range since 1985. Community-based vegetation monitoring results from sites near Wekweètì from June to October in 2013 and 2014 were used for calibrating and validating these estimates. The researchers measured how good summer range conditions were for each year, using a calculation of how much feed is available in early summer and late fall and feed quality at the peak of leaf productivity. The researchers found that about half of the variation in the late winter calf:cow ratio of the Bathurst caribou since 1985 is due to differences in the condition of the summer range. This suggests that summer range conditions could be one of the most important factors in the decline.

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File Number: 12 404 827 **Licence No:** 15404 (Multi-year licence - year 2 of 5)
Region: SA **Location:** Within a 100km radius of Norman Wells

Establishing a watershed framework for assessing cumulative impacts of development

The goal of this ongoing project is to work with Sahtú communities to monitor water quality around Norman Wells. To help plan and design the project, the researchers attended an 8 day Sahtú Cross-Cultural Research Camp at Stewart Lake with other researchers, elders, youth and members of the Sahtú Environmental Research and Monitoring Forum. This camp provided a forum for scientists and Dene/Métis knowledge holders to learn about each other's research questions and ways of learning about changes to the land, including surface water quality. Both elders and youth voiced concerns about how various disturbances are affecting surface water quality, such as landslides, fire, and industrial development. Participants from the Sahtú identified areas that are important to their communities and helped identify sampling sites. During the camp, small water insects were collected from two streams near the camp. Later in the summer, researchers and community members measured stream health in the area west of the Mackenzie

River between Tulít'a and Norman Wells. They looked at small water animals and water quality in around 30 different locations. The sites included areas with no disturbance as well as sites impacted by landslides/slumps, fire (there was a relatively large fire in the study area that burned in July 2014) and industrial development (e.g. road and seismic lines). Analysis is ongoing and is expected to be presented in the community in 2015.

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File Number: 12 404 860 **Licence No:** 15500 (Multi-year licence - year 1 of 2)
Region: NS **Location:** The Prince of Wales Northern Heritage Center

Investigation of ancient arctic metallurgy

The goal of this ongoing research is to study artifacts made from copper that are housed in the Prince of Wales Northern Heritage Centre. The researcher examined more than 200 objects, mostly copper, but also items made from other metals and traditional tools for working with copper. The majority of objects originate in the NWT, though several were from Nunavut. The researcher took photographs, measured the weight and size, and recorded a description of the shape and use of the item and how it was made. The researchers also used a special machine that identifies the chemical composition of the item. The machine is known as a portable X-Ray Fluorescence (pXRF). The researchers used the pXRF to tell artifacts that were pure copper apart from foreign imports made from copper that is mined and melted to make tools (primarily post-Contact Euro-Canadian trade metals). Pure copper artifacts were made by people long ago, from copper that is found in pure metal form. The researchers found that pXRF can tell different types of copper apart. The pXRF was also used to see if it is possible to tell if a blue-green stain found on some artifacts that are not made of copper could have come from touching copper originally. Early results show that it is possible to tell the difference between a stain from being in contact with copper and other things that might cause a stain.

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File Number: 12 404 866 **Licence No:** 15517
Region: IN **Location:** Outer Mackenzie Delta Islands; Tuktoyaktuk Peninsula

Terrestrial geoscience studies of earthquake (seismic) hazard in the Mackenzie-Beaufort area

Industry, regulators and local communities require information on earthquake geohazards and their effect on engineering structures both at a regional and local scale. Ongoing work undertaken as part of the revision of the National Seismic Hazard Model for the Mackenzie-Beaufort area in the 2015 National Building Code of Canada suggests that there is an increased seismic (earthquake) hazard than previously thought. In an effort to further refine this estimate of earthquake hazard, the Geological Survey of Canada undertook a 1-year preliminary study with two field-based research activities: (1) Assessment of the potential for a record of paleostunami event(s) preserved in the sediments of low elevation coastal lake basins in the outer Mackenzie Delta and if this record can be used as an indicator of past large earthquake events prior to the

collection of instrumented records (i.e. pre-1960); (2) Estimation of the effects of permafrost on ground motion amplification to determine whether ground shaking during an earthquake would be uniform or not. Over the 2014 field season researchers accomplished and examination and description of a coastal exposure at North Head revealed several massive clean sand layers, which could have been deposited by a past tsunami events. Three shallow push-cores were taken and organic material was collected for dating. They also completed about 20 new measurements were taken with a Tromino instrument in the Mackenzie Delta. Preliminary analysis suggests that there is substantial regional variability in ground motion amplification that may be associated with changes in the permafrost thickness. Researchers are very pleased with the initial results of these two research activities. Data analysis will continue in the coming months and we hope to return to the field in 2015 to advance these studies past the preliminary stage.

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File Number: 12 404 359
Region: IN

Licence No: 15523
Location: Herschel Island; North Head; Johnson Point; Morgan Bluffs; Cape Cardwell; Nelson River Bluffs; Worth Point Bluffs

Sampling of Quaternary glacial sediments exposed in Beaufort Sea and Amundsen Gulf area as a basis for comparison with marine sequences on Beaufort Shelf and Slope

The goal of this project was to study how glaciers moved across northwestern North America and the Beaufort Sea. The researchers had a focus on recently-discovered deposits which are now deep beneath the surface of the Beaufort Sea but were deposited by retreating glaciers many years ago. When these deposits were found in the outer Beaufort Shelf and Slope in 2012 and 2013 around 750 metres below the surface, it was the first time glacial deposits were found in this area – scientists used to think that the outer Beaufort Shelf was not glaciated. The researchers visited and studied glacial deposits exposed on the shore of the Beaufort Sea to compare these to the deposits found offshore. They took samples from Hershel Island to the west, northern Richards Island, several sites on the mainland towards Paulatuk, and on Banks Island. The researchers are studying the chemistry of the deposits and the origin of the pebbles contained in the glacial sediments. The research will help interpret the geology of the study area and provide new insights on possible offshore geohazards.

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File Number: 12 404 847
Region: IN

Licence No: 15406
Location: The airspace adjacent waters between latitudes of (62° and 75°N) and between longitudes of (120° and 141°W).

Radiation – Aerosol – Cloud Experiment in the Arctic Circle (RACEPAC)

The goal of this research is to improve our understanding of how clouds form in the Arctic atmosphere. Clouds are made up of small droplets of water or ice, suspended in the air. For these droplets to form, there is usually a tiny particle – a nucleus, it's called – onto which water vapour

in the air condenses in the same way that water condenses on a cold glass. Clouds form differently around different types of particles, and the researchers wanted to understand this process in greater depth. Researchers performed a total of 16 research flights out of Inuvik, mostly over the Beaufort Sea ice, or open water. Researchers collected observations on low, layered clouds; the types of small particles in the air; and about the sea ice – they even mapped out clouds that were being photographed by satellites at the same time, to validate the satellite images. The clouds were sampled using a probe from the plane to see how big the droplets were. The researchers were interested in if the clouds were made up of water droplets ("liquid" clouds) or of ice particles. They found that the clouds were mostly liquid water, with some ice near the very top. They were also interested in measuring the small particles that 'seed' clouds. They found that the air near the surface of the sea was very clean, but higher up – more than 2 km into the air – there were particles, which had travelled from long distances to arrive there. Further information on the flights can be found on the project webpage: http://research.uni-leipzig.de/racepac/index.html

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File Number: 12 404 871 **Licence No:** 15534
Region: DC, NS **Location:** Sun-Rose former uranium exploration site; River Lake Portage dump site; Highway #1 Km

Phase III Environmental Site Assessments of three sites in the Northwest Territories
The goal of this project was to assess environmental impacts to three sites that may be contaminated from earlier industrial development. The first site, the Sun Rose Claim, sits on a naturally occurring uranium deposit located approximately 35 kilometres north of Behchokǫ̀. Uranium exploration took place there in the 1950s. The site was never operated as a mine; no processing of ore actually took place. This site was assessed for environmental concerns, human health concerns, ecological concerns, radio-activity, possible hazards such as mine shafts, and waste rock issues. The second site, the Highway #1 drum dump, is located 31 kilometres northwest of Fort Simpson. Approximately 1,200 drums had been stored there since the 1980s, along with metal debris, utilidor segments and a former passenger ferry. All 1,200 drums and all debris were removed under AANDC's jurisdiction and the site was assessed for environmental and human health hazards. The third site, the River Lake Portage dump site, is located 35 kilometres northeast of Yellowknife. Since the 1970s, it has been used as an unapproved dumping area. This site was also assessed for environmental and safety concerns.

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File Number: 12 404 555 **Licence No:** 15498
Region: NS **Location:** Wekweètì; Daring Lake; Baker Creek

Long term and current variability in sources and sinks of carbon and nitrogen in terrestrial and aquatic ecosystems underlain by discontinuous and continuous permafrost
This research focused on carbon and nitrogen in catchments, surface water bodies and lake sediments in the subarctic and low arctic environments of the NWT. This first part of the project focused on Dissolved Organic Carbon (DOC) in surface and shallow groundwaters, which is

important for water quality and aquatic health. Climate change in the study region will likely result in faster rates of peatland breaking down and decomposing. The research team examined DOC quantity and quality from different areas in the discontinuous permafrost (peat plateaux, lakes, and rivers in the Taiga Shield). They used a group of methods to describe DOC quality including: ultra-violet and visible absorbance, carbon to nitrogen ratios, size-exclusion chromatography, and disinfection potential. Laboratory experiments were also done to better understand how chemical process work in the warming peat. The second part of the project looked at carbon and nitrogen in lake sediments. The researchers studied cumulative impacts of environmental change on carbon cycling, nutrient sources and productivity in lakes. To do this, researchers took core samples and identified factors governing change in productivity, such as forest fires, climate change and long-range inputs of reactive nitrogen nutrients. Sediment cores were taken from lakes in continuous, and both widespread and sporadic discontinuous permafrost zones.

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File Number: 12 404 858
Region: SA

Licence No: 15491
Location: Along the Mountain River that crosses the Mackenzie Mountains

Mackenzie Mountains expedition

The purpose of this project, which ran from July 24 to August 11, was to gather field observations and collect 50 rock samples to understand the geology of the Mackenzie Mountains, including how the mountains were created and are being eroded away. The Mackenzie Mountains are geologically old, but the current earthquake activity and the impressive rugged terrain suggest that the mountains may still be growing and changing like a younger mountain range. The researchers hope to use the rock samples to figure out when mountain building resumed in the Mackenzie Mountains. Overall, researchers were amazed by the landscape and the geology. A report about the expedition can be found at: http://www.uc.edu/profiles/profile.asp?id=20939

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File Number: 12 404 807
Region: DC

Licence No: 15421 (Multi-year licence - year 2 of 3)
Location: Near Etanda Lakes (124° 22' 18.68" W, 60° 50' 32.00" N)

Liard Basin 2012 - Golata Formation Fossil

The Petroleum Group of the Northwest Territories Geological Survey (formerly named the Northwest Territories Geoscience Office) found an interesting fossil in the summer of 2012 in the middle of a rock formation called the Golata Formation. The Golata Formation is in northern BC and Alberta, and southern NWT, and dates to about 350 million years ago. The fossil was determined to be a part of the head of a shark. The fossil has both upper and lower teeth and the remains of fossilized cartilage, which makes up sharks' skeletons instead of bone. The fossil was scanned using a CT scanner, which is a special x-ray machine that takes many cross-section images of the fossil. These cross-sections will help the researchers to reconstruct the three-

dimensional anatomy of the shark's head when it was alive. The CT scan data is currently being analyzed by researchers.

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File Number: 12 404 864
Region: SA
Licence No: 15511 (Multi-year licence - year 1 of 2)
Location: Eastern Mackenzie Mountains; Central Mackenzie Valley

Sedimentology and Ichnology of the Cambrian Mount Clark and Mount Cap Formations, Northwest Territories

The goal of this ongoing research is to study the geology of a rock formation in the Mackenzie Mountains, called the Cambrian Mount Clark Formation. There has been some geological work to describe this formation, but the researchers are planning on recording much more detailed information about how and when the rocks formed into layers. They are also seeking any evidence of very early life that might have been left behind as a trace in the rock, such as small burrows. Finally, the researchers will chart out how the formation relates in time and space to other rock formations around it. The researchers visited four places where the rock formation is accessible at the surface, within the Mackenzie Mountains. It appears as though the rocks were deposited in an ancient sea shore area, where storms mixed up the water and sediment before the sediment settled to the bottom. After the storms, the sea bed was not quickly re-inhabited by the early life forms that were present before. Occasionally, the sea level itself changed dramatically. The researchers are hoping to use this information to understand the whole of the formation, even where it is buried far under the surface of the earth.

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File Number: 12 404 687
Region: NS
Licence No: 15378 (Multi-year licence - year 1 of 5)
Location: In and around Daring Lake Terrestrial Ecosystem Research Station

Biogeochemical controls on the structure and functioning of low arctic ecosystems

The objective of this ongoing research is to better understand how Canadian arctic tundra ecosystems function and how they are likely to be impacted by climate change, industrial development, and air pollution. In 2014, researchers worked most of the summer at Daring Lake collecting soil and plant samples from research plots that were established many years ago. Samples were taken from the tundra including all the plants in a plot, and their soil up to 10 centimetres deep. These samples were used to study how the plants can get nutrients from the soil with their roots, and if this has changed. Analysis of past samples from Daring Lake's research plots suggests that when nitrogen, which is like food for plants, is added to tundra, tiny one-celled organisms that live in the soil tend to store most of it within days to weeks. If more and more nitrogen is added to the soil over five or more years, it starts to be used by shrubs in particular, because the soil can't hold any more. The research team also collected samples from birch shrubs, including leaves and the soil around the roots. Samples were collected from northern North America and also in Scandinavia, in an international effort. Before this research, scientists thought that a lack of nitrogen was the biggest limitation to birch growth. However, it appears that

both nitrogen and phosphorus, another type of plant food, are important to birches. Ongoing work at Daring Lake has advanced our understanding of how tundra ecosystems work.

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File Number: 12 404 769 **Licence No:** 15480
Region: SA **Location:** Northern Mackenzie Mountains

Early Neoproterozoic Stratigraphy of the Mackenzie Mountains
The objective of this study was to describe and sample approximately three kilometers of ancient rock layers in the Mackenzie Mountains near Stoneknife River. This location was chosen because of its spectacular preservation of the rock layers and the fact that a very interesting and old geological time period is exposed. The rocks are from 850 million to 550 million years old. This period in Earth history covers the two separate periods when glaciers covered the entire earth from pole to pole, called Snowball Earth Events. Over the ten days spent at this location, samples were collected and geological measurements taken. Samples were brought to the lab and tested to determine the chemical make-up of the rock, which reflects the chemistry of the oceans in which they formed. The laboratory work on these samples is revealing exciting preliminary results about the cause for the first Snowball Glaciation, which began 717 million years ago, shortly after a massive volcanic episode covered much of northern Canada in basalt. Work on the samples is ongoing and will likely stimulate additional research.

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File Number: 12 404 797 **Licence No:** 15489 (Multi-year licence - year 2 of 3)
Region: SA **Location:** Exploration Licenses EL 462 and 463

EL462 & EL463 2013-2015 surface and groundwater monitoring program
The goal of this ongoing project is to monitor the surface water and groundwater around two petroleum developments: EL 462, and EL 463 (since consolidated into a single Exploration Licence and now known as EL494). Between June and October 2014, the researchers set up data collecting stations to measure water levels, climatic conditions, as well as stream flow at Bogg Creek, Slater River and Little Bear River during three separate field campaigns. They also collected surface water samples at thirty-nine locations during two field sampling events. Finally, they downloaded data from 8 temperature loggers. The results of the water level data 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 have been submitted to the Sahtú Land and Water Board and are available on the registry.

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File Number: 12 404 763 **Licence No:** 15428 (Multi-year licence - year 4 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 goal of this ongoing project is to collect information about the current environment around the proposed NICO mine. In 2014, a field program was conducted in May and September at the project location. Samples were taken from the Marian River at ten different locations, from where the proposed all-weather road will cross the river, to downstream of the "reference" lake outlet. A "reference" lake is a lake near a development that won't be impacted by the development, so can be used for comparison purposes. Field measurements were collected, such as temperature, acidity, and other characteristics of the water, and water samples were also collected for later laboratory analysis. Results are pending on the laboratory samples. A technical memorandum will be prepared to summarize the results and will be submitted to the Wek'èezhìi Land and Water Board. In order to study how the mine's waste rock will affect water, waste rock and tailings field plots were constructed at the project site prior to 2014. In June and July of 2015, samples were collected of the leachate, which is the liquid run-off from the waste rock and tailings. Leachate samples were submitted for chemical analysis. The results of leachate analysis will be used the help plan the future mine.

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File Number: 12 404 713

Licence No: 15386 (Multi-year licence - year 3 of 5)

Region: IN, GW

Location: Mackenzie River near the Tsiigehtchic ferry crossing

The arctic great rivers observatory

This project studies the six largest rivers that flow into the Arctic Ocean: in North America the Mackenzie and Yukon, and in Russia the Ob', Yenisey, Lena, and Kolyma. Researchers are measuring the concentration of naturally occurring chemicals, such as carbon, nitrogen, and phosphorus, in these rivers. The aim is to obtain current information about the flow of these chemicals to the ocean, to help understand how climate change is impacting Arctic rivers. Samples were collected from a motorized boat, just upstream of the Tsiigehtchic ferry crossing. For each sampling trip, 8 litres of water were collected and transported back to Inuvik for further processing in the lab. Researchers also use a hand-held water meter to measure water temperature, acidity, dissolved oxygen concentration, and other measures. 2014 was the third year of this five-year project. Sampling was conducted every second month starting in May. Laboratory analyses are underway, and results are available at: http://arcticgreatrivers.org.

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File Number: 12 404 808

Licence No: 15368 (Multi-year licence - year 1 of 5)

Region: NS, SS

Location: The study area is defined by a radius of 31 km from the centre of the Snap Lake Mine

De Beers Snap Lake Mine- 2011-2014 Environmental monitoring program
The goal of this ongoing project is to monitor the environmental effects of the Snap Lake Mine. De Beers have been collecting wildlife data for the Snap Lake area since 1999. The wildlife effects monitoring program is a requirement of the Mine's Environmental Agreement (Article VII, 7.2c) and Land Use Permit (Condition 36). A Wildlife Effects Monitoring Plan was prepared for the Mine in 2004. The program is designed to detect, monitor, and measure environmental effects that may impact wildlife habitat, changes to wildlife behaviour and distribution, and wildlife mortalities associated with the Mine activities. The annual monitoring program is intended to provide information for the Mine's environmental management system to adaptively manage the Mine to protect wildlife and wildlife habitat, and to contribute to regional monitoring information that may then be used to assess cumulative effects of mining on wildlife.

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File Number: 12 404 861
Region: IN
Licence No: 15501
Location: 22 to 200 km offshore of the Tuktoyaktuk Peninsula

Canada-Korea-USA Beaufort Sea geoscience research program: 2014 Activities
The goal of this project was to collect information about the seafloor of the Beaufort Sea, focussing on petroleum deposits known as gas hydrates, and what happens when permafrost there starts to melt and degrade. The researchers worked in September 2014 from the RV Araon, an ice breaker owned and operated by the Korean Polar Research Institute. The research was carried out as a collaboration between the Korea Polar Research Institute, Natural Resources Canada, Department of Fisheries and Oceans Canada, Monterey Bay Aquarium Research Institute, and the University of Bremen. The study team collected many types of information. They mapped hazards on the seafloor, and how seismic waves move through the seafloor. They way that seismic waves move through the seafloor helps the researchers understand what kinds of deposits make up the seafloor. They studied both shallow and deep deposits using different techniques. They took measurements about various aspects of the ocean water and the air above it, and used a special instrument to map out the landforms of the seafloor. They measured how warm water flows through the ocean, which will help identify permafrost and gas hydrates. They took cores from the seafloor and will study the sediments in the lab. All the information collected during the research cruise will be analyzed and interpreted in the coming months.

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File Number: 12 404 838
Region: IN, GW, SA, DC, NS, SS
Licence No: 15399 (Multi-year licence - year 2 of 5)
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 2014 to start an NWT-wide community-based and community-driven water quality monitoring program. Water is monitored at roughly 40 sites in 21 communities. The program is addressing priorities raised by NWT communities during the development of the NWT Water Stewardship Strategy. This program is gathering information about aquatic ecosystem health and water quality, and helps to build capacity for communities to monitor their waters. Community members were trained on how to use and retrieve special water monitoring equipment. This equipment varied by site, but overall included tools to measure water quality, and sampling equipment to take water samples for measuring water quality plus identifying metals and hydrocarbons from oil and gas development. Other special instruments are used which stay in the water for a period of time and absorb contaminants. One type sits in the water for roughly a month at a time and absorbs oil and gas chemicals, another sits in the water for roughly 2-5 days and absorbs toxic metals. The information gathered will help communities and researchers understand how things are changing across space and time. Results will be compared, where applicable, to water quality guidelines. Site comparisons throughout NWT will provide a snapshot of overall watershed 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: GW
Licence No: 15520 (Multi-year licence - year 2 of 2)
Location: Peel Plateau

Remote sensing of arctic vegetation biochemistry
There were two main goal of this research. The first was to measure how light is absorbed and reflected by arctic vegetation at the ground-level in various vegetation communities across the Western Arctic. The second goal was to develop a robust and sophisticated means of monitoring vegetation and climate dynamics over the current remote sensing and field-based methods. The work in 2014, builds on past work building a computer-based model using satellite data to describe the biochemistry of various plants. To do this the researchers look at how light reflects off of different types of vegetation. In 2014, a combination of remote sensing and fieldwork took in Richardson Mountains. Research is expected to be finalized in 2015

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File Number: 12 404 545
Region: GW
Licence No: 15453 (Multi-year licence - year 5 of 5)
Location: Water sampling at the following locations:
67°16’03.4”N, 135 23’05.4W; 67°16’29.3”N, 135°21’20.6W; 67°18’33.9”N, 135°18’33.8W; 67°18’43.2”N, 135°10’42.5W; 67°19’33.2”N, 135°07’29.3W; 67°17’02.9”N, 135°09’59.2W; 67°16’49.7”N, 135°10’45.1W; 67°15’49.6”N, 135°13’07.9W; 67°15’06.1”N, 135°16’40.1W; 67°23’ 17.1”N, 135°56’06.9W; 67°33’15.2”N, 135°12’09.9”W
Permafrost monitoring at the following locations:

67°18’45.6”N, 135°00’27.0”W; 67°14’41.2”N, 135°13’10.7”W; 67°13’13.1”N, 135°34’26.9”W
Shrub clearing experiments along Dempster Highway:
67°14'10.49"N; 135°21'48.52"W (control);
67°14'47.09"N; 135°10'38.07"W (control);
67°14'26.35"N; 135°19'2.26"W (brush);
67°14'42.09"N; 135°12'0.20"W (brush);
67°14'58.21"N; 135° 8'24.17"W (brush)

Evaluating the environmental impacts of permafrost mega-disturbances along the Dempster Highway, NWT
The goal of this multidisciplinary study was to examine permafrost conditions and landscape change in the Peel Plateau, northwestern NWT. The researchers recorded the temperature of the permafrost across an area where the landscape changes from the Peel lowlands to the foothills of the Richardson Mountains. The researchers also studied permafrost thaw slumps, which are slope disturbances caused by thawing permafrost. Large slumps are common throughout this Peel Plateau, and the study found that they cause hundreds of thousands of cubic metres of sediment to move downslope every year, typically into rivers and creeks. This severely impacts the terrestrial and aquatic ecosystems and drainage patterns of downstream rivers and lakes. Researchers analyzed satellite images of the area starting in the mid-1980s, which indicated that the slumps are increasing in number, growth rate, and size throughout the region. The study found that a recent increase in the frequency and magnitude of summer rainfall is a key reason why slump activity has intensified. In summer 2014 the research team also worked with community members of Fort McPherson to determine the impact of shrub removal on ground temperatures near to the Dempster Highway. In 2015 the research team will assess the ground temperatures, active-layer thickness and snow cover at sites where shrubs were removed.

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File Number: 12 404 770
Region: IN, GW
Licence No: 15521
Location: Aklavik West Road and bridge

Proposed helicopter reconnaissance – spring and summer programs 2014 for proposed Aklavik West Road and Bridge
No research was conducted under this NWT Research Licence in 2014.

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File Number: 12 404 782
Region: GW
Licence No: 15459
Location: Sample sites along the Dempster Highway between Tsiigehtchic and Inuvik:
67°39’30.545”N 133°50’57.99”W; 67°45’30.40”N 133°50’55.95”W; 67°50’15.02”N 133°42’14.01”W; 67°59’34.72”N 133°27’46.20”W; 68°14’17.51”N 133°18’21.65”W; 68°18’53.32”N 133°22’11.63”W; 68°32’19.88”N 133°52’05.97”W

Biogeochemical variations in Pleistocene and Holocene-age permafrost across various ecological landscapes, western Canadian Arctic

The goal of this project was to study permafrost conditions both today and from many, many years ago. From July 21 to August 15, 2014, the researchers travelled along the Dempster Highway and took samples from 7 different sites near to streams. They wanted to see how melting permafrost impacted the streams. Core samples of the active (that is, melts in the summer) layer and deeper frozen were collected in 5 centimetres lengths from the soil surface to 3 metres below the surface. The samples will be used to study the chemical properties of the samples, and the ice in the permafrost. The chemical properties will help the researchers understand how the thawing permafrost will impact the environment. If possible, the layers will be tested to see how old they are. Active layer samples were collected from two hummocky terrain sites. Hummocks are the bumps that form in some areas that make the ground very irregular. Samples were taken in the centre of the hummocks, along the edges of them, and in the low areas between them. Finally, the samples will be used to study how materials move through permafrost due to the cycles of freezing and thawing

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File Number: 12 404 621
Region: NS

Licence No: 15419 (Multi-year licence - year 1 of 5)
Location: In and around Daring Lake Tundra Ecological Research Station

Toward predicting future tundra carbon balance

The overall objective of this ongoing research is to measure the tundra-atmosphere exchange of carbon dioxide (an important greenhouse gas) over various tundra terrains. The purpose is to determine if more carbon dioxide goes in than goes out the tundra. When more carbon goes in, it's called a sink. When more carbon is released, it's called a source. In 2014, this project focussed on measuring carbon dioxide at arctic tundra sites near Daring Lake, some of which were studied in previous projects. The field season lasted from instrument set up in early-May through to take-down in late-August. Measurements at the four terrestrial tundra sites in 2014 again showed that the tundra was a carbon dioxide sink, despite (or perhaps because of) some very unusual weather during the field season. Researchers also measured how carbon goes in and out of tundra ponds, and found that most ponds are sources of carbon to the atmosphere. More importantly, the warmer the temperature, the greater the amount of carbon released by the pond. Finally, the researchers put up instruments to measure winter carbon exchange from tundra sites. The data will be collected in 2015 near the end of winter. Overall, this research helps us to understand how Canadian Arctic tundra will influence the amount of carbon dioxide in the atmosphere today and into the future.

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File Number: 12 404 567
Region: IN

Licence No: 15490
Location: In and around Sachs Harbour

Permafrost disturbance susceptibility mapping
The goal of this project was to map disturbances to the permafrost both inland and at the coast, around the community of Sachs Harbour. Through communication with community members, a number of potential sites where the permafrost might have been disturbed were identified and then visited and mapped during the field season in July and August of 2014. The researchers found that while permafrost degradation was widespread, there was only a small number of inland active layer detachments (where the melted layer of permafrost slides down a slope) and retrogressive thaw slumps (where permafrost melting causes landslides). This is in contrast to the coast where a number of disturbances were mapped to the east of the community. Additionally, there are areas of exposed ice along the coast increasing the likelihood of disturbance or erosion at these locations. Aside from mapping permafrost disturbances, the researcher planned to collect water samples at the disturbances. Only a small number of water samples were able to be collected due to the limited amount of running water during the time of the trip. These samples are currently being analysed and the results will be shared with a larger project organized through the NWT Community Based Monitoring Program. While in Sachs Harbour, the researcher attended a community meeting and made a presentation about this project.

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File Number: 12 402 712 **Licence No:** 15405 (Multi-year licence - year 3 of 5)
Region: IN, GW **Location:** Mackenzie Delta

A multi-scale assessment of cumulative impacts in the Northern Mackenzie Basin
The Northern Mackenzie Basin is an area of enormous ecological and cultural significance that is changing in response to more frequent disturbances (natural and human-caused), and regional temperature increases. These changes are impacting regional ecosystems, but the cumulative effects of multiple disturbances are extremely poorly understood. In this project, researchers combined satellite images and air photos with field observations to document the extent and cause of changes occurring between 1985 and 2012. Researchers found that 85% of the Tuktoyaktuk Coastland has more vegetation in 2011 than in 1985, making this one of the most intensely greening regions in the Arctic. Air photos from 1980 and 2013 show that this greening is linked with more growth of erect dwarf and tall shrubs, which shade the ground with their leaves, and less ground lichen cover. This research suggests that these changes are due primarily to regional warming. The researchers also studied how disturbances like all-weather roads, degrading ice wedges, drained lakes, historic seismic lines, tundra fires, thaw slumps (landslides in permafrost), and drilling mud sumps might be impacting the environment. They have found that disturbances like these can result in a cycle of changes among vegetation, snow pack, and soils that cause the effects of disturbance to last for centuries. The researchers were also interested in knowing how much of the Northern Mackenzie Basin region is affected by disturbances like this. To find out, they used field sampling, air photos and satellite images to map out the disturbances and any related impacts. This mapping showed that, despite how important these disturbances are on a local scale, disturbances only affect a small amount of the study region. This information is especially relevant to wildlife management organizations, who are interested in how landscape changes will affect wildlife.

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File Number: 12 404 839
Region: NS
Licence No: 15382 (Multi-year licence - year 2 of 5)
Location: Waterbodies located within the EKATI claim block

EKATI engineering and environmental monitoring programs
The goal of this ongoing monitoring and research project is twofold. First, the researchers are monitoring lakes and rivers and air quality to determine if the Ekati Diamond Mine is having any effects. Second, the researchers are gathering information about currently undeveloped areas where mine development may occur in the future. The monitoring programs, include several components to identify if there has been any changes to the quality of the air, the quality of the water and sediments, and the plants and animals that live in the water. Baseline studies, which are aimed at understanding how things are before a development starts, were continued in various sites around Lac du Sauvage near the outflow of Christine Lake and in lakes southwest of Misery Camp near Lac de Gras. These studies looked at many aspects of the health of the water system including the plants, fish, and tiny creatures who live in the water, the sediments, how water flows through the area, and the weather system. Annual results are reported to the Wek'èezhìi Land and Water Board.

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File Number: 12 404 850
Region: IN
Licence No: 15432
Location: International waters between 71° north and 74° north at 135° west

University of Washington marginal ice zone
The Marginal Ice Zone Program studies the forces that control sea ice melt and break-up in the region of partial ice cover between the pack ice and the open water. These physics may change as the region sees increasing open water during summer. For example, open water absorbs the energy from sunlight better than ice, which reflects the sunlight back. The warming open water then causes more ice to melt. Open water also allows waves to form at the sea surface, which can cause the sea ice to break into smaller pieces that also melt more rapidly. In spring 2014, the researchers put instruments on the sea ice near Sachs Harbour. These instruments drifted west through the summertime melt, and successfully sent information about the ocean, ice and atmosphere back to the researchers. In 2014, the energy from the waves was not strong enough to cause the ice pack to break-up. Regions of partial ice cover warmed up more due to the warming effect of the sun. The researchers noted that around freeze-up, there was rapid phytoplankton (small plant/algae) growth. They were probably fed by essential nutrients brought from deeper waters to the sunlit surface by increased mixing of the water.

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File Number: 12 404 485
Region: IN, GW
Licence No: 15461 (Multi-year licence - year 1 of 5)
Location: Within the Mackenzie Delta

Biogeochemistry of lakes in the Mackenzie Delta
This project is ongoing and the long-term goal is understand the natural systems in lakes in the Mackenzie Delta to help scientists understand how global climate change might impact major arctic river deltas. Specific goals during 2014 included measuring how much methane is produced in Delta lakes, and measuring how much methane builds up in water under the ice. During May, samples of unfrozen lake water were collected from 27 lakes near Inuvik for measurement of under-ice methane. During June through August water samples were collected each week from 6 lakes near Inuvik to measure the methane content. The researchers also conducted experiments on the water, growing certain types of methane-eating and methane-producing bacteria. Water samples were analyzed for methane at the Inuvik Research Centre, along with measurements of the bacteria. Some water samples were also brought back to Simon Fraser University to study how the bacteria uses carbon and converts it into methane. Most analyses are now complete, but data is still being checked and summarized. Preliminary results indicate that most under-ice methane quickly escapes to the atmosphere after ice-out, but that methane continues to be produced throughout the summer open-water period.

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File Number: 12 404 822
Region: IN
Licence No: 15400 (Multi-year licence - year 2 of 3)
Location: The Beaufort Sea; Mackenzie Shelf; Amundsen Gulf region

Addendum to ArcticNet licence # 15213
The central aim of this research project is to conduct long-term studies of climate-induced changes in the Beaufort Sea region. The research is focused on the impacts of climate change on both the marine ecosystem and the interactions between the ocean, sea ice and atmosphere. ArcticNet researchers collected water, sediment, atmospheric and biological samples at more than 50 locations in the Beaufort Sea/Mackenzie Shelf/Amundsen Gulf region from 14 August to 25 September 2014 using the research icebreaker CCGS *Amundsen*. The *Amundsen* is equipped with specialized equipment to map the surface of the ocean floor and also has many instruments that measure and track various properties of the water and air. From the ship's wheelhouse, an Inuvialuit Marine Wildlife Observer kept watch for and identified marine mammals and seabirds. Ultimately, the knowledge generated from the ArcticNet marine program, including this project, will be available to communities, industry and other stakeholders and decision-makers in order to better understand and adapt to climate change. Information collected from this multi-year program will help researchers understand the impacts of climate variability and change on the physical, biological and chemical processes in the Beaufort Sea/Mackenzie Shelf/Amundsen Gulf region.

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File Number: 12 404 849
Region: GW
Licence No: 15431
Location: Aklavik; Fort McPherson; Inuvik; Tsiigehtchic

Gwich'in moss houses and winter berries as climate change adaptations
In a world where much of what we use is bought at a store, we may forget that materials for shelter originate from the land or sea. In the Arctic, where terrain and waters may become impassable for days or weeks, traditional knowledge provides wisdom about how to build using materials from the land. To find out more about making shelters in Gwich'in tradition, architect and ethnoecologist Dr. Nancy Mackin first consulted with Elders, and then organized two winter excursions to Gwich'in Territorial Park to build structures using a framework of wood and an insulating layer of turf and moss (a nan kanh in Gwich'in). Students from East Three High School worked with Dr. Mackin and Gwich'in knowledge-holders Willie Simon, Alestine Andre, Mabel English, and John Jerome to make an A-frame shaped structure of birch, with moss blocks as an insulating cover. Elders also showed students winter survival strategies, such as harvesting berries from under the snow. The team revisited the house in June 2014, and learned more about climate change and useful technologies, such as making rope from moose hide. Students were impressed at the usefulness of traditional knowledge and the solidity of structures built the traditional way.

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File Number: 12 404 868
Region: SA
Licence No: 15522
Location: The Canol Heritage Trail within the Mackenzie and Selwyn Mountains

Long-term ecological and geomorphological investigations in the subalpine of the Mackenzie Mountains, NWT
The goal of this project was to study recent permafrost thaw and track any movement of the treeline coincident with climate change. Permafrost may hold crucial clues about global warming. The 1990–2014 weather record from 5 weather stations in the Mackenzie Mountains area shows an increase of about 1.3°C in annual permafrost temperature. Warming appears to have thawed permafrost, varying from 3 centimetres per decade in low elevation sites, to nearly 8 centimetres per decade at high elevations. As temperatures rise and permafrost thaws, the organic compounds in it begin to decompose, producing carbon dioxide and methane. Release of these greenhouse gases will amplify the effects of climate warming. Arctic landscapes will change, sometimes abruptly, and the current plant and animal residents may find themselves unable to adapt. The treeline was the other major focus of this research. Warmer temperatures could mean that more trees can grow farther north or further upslope in mountainous areas. The researcher planted new trees from seeds in some areas to see if they would grow. It appears from this experiment that south-facing alpine slopes may be ideal environments for new trees to establish. However, existing trees along the Canol Trail do not currently produce enough good seed to colonize new areas. Further monitoring is necessary to determine if current patterns of tree growth and permafrost thaw will continue into the foreseeable future.

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File Number: 12 404 792
Region: SA
Licence No: 15414
Location: Within the boundaries of EL 470

Environmental Studies for EL470
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:** 15439 (Multi-year licence - year 1 of 5)
Region: IN **Location:** Trail Valley Creek; Havikpak Creek

Hydrology of high latitude watersheds
There is an urgent need to understand the impact of a rapidly changing climate on the water resources (snowcover, stream flow and lake levels) of the Canadian Arctic. There is a need to know how changes in water will impact animals, fish and waterfowl and other living systems, and to ensure that roads, pipelines and mines are built to properly withstand changes in, for example, snow and floods. To better understand these changes in streams, lakes and snow, there is a need for: 1) long term observations, 2) better understanding of the factors controlling each of these, and 3) methods to predict future changes in water. This study is addressing all of these needs. During the past year, the researchers have continued the collection of water data and updated the instruments at two study sites in the Inuvik region (Havikpak Creek and Trail Valley Creek). These sites have the longest water sampling data sets in the Canadian Arctic and are a unique source of information on northern water resources. The researchers have also continued to develop better computer-based models to predict future changes. Finally, they rejuvenated the research camp at Trail Valley Creek.

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File Number: 12 404 874 **Licence No:** 15538 (Multi-year licence - year 1 of 3)
Region: NS **Location:** Avalon Nechalacho Rare Earth Elements Project at Thor Lake; Lakes and streams the Ingraham Trail

Understanding the potential impact of rare earth elements in aquatic systems in the NWT
The objectives of this ongoing research are to evaluate the relative sensitivity to certain contaminants of northern aquatic invertebrates (like water insects) and northern ecosystems in comparison to southern species and environments. The contaminants in question are the rare earth elements. Rare earth elements are minerals that are often used in manufacturing electronics. To make the comparison, the researcher took samples of aquatic invertebrates from shoreline vegetation. Samples from 3 sites along the Ingraham Trail were collected using special nets on Sept 16 and 17. Samples were sorted and amphipods (tiny shrimp-like animals) were saved and then transported for analysis. The amphipods were grown in the lab, where they survived but did not reproduce successfully. The standard testing method to determine how sensitive the creature is requires that tests be done with young offspring (the most sensitive life stage). Because there were not enough offspring produced it was not possible to test for the relative sensitivity of the NWT organisms (compared to southern Canada organisms of the same

species). The lack of reproduction may be due to the late date of collection of this seasonal organism. Planning is underway for further collections in the summer of 2015.

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File Number: 12 404 856 **Licence No:** 15479
Region: GW **Location:** Dempster Highway form the Peel Plateau to near the Yukon boarder

Modeling changes in permafrost conditions along the Dempster Highway under climate change

The purpose of this project was to gather information needed to make a computer-based model about how climate change may affect the highway. Fieldwork was conducted along the Dempster Highway in the summer of 2014, and the project is a part of the Dempster Highway baseline monitoring project, headed by Transport Canada, Yukon Highway Engineering Department, and Carleton University. Temperature measurement instruments called 'thermistor strings' were installed at two separate sites. The thermistor strings record temperature at 5, 25, 50, and 100 centimetre depths. These records will allow the near-surface temperatures to be better estimated in the computer model. Special tiny digital weather recorders called iButtons were also installed at each site to help measure when snow arrived, when it left, and its maximum depth. A topographic survey of the sites was conducted out from the center of the road to the edge of the right-of-way. The model is currently under construction, so at this point there are no results to report.

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File Number: 12 404 867 **Licence No:** 15519
Region: GW **Location:** Proposed Mackenzie Valley Highway

Mackenzie Valley Highway hydrotechnical field investigation

The main purpose of this project was to study how water will flow over and around the proposed Mackenzie Valley Highway, to verify computer modelling results and to collect field data at potential water crossings along the proposed highway alignment. The fieldwork for this hydrotechnical assessment on the portion of the proposed highway within the Gwich'in Settlement Area was done August 27 through September 1. At each of 29 potential water crossing, the research team studied of the shape and form of the watercourses, recorded a typical cross-section for each waterway, took measurements of channel flow and water chemistry. The team also took site photographs and wildlife observations. Work is planned to continue in 2015. After this second field season, the study will be completed to confirm the crossing locations along the proposed highway, and to make recommendations about the type and size of structure which could be used at each potential crossing, such as one or more culverts.

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File Number: 12 404 564
Region: NS, SS

Licence No: 15499 (Multi-year licence - year 1 of 3)
Location: East Arm Great Slave Lake; Wilson Island area; Union Island area; Taltheilei Narrows

Provenance of the East Arm Basin

This project hopes to compare and contrast the evolution and source of bedrock in the East Arm Basin with bedrock preserved between Great Slave and Great Bear lakes. During 2014, bedrock exposures in the southwest part of the East Arm of Great Slave Lake were visited and studied. The specific locations of the bedrock were on the north shore between Blachford Lake and Taltheilei Narrows, the islands between Blanchet and Union, and the south shore in the vicinity of McDonald Lake. Smoke from forest fires prevented safe access to the Wilson Island area. Sites were accessed using both a helicopter and a zodiac. About 45 fist-sized rock samples were collected. They will be tested to determine the precise age of the rock. Researchers also mapped a bedrock exposure that may represent the oldest rock layer in the world that comes from a tidal zone, dating to 1.9 billion years.

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File Number: 12 404 876
Region: GW, DC, SS

Licence No: 15548 (Multi-year licence - year 1 of 5)
Location: Site A: Along Highway #5, between the boundary of Wood Buffalo National Park west of Fort Smith and Angus Tower; Site B: outside of Wood Buffalo National Park and along Highway #5, between the Park boundary west of Fort Smith and the intersection between the road leading to Thebacha Campground and Highway #5; Site C: The Dempster Highway between the north shore of Campbell Lake (68°.16'N, 133°.14'W) and Rengleng River that crosses Dempster Highway around 67°.45'N; Site D: Area north of Fort Providence along Highway #3, where Forest Management Division, Environment and Natural Resources, Government of Northwest Territories maintains a research area; and, Site E: Between Tsiigehtchic and Fort McPherson.

Climate change and structure of circumpolar boreal forests during the past century

The goal of this ongoing project is to study black spruce and jack pine stands in the Northwest Territories. Field work took place between late August and the end of September, when the researchers measured tree height and width, and took core samples from one stand of black spruce and two stands of jack pine. The black spruce stand was east of Fort McPherson, and the jack pine stands were at about 60 km north of Fort Providence. The researchers were interested in the age, height, size, and other characteristics of all the trees in the stand. The stem samples were taken to a laboratory at Kyoto University, Japan, and are currently under analysis. An examination of how forests grow and use nutrients was also conducted in five study plots: two were in Inuvik area, and three were in Wood Buffalo National Park west of Fort Smith. At these plots, the spruce or pine needles and other dead vegetation from the ground was collected in special containers. The researchers studied how the tree roots grow using an instrument that was pushed into the ground around trees two years ago. Both these samples were also brought to a

laboratory at Kyoto University for further analysis. The basic research plan will be the same next year, and some new study plots will be added to increase the number of stands to be examined.

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File Number: 12 404 779
Region: NS
Licence No: 15442 (Multi-year licence - year 3 of 5)
Location: Bluefish Lake; Prosperous Lake; Yellowknife River between Prosperous Lake and Bluefish Lake

NTPC Bluefish Hydro repairs

There are two main goals of this ongoing study. This first is to describe and monitor the water volume and fish activity in the Yellowknife River between Prosperous Lake and Bluefish Lake after the construction of the new dam and spillway for the Bluefish Hydro Plant. The second is to meet the terms of the Fisheries Act Authorization. During construction of the dam and spillway, a shallow water zone, or shoal, where fish could spawn was created for habitat compensation, which was monitored to confirm its use by fish. Tissue samples from Slimy Sculpin, which are eaten for food by other fish, were also collected to monitor changes in mercury levels. Finally, the researchers took measurements to monitor water levels and flows in the Yellowknife River, fish migration up from Prosperous Lake, and fish presence in the upper reach of the Yellowknife River below the spillway at Bluefish Lake. Results from all monitoring will be presented in annual reports to the Mackenzie Valley Land and Water Board and to the Department of Fisheries and Oceans.

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File Number: 12 404 504
Region: SS
Licence No: 15488
Location: South Rae study area

South Rae field trip

The goal of this project was to study how geologists can best map out the layers of the rocks that form the surface of the earth in the South Rae study area. To do this, the researchers took a six-day field trip in the area in summer 2014. The researchers were able to get a general perspective of the geological history of the area from about 2.5 million years ago until modern times. They mapped out where rock layers were visible at the surface, and found good locations for future research camps. The researchers also used air-photos to study the geology of the NTS map sheet 75B. They looked specifically at 110 locations, either in air photos or on the ground. They were also interested in studying evidence of glaciers from long ago – they took samples of glacial deposits to study them back in the lab, and mapped how and where the glaciers of the ice ages moved. They found that generally, the rock layer nearest the surface is a loose, mixed-up layer of rocks of various sizes that is left behind from glaciers, known as till. Sometimes the glacial deposits were large eskers or thin, curving ridges. The researchers also found evidence (old beaches) to show that there was a glacial lake(s) in the east around Firedrake Lake. Finally, the researchers checked glacial till around Thye Lake to see if it is worth studying for evidence of valuable resources uphill, that the glacier swept down with it.

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File Number: 12 404 826
Region: IN

Licence No: 15392 (Multi-year licence - year 2 of 3)
Location: Inuvik; Delta near Inuvik; Central Delta area; Illisarvik area; Garry Island; Fish Island area

Soil carbon in the Mackenzie Delta Region

The goal of this ongoing project is to examine how natural physical and biological systems may influence how much and what kind of carbon is stored in the soil in the Mackenzie Delta region. Carbon is a molecule that is essential for life, but is also important for global climate change. The research team has traveled to over 20 locations north and south of treeline in the Delta and the adjacent uplands for field investigations. They visited places where the soil profile is exposed, such as riverbanks, to record the soil and take samples of the permafrost. Hundreds of soil samples were analysed first at the laboratory in the Aurora Research Institute in Inuvik, and then at Carleton University in Ottawa. Early results on how much carbon is found, and where it is found, suggest that there are clear differences in carbon in the soil between the Delta and the uplands, but differences across treeline are less distinct. Fieldwork in the summer of 2014 significantly increased the number of sites being studied; however, additional work is needed and two field trips in 2015 will be necessary. Laboratory investigations into carbon quality will be conducted during winter and spring 2014-2015.

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File Number: 12 404 640
Region: IN, GW

Licence No: 15429 (Multi-year licence - year 1 of 5)
Location: Husky Lake; Burn area south of Inuvik; Noell Lake area; Campbell Dolomite Upland; Dempster Highway/Peel Plateau

Examining the impacts of climate and environmental change on aquatic and terrestrial ecosystems of the Mackenzie region, NWT

There are several main goals of this ongoing study. The first is to study the effects of melting permafrost and thaw slumping (landslides) on lakes and rivers. The second is to examine what happens to the water system when a lake drains out. In April 2014, lake sediment cores from 6 lakes were collected on the Peel Plateau. The sediment cores will be analyzed in 2015. Bad weather prevented the researcher from collecting drained lake samples by helicopter. This work now planned for spring 2015. As a third goal, and in anticipation of the construction of the Inuvik-Tuktoyaktuk all-weather road, the research team also examined the impacts of dust on lakes using small lakes/ponds along the Dempster Highway near Fort McPherson as the study sites. They took water samples and cores from the lake bed to see if road dust from the Dempster Highway changes the water chemistry of the lakes, which could change algae within the lake as well. The researchers assumed that dust would only travel a few hundred meters from the highway. They collected water samples 30 lakes on the Peel Plateau, by helicopter or vehicle. At each lake, approximately 2 litres of water was collected from the centre of the lakes and tested for a number of different things: chemistry, temperature, nutrients, metals, and more. Lakes in close vicinity to the Dempster Highway seem to be more alkaline.

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File Number: 12 404 865 **Licence No:** 15514
Region: GW **Location:** Dempster Highway

Water and leaf wax isotopes in permafrost
The objective of this research was to study different forms of hydrogen, called isotopes, found in ground ice in permafrost and in the waxy covering of the leaves on trees growing in the same area. The different isotopes of hydrogen can be measured using a technique called stable isotope analysis. The water in the ground ice is a reflection of annual precipitation, and the hydrogen isotopes in this water are related to annual air temperatures. Similarly, the hydrogen isotopes in the waxy covering of leaves come from the precipitation and are related to temperature, but there is a slight difference between the leaf waxes and the ground ice. Understanding this difference between the ground ice and leaf waxes will help scientists to understand how temperatures changed in the past, from a time when we only have fossils to study. Scientists have found tiny molecules of fossil leaf waxes in ancient sediments – the same molecules of leaf wax that cover modern leaves. They are hoping that they can use the hydrogen in these fossilized leaf waxes to figure out what the climate was when the trees were actually growing, by comparing it with modern leaves. In July 2014, the research team collected shallow permafrost cores from the top 1-2 metres of permafrost at two forested sites along the Dempster Highway – one near the Inuvik Airport and the other near Campbell Lake. The next step for this research is to measure the hydrogen in the leaf wax of the trees growing at the test sites.

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File Number: 12 404 853 **Licence No:** 15445
Region: IN **Location:** Inuvik to Tuktoyaktuk Highway

2013 - 2014 Inuvik Tuktoyaktuk Highway geotechnical program
No summary was submitted for this licence. This project is not in compliance with licensing requirements.

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File Number: 12 404 823 **Licence No:** 15403 (Multi-year licence - year 2 of 4)
Region: IN **Location:** East Channel lakes area; Reindeer Station lakes area

The ecology and paleoecology of benthic macroinvertebrates in the Mackenzie Delta region
Recent warming has led to large areas where the permafrost is thawing. When permafrost thaws, it can release carbon and nutrients currently locked away in frozen soils. The nutrients are released because previously-frozen plant matter starts to decompose from bacterial action, and

these nutrients can then find their way to lakes and rivers to be used by fish and other water life. From July 27 to August 16, the research team sampled eleven lakes near Reindeer Station, and eight lakes within the Mackenzie Delta near Inuvik. Sediment cores were collected in lakes on the permafrost to examine the benthic invertebrates (organisms that live on the bottom sediments of rivers, streams, and lakes) that are found in the sediment. The researchers also took water samples from each lake and made note of the temperature and other characteristics of the water. The samples were then taken to the Canadian Centre for Inland Waters in Burlington, Ontario for analysis. Preliminary analysis shows differences between lakes in areas of stable permafrost and lakes in more northern areas with unstable permafrost and thaw polygon development. The researchers noticed that the productivity of lakes that are located in the Mackenzie Delta is different from those outside the floodplain. In addition, the types of invertebrates differed between lakes that flood during spring melt and those that are connected to the main channels. Work will continue in 2015.

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File Number: 12 404 570 **Licence No:** 15413 (Multi-year licence - year 1 of 2)
Region: DC **Location:** The Scotty Creek drainage area

Permafrost thaw impacts on northern water resources and ecosystems
The goal of this ongoing large project is to study how and why permafrost is thawing around Scotty Creek, and to develop science-based tools to predict permafrost thaw. The researchers also want to understand and predict the impact of permafrost thaw on the land and water. The researchers have mapped out how permafrost is thawing in the Liard River valley, and have found that it is thawing more quickly over time. They are also studying how forest cover has reduced drastically over the same time. Although these changes are due to a warming climate, this study indicates that permafrost also thaws more quickly where trees are removed by fire, disease or by human activities. They are studying a recent forest fire in the area to learn more. This project has many different components and different research partners, who are studying how forest fires, vegetation type, tree disease and tree root growth, landscape features, rivers and streams, groundwater, and seismic lines affect changing snow, permafrost, and water systems.

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File Number: 12 404 680 **Licence No:** 15527 (Multi-year licence - year 1 of 3)
Region: IN **Location:** The Brock River; Hornaday Rivers

Geology of the Brock Inlier
The goal of this project is to study a rock layer which is around a thousand million year old. This layer is visible at the surface, and is known as the Brock Inlier. The inlier (inliers are an area of older rocks surrounded by younger rocks) overlaps the eastern edge of the Darnley Bay Anomaly, which is a unique area that has a strong gravitation pull and, like the North Pole, also is very magnetic. The mining industry thinks this is because of a deeply buried deposit of certain minable metal ores. The results of this study are, in part, to support industrial exploration by adding to the scientific information about the surrounding region. Recently, geologists have found that there have been some errors in geological mapping in the region. The Brock Inlier was originally

mapped by helicopter reconnaissance in 1968, and geologists feel that it needs to be re-mapped using current stratigraphic knowledge and terminology.

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File Number: 12 404 761
Region: NS
Licence No: 15395 (Multi-year licence - year 3 of 3)
Location: The Acasta River Region

Petrogenesis of the Acasta Gneiss Complex: Ancient rocks revisited
No research was conducted under this NWT Scientific Research licence in 2014.

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File Number: 12 404 857
Region: SA, DC
Licence No: 15486
Location: In streams and watercourses in and around Tungsten

Chihong Lead-Zinc mining project
The goal of this project was to study fish and fish habitat along a newly upgraded road. Selwyn Chihong Mining Ltd. upgraded the Howard's Pass Access Road in 2014. The access road extends 80 kilometres from the Nahanni Range Road to Selwyn's XY camp at Howard's Pass, Yukon. The researchers studied fish presence, and habitat type and quality, at every watercourse crossings along the road. Watercourses included streams, rivers, lakes, and wetlands. In all, 86 watercourses were assessed. Four species of fish were found during the study: arctic grayling, burbot, slimy sculpin and lake trout. Lake trout were sampled only from the lakes in the southern portion of the study area, and the other three fish species were found from slow moving streams and rivers throughout the length of the road. Fish were only found in 11 streams with arctic grayling found in 9, burbot in 4, and sculpin in 7. Fourteen creeks were assumed to have fish based on clear, unobstructed fish access from downstream fish-bearing waters. In total, about 40% of the watercourses sampled were considered fish-bearing with the remaining 60% non-fish bearing. Although fish are widely distributed through the study area, overall abundance is low and high quality fish habitat occurrence is low.

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File Number: 12 404 703
Region: GW, SA
Licence No: 15504
Location: Along the Mackenzie Valley Fibre Link corridor between Fort Good Hope and the Dempster Highway, near Inuvik

Bathymetry surveys - Mackenzie Valley Fibre Link
In August 2014, Stantec Consulting Ltd. conducted bathymetry surveys, or an examination of lake depths, at 26 lakes along the Mackenzie Valley Fibre Link corridor. The lakes were surveyed to

see if they would be suitable water sources during winter construction seasons. All lakes were accessed by helicopter. The surveys were conducted using a special instrument that measures and maps how the deep the water is; this was mounted on to a boat. The boat was driven slowly across the water, along selected transects. The water depths recorded were checked by measuring the depth using a rope with a weight. Other data quality checks were also performed. For each lake, the researchers produced a computerized mapping file of the elevation and bathymetric maps, calculated size/shape statistics for each lake (e.g., surface area, average depth), the total lake volume, and the amount of water available under 1 metre and 1.5 metres of ice.

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File Number: 12 404 657
Region: IN, GW, SA, DC

Licence No: 15433 (Multi-year licence - year 1 of 5)
Location: Jean Marie River; Fort Simpson; Wrigley; Tulít'a; Norman Wells; Fort Good Hope; Tsiigehtchic; Inuvik; Tuktoyaktuk

Permafrost monitoring and collection of baseline terrain information in the Mackenzie Valley Corridor, NWT

The goal of this ongoing project is to monitor how permafrost is changing along the Mackenzie Valley. Existing permafrost monitoring sites throughout the Mackenzie corridor, from Fort Simpson to the Mackenzie Delta (Inuvialuit, Gwich'in, Sahtú, Dehcho regions), were visited in August and September 2014 to record the ground temperature and measure the active layer thickness (the part of the ground above the permafrost that thaws every year). The ongoing measurements from the 40 research sites allow for a better description of current permafrost conditions, improve understanding of the natural variability in permafrost conditions, and ensure regional baseline permafrost information is available to support land management decisions. Permafrost temperatures, ranging from warmer than -2°C in the discontinuous zone in the south to colder than -4°C in the continuous zone further north, generally continue to increase in the region although the rate of increase has been slower in recent years. Active layer thickness ranges from less than 50 cm in the north to greater than 100 cm in the southern region. Generally, active layers have become thicker since 2009 – that is, a thicker layer of the ground thaws every year – and data collected in 2014 shows this trend continuing, although it's variable. Continued data collection is planned to better assess the impact of climate change on the permafrost. Reports will be made available when completed.

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File Number: 12 404 548
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Licence No: 15540 (Multi-year licence - year 1 of 3)
Location: Hepburn Lake; Sulky Lake; Colville Lake; near Behchokǫ̀; Ulukhaktok; Thor Lake; Norman Wells array

Mackenzie craton

The goal of this project is to map out locations where diamonds may have been formed deep (100-300 kilometres) under the surface of the earth, to make diamond exploration more efficient. To find these deposits, the research team measured how naturally-occurring earthquake waves

move through the surface of the earth. The research team recorded these waves at several widely-spaced locations in the NWT. Each station consists of a sensor buried about 1 metre in gravel. Some have a satellite dish, solar panels and battery/electronic boxes. From similar sites around the globe, seismic waves from earthquakes are recorded by the sensor and transmitted to Ottawa using a satellite telemetry link (same as TV signals). The NWT stations are part of a series of stations across the continent. In August five stations near Norman Wells were upgraded or serviced, stations near Behchokǫ̀ and Ulukhaktok were removed and one was re-installed at Johnson Point on Banks Island. The authors published their findings in a report (Natural Resources Canada open file report 7691). The researchers found that the earth's crust is very thin – 15-24 kilometres – in several locations, which has made it harder to map it out. Understanding how thick the various layers of the earth are is important to understanding geological history and helps geologists understand where to look to find oil and gas deposits or diamonds.

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File Number: 12 404 806 **Licence No:** 15380 (Multi-year licence - year 2 of 4)
Region: DC **Location:** Scotty Creek

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

This ongoing research project is trying to understand how greenhouse gases, water vapour, and heat are both released from, and go back into, permafrost. It is very important to understand how climate change is affecting these systems, which in turn have a big impact on the whole ecosystem – for example, on the plants and animals, and water systems. In particular, the researchers are interested in looking at the effect of how thick the active layer is on these processes. The active layer is the portion of permafrost that melts every summer, and is getting thicker as the climate changes. To understand this system, the researchers are using a very complicated mathematical technique (the eddy covariance technique). They have taken measurements at Scotty Creek since spring 2013. These measurements have continued over 2014. The researchers are focussing on the quality of the measurement instruments and techniques, because that will ensure that the information they collect through the project will be of high quality and accurately reflect what is happening in the real world. To understand how carbon, water and energy cycle processes are affected by climate change, the continued observation of these systems is crucial and will continue in 2015.

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File Number: 12 404 806 **Licence No:** 15397 (Multi-year licence - year 2 of 4)
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). Eddy covariance and support measurements at Havikpak Creek

and Trail Valley Creek have been made since spring 2013. These measurements have continued over 2014, and the team has made significant steps in ensuring collection techniques are consistent and easy to compare. To understand how carbon, water and energy cycle processes are affected by climate change, the continued observation of these net exchanges is crucial and will continue in 2015.

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File Number: 12 404 870 **Licence No:** 15532
Region: DC **Location:** The Keele Formation; Sheepbed Formation

Tracking environmental change in the Neoproterozoic Sheepbed and Keele Formations, Mackenzie Mountains, Northwest Territories, Canada

The goal of this research was to record high quality information about the rock layers of several rock formations in the Mackenzie Mountains that are very old. Geologists from Harvard University and Colorado College completed one week of fieldwork in the Backbone Ranges to study the geological history of these formations. These rocks are about 650-500 million years old. The researchers studied how the rocks were deposited into layers over time under an ancient sea, and small rock samples were collected from the different layers in each formation. They collected a few different types of samples – some will be used to find out how old each layer is. Another type of sample told the researchers about the ancient seas that were present when the rock layers were originally being deposited – they want to find out if there was oxygen in the sea water, like there is today. The analysis shows that the ancient seas started off without oxygen, but then became more and more oxygenated, which may provide information to the researchers about some of the earliest life on earth.

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File Number: 12 404 785 **Licence No:** 15492
Region: GW **Location:** Around Fort McPherson

The effect of permafrost slumping on carbon delivery from land to water

The goal of this project was to find out if thaw slumps – which are landslides due to melting permafrost – are changing the amount of carbon that is present in the streams that the newly thawed land is sliding into. Carbon is an important energy source for life on earth, but is also implicated in climate change. When permafrost thaws, carbon that was previously 'locked up' in frozen soils can be consumed by bacteria, or can decompose into carbon dioxide, and then be released to the atmosphere. This release of carbon dioxide is important for understanding climate change. Also, when bacteria are consuming more carbon, this can have an effect on the animals that feed on them. Fieldwork during the summer of 2014 took place between July 3 and August 28, and was based in the Peel Plateau region west of Fort McPherson. Researchers accessed eight different thaw slump sites during the summer, and took samples of stream water upstream and downstream of slumps, and slump runoff water, to analyze how much carbon was in the water. In addition to the survey work, researchers conducted lab-based experiments to examine how quickly the carbon in the streams above and below a thaw slump changes into carbon

dioxide. The results of these experiments suggest that carbon from slumps changes into carbon dioxide much more readily than expected. Early results from this work have been presented at a set of academic conference in 2014 and will be present in the communities in 2015.

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File Number: 12 404 720 **Licence No:** 15377 (Multi-year licence - year 4 of 4)
Region: DC **Location:** Jean Marie River; Fort Providence

Solar irradiance monitoring in Jean Marie River and Fort Providence

The objective of this research project is see if the sunshine in Jean Marie River and Ft. Providence is enough for solar panels to be used to generate electricity. In 2014, two reports were released about solar and wind monitoring activities in these locations. Both reports are available at nwtresearch.com. These studies showed that if either community is considering switching from the diesel generators that currently provide electricity to either solar or wind power, solar energy generation is a far better option than wind energy. Solar power systems can be made to size for a specific community's needs and the equipment is far easier to transport, install, and operate than wind systems. If Fort Providence is going to move to solar power, the government would have to help to cover some of the project costs to make it cost-effective compared to diesel generation. In Jean Marie River, some government subsidies would probably be required for residential service, which is already subsidized, but no subsidies should be required for utility projects, as solar power would be cost-effective compared to diesel generation.

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File Number: 12 404 825 **Licence No:** 15371 (Multi-year licence - year 1 of 2)
Region: SA, NS **Location:** Northeast of Yellowknife; Near Norman Wells

Using remote sensing to support cumulative impact monitoring of water resources in the Northwest Territories.

The goal of the project was to use satellite images that were processed carefully through a computer program to study cumulative effects on water systems, especially ice attached to the bottom of the lake. 'Cumulative effects' means the environmental effects of all the different changes to the earth such as mines, roads, forest fires, etc., in an area. Satellite images were used to monitor the condition and distribution of lakes and rivers specifically. These images provide information on winter lake ice cover, seasonal and annual changes in lake size, general land cover including wetland types, and underwater vegetation within lakes. The information from the satellite images was validated with fieldwork. Two field surveys were completed in 2014, one in the summer and one in the winter. Winter field work happened between April 3 and 7 in the Slave Geological Province area. The field team measured the thickness of the surface ice, and used a special radar to measure the ice attached to the bottom of the lakes. Summer fieldwork was completed between September 17 and 18 in the Central Mackenzie Valley area. In the summer the researchers took special air photos from a helicopter along transects around 25 to 45 kilometres. These photos were compared with the satellite images to make sure the satellite

images were correct. Information on the project is available through the NWT Discovery Portal and an executive summary report is available upon request.

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File Number: 12 404 776 **Licence No:** 15531
Region: DC **Location:** Near the Scotty Creek research site

Impact of permafrost thaw and wildfire on carbon storage in peatlands

The research aims to study the question: Is permafrost thaw in peatlands linked to rapid losses of the top surface of the peatland, which acts like insulation? In August 2014, the research team conducted field work at the Scotty Creek research campsite. This fieldwork consisted of extracting eight soil cores from peatlands around the campsite. Each core is between 5 and 10 centimetres across, and is about 5 metres long. The cores were taken to a lab at the University of Alberta, were they were sectioned into 1 centimetre segments. Each segment was studied to see how long ago it was deposited in the bottom of the swamp, analyzing the amount and type of carbon and other nutrients, and studying how fast it would decompose if it were exposed. This research will allow for the study of how peatlands changed in both chemistry and the life of the peatland as it changed and developed, going back 9000 years. The results will provide an understanding of how past and ongoing climate change will affect these peatlands. Preliminary results were presented at the American Geophysical Union Fall meeting in San Francisco in December, and will be submitted for publication in scientific journals in 2015.

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File Number: 12 404 809 **Licence No:** 15434 (Multi-year licence - year 2 of 5)
Region: NS **Location:** Lac de Gras

Diavik Aquatic Effects Monitoring Program

The purpose of this project is to monitor the lakes and rivers around the Diavik Diamond Mine. The mine must conduct environmental monitoring programs under the terms and conditions of their Territorial Water Licence and their Fisheries Authorization from Fisheries and Oceans Canada. The researchers want to see what the short and long-term effects of the mine are to improve mine operations if issues are found. The focus is on Lac de Gras the lake surrounding the mine. The monitoring team measures many things such as changes to chemistry, dust, water life of all shapes and sizes, and traditional use of the lake. The monitoring program runs every year, and a report is produced every March. The report compares the parts of the lake that are affected by the mine with areas that have not been affected to determine how, when, and where the mine is changing the lake. A report is also produced every three years to include a longer timeframe. The researchers found that there are differences in the level to which the various things they are monitoring have changed due to the mine. In most cases, the changes are the most marked close to the mine, and get less noticeable further away from the mine.

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File Number: 12 404 798
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Licence No: 15518 (Multi-year licence - year 1 of 2)
Location: Ellice Island; Garry Island; Pelly Island; Hooper Island; Kendal Island; Tuktoyaktuk; Toker Point; McKinley Bay South; Russell Inlet; Topkak Point; Tuft Point; Mackenzie Delta

Coastal geoscience research in the Beaufort Sea and nearshore sediment dynamics of Tuktoyaktuk Harbour

There are three overall objectives of this ongoing research. The first is to monitor changes in the Beaufort Sea coastline. The second is to monitor how the Mackenzie Delta is sinking into the ocean. The third objective is to better understand how sediments are deposited on the sea floor in the shallow waters of Kugmallit Bay, in particular the approaches to Tuktoyaktuk Harbour. For the first objective, a total of 14 coastal monitoring sites were visited including Pelly Island, Hopper Island, Garry Island and Kendall Island which have not been surveyed in over 20 years. The project team found that Pelly Island has eroded more than 1 kilometre since 1957. This new research suggests in coastal regions where there are high, ice-rich cliffs, coastal erosion rates have accelerated in the last 10 years. For the third objective, this fieldwork greatly improved scientists' understanding of nearshore processes near Tuktoyaktuk Harbour. A set of core samples inside and out of the harbour showed that it has filled in a minimum of 29 centimetre since 1983. Special instruments to measure the water's chemistry and movement were successfully installed (June 2014) and retrieved (August 2014) in Kugmallit Bay and at the approaches to Tuktoyaktuk Harbour. Ongoing data analysis of the samples will help in the development of the 2015 field campaign.

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File Number: 12 404 791
Region: DC

Licence No: 15391 (Multi-year licence - year 2 of 3)
Location: Five locations on Prairie Creek up and downstream of the mine

Prairie Creek Mine - Baseline Aquatic Monitoring Program

The objective of this ongoing research is to collect baseline information about lakes and rivers in advance of the development of the Prairie Creek Mine, so impacts from the mine can be identified. In the 2014 field program, conducted in late July and early August, the researchers collected benthic invertebrates (small underwater insects) and information about the habitat in the lakes and rivers. No fish studies were conducted in 2014. The primary purpose of the study was to investigate a location upstream on Prairie Creek, above where the mine effluent will flow out – this is called a "reference location" because water from this location will not be impacted by the mine and so can be used for comparison purposes. This area seems to have more nutrients – more algae – in it than would be expected. Since mines can also cause an increase in nutrients, it is important to understand the naturally-occurring levels for later comparison. The researchers also revisiting six sites last sampled by Parks Canada in 2009. All stations were within 3 kilometres of the mine, three stations downstream and three upstream. The researchers found that the

'reference location' should be moved to another spot. All the water monitoring information has been uploaded to the Canadian water monitoring database, and analysis is ongoing.

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File Number: 12 404 862
Region: NS

Licence No: 15509
Location: Felsic Lake/Snare River area; Courageous/MacKay Lake area; Lac du Rocher/Fat Lake area

Geochemical comparison from three Archean greenstone belts across the Slave craton

The goal of this project was to investigate the geological history of three greenstone belts. A greenstone belt is a type of rock deposit that came from flowing lava or magma (which is lava that stays underground), that hardened into rock. Sometimes greenstone belts, which are often green in colour, have minerals and metals in them that can be mined. During the 2014 summer field season, the research team visited three greenstone belts (Lac du Rocher, Wijinnedi-Snare, and Courageous-MacKay). Travelling by helicopter and float plane, they stayed for 6-14 days, with a small 2-4 person field camp. The research in the area consisted of primary geological observations of visible bedrock, recording information and measurements about the rock layers and types, and photography of the rock's characteristics. A total of 34 geological rock samples were collected (approximately 11 from each location). These samples were shipped to Carleton University, Ottawa, for further detailed chemical analysis, which is ongoing. Preliminary results indicating that the volcanic rocks from the three localities have a very similar history. Because they are so old, the rocks have been changed by the forces of the earth's surface. The researchers were able to determine these rocks formed between 2.7 – 2.6 billion years ago from an underwater volcano. The rocks were formed from magma that came from deep under the surface of the earth. Further chemical analysis/interpretation is currently ongoing.

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File Number: 12 404 851
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Licence No: 15441 (Multi-year licence - year 1 of 5)
Location: Along the Ranger patrol routes of Tuktoyaktuk; Paulatuk; Kugluktuk; Ulukhaktok; Sachs Harbour

Canadian Ranger ocean watch

The goal of this ongoing project is to collect information from the ocean in the Arctic Archipelago. In February, 2014, four DFO researchers worked with Ranger groups in Paulatuk, Tuktoyaktuk and Ulukhaktok prior to the groups' winter exercise. Then during the exercise, Rangers collected oceanographic data using scientific instruments lowered through holes augured in the sea ice. The information collected by the rangers was supplied to DFO and is being used to trace fresh water flows in winter through the Canadian Archipelago and sea ice properties. Information was also collected about winter conditions for plankton growth. Plankton is a general term that refers to very small life forms of many types that live in water.

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Region: NS
Licence No: 15482 (Multi-year licence - year 3 of 3)
Location: White Truck Site; Boundary Creek; Mosquito Creek

Carbon cycling linkages of permafrost systems [CYCLOPS]
The goal of this ongoing research is to study the way that plants, soil, and permafrost interact. The researchers are studying this interaction in northern areas where the permafrost is continuous, and in more southern areas where it is sporadic. In 2014, the research team collected samples to determine the role that different plant communities and different soil types play in protecting permafrost. They studied this in both unburned and fire-disturbed ecosystems. The research team also studied the impacts of permafrost thaw on how greenhouse gases are released and taken in to the ground, in both free-draining areas and peatland systems. After a forest fire, there is a lot of regional variation in how fast different vegetation types grow back. This variability allowed the researchers to study the relationship between different vegetation types and permafrost. Finally, this information is allowing the researchers to understand the impact of permafrost thaw in different ecosystems. Analysis is ongoing.

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File Number: 12 404 549
Region: NS
Licence No: 15423 (Multi-year licence - year 5 of 5)
Location: Ingraham Trail; Baker Creek Watershed north of Yellowknife; Tibbitt to Contwoyto Winter Road

North Slave permafrost study: Characterizing and predicting discontinuous permafrost for climate change adaptation
The overall objective of this ongoing research is to study discontinuous permafrost in the northern Great Slave Lake region, and to predict where discontinuous permafrost is likely to occur. Discontinuous permafrost is ground that is permanently frozen only in patches. Knowing about discontinuous permafrost will assist in planning and the development and maintenance of community and industry infrastructure. Fieldwork was conducted between March and September 2014 in the Great Slave region along Highways 3 and 4, and the Tibbitt to Contwoyto Winter Road. Ice and water samples from frozen winter overland flow or “icings” were collected in March. Five icing sites were also visited in June and September for data collection. The researchers are also studying how temperatures change over the region. To do this, they are collecting temperature records from various sites, including: the top layer of the permafrost that thaws every summer in birch, spruce forest and peatland sites and ground temperatures from winter road and burn sites. These records are used to understand how temperature and climate changes across the region, and the effects of water on local permafrost conditions. Three new temperature monitoring sites were installed west of Lockhart Lake within tundra environments on the Tibbitt to Contwoyto Winter Road. Other components to this project include a study of ground ice and recent thaw slumping (landslides from thawing permafrost) along the Yellowknife River and mapping work on the vegetation cover and geology of the area.

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File Number: 12 404 814 **Licence No:** 15401 (Multi-year licence - year 2 of 3)
Region: IN, GW **Location:** Trail Valley Creek; Havikpak Catchment

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

The main aim of this ongoing research is to see how the water cycle controls how much carbon is released from, or absorbed by, the permafrost. The researchers are interested in how this will change due to climate change. 2014 was the second major field season for this project, and researchers had six successful week-long field trips to Trail Valley Creek between 7 June and 10 September. Fieldwork included measuring how much carbon dioxide and other greenhouse gases moved in and out of the permafrost in three vegetation types. The researchers also studied vegetation and soil characteristics in the area, and the depth of the active-layer, which is the top part of the permafrost that melts in the summer. The researchers collected soil samples and water samples to help them understand the carbon processes through laboratory study. The surface water samples have now been analysed for different types of carbon and other elements to help the researchers understand how long it takes for carbon to go from the air into a plant, to the ground, and then back into the air again. This research remains on-track, and in 2015, the researchers expect to share it in Inuvik.

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File Number: 12 404 711 **Licence No:** 15506 (Multi-year licence - year 4 of 5)
Region: IN **Location:** Noell Lake catchment

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

The main goal of this ongoing research is to improve scientific knowledge about lake ice, and its effect on food webs and living systems in Arctic tundra upland lakes. To study lake ice, researchers developed a special instrument that automatically measures weather, lake ice, and water quality. The instrument is on a buoy that is moored to the lakebed. The system was first used in Noell Lake north of Inuvik in fall of 2010 for testing and validation. In 2014, to make sure the instrument was working correctly, the researchers took water samples and analysed them for water quality. As in previous years, researchers had planned to conduct a detailed lake ice survey on Noell Lake in early May, but the environmental conditions were deemed to be unsafe and no surveys were completed. Although validation of the system is ongoing, it is clear that when the system is functioning properly, it is recording accurate information about the lake. Information collected from this lake monitoring instrument is allowing the researchers to examine lake ice and its effects on water quality, food webs, and living systems in the lake through the winter, and water quality, food webs and living systems in the lake during the ice-free season.

Social Science

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File Number: 12 410 966
Region: IN, GW

Licence No: 15449
Location: Aklavik; Inuvik; Fort McPherson; Tsiigehtchic; 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
No research was conducted under this NWT Scientific Research Licence in 2014.

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File Number: 12 410 979
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Licence No: 15448 (Multi-year licence - year 1 of 3)
Location: Inuvik

Modality in Uummarmiutun - expressions of 'obligations', 'permissions', and 'certainty'
This research studies a specific part of the Uummarmiutun language called 'modal suffixes.' English examples of model suffixes are words like 'must', 'might' and 'can', while examples of Uummarmiutun modal suffixes are 'hugnaq', 'viaq', 'lla' and 'î uk î au'. These Uummarmiutun words are very abstract, and English translations often do not give the full picture. Elders' descriptions and reflections on how to use these words are critical to understanding these parts of the language. Here are some of the most important differences between the Uummarmiutun versions and English versions: 1) 'viaq' is translated as 'might': 'niriviaraa' is "she viaq (might) eat it." However, 'viaq' unlike the English 'might' encourages the hearer to take action to prevent the event from happening. 2) 'niq' is another special suffix. 'Niq' always means that the speaker is sure of what she is saying: 'hialungniqhuq' is "it is niq raining." But 'niq' also shows the hearer that

there is something special about this. Perhaps the speaker is surprised that it is raining, or she wants the hearer to think about this and bring an umbrella. This project will continue in 2015, and include Siglitun and Kangiryuarmiutun modal suffixes.

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File Number: 12 410 1000 **Licence No:** 15544
Region: IN **Location:** Inuvik; Yellowknife

Environmental change and shipping development in the Beaufort Sea
The goal of this research is to identify the hopes, concerns and management suggestions about the potential for increased shipping activities for the Beaufort Sea Region. In August 2014, the researcher traveled to Yellowknife and Inuvik to interview members of the Government of the Northwest Territories, the Inuvialuit Regional Corporation, and the Inuvialuit Game Council. The conversations focused on the risks and opportunities that more shipping will bring to the region. The responses were compared with information in reports and journal articles to support the argument that organizations that work at the regional scale can help improve planning for shipping in the Beaufort Sea and Inuvialuit Settlement Regions. Results focused on ensuring that environmental, social, and cultural damage is avoided while still taking advantage of the opportunities. This research was presented in December 2014 at the Arctic Change Conference in Ottawa and the Inuvialuit Game Council Meeting in Inuvik. The fieldwork also allowed for a better understanding of the hopes and concerns of those living in the Beaufort Sea and Inuvialuit Settlement Regions, which will contribute to future research. To learn more about the research, please visit passages.ie.dal.ca.

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Region: NS **Location:** Yellowknife

Wolverine (*Gulo gulo*) conservation and perceptions by local populations: Case studies in Sweden and the Northwest Territories, Canada
The goal of this project is to understand the overall opinions, values and attitudes of children toward the wolverine, with the goal of determining where and how educational programs can increase overall knowledge of this animal. Between May and June 2014, the researcher surveyed elementary school classes to see how young people feel about wolverines as well as their level of knowledge about this animal. The surveys were followed by short presentation about wolverines and the research. The research will continue in 2015.

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File Number: 12 410 956 **Licence No:** 15497
Region: SS **Location:** Kakisa

Ka'a'gee Tu First Nation exploration of climate change, food security and health
This project examined the impacts of climate change on food security in the community of Kakisa. Food security refers to people having good access to a healthy and sustainable food supply. Community-based research methods were used to ensure the research was community-driven and responded to the needs of the community stakeholders. The research revealed that climate change is indeed impacting the community by making it more difficult to access the land for harvesting and gathering. Community members have also noticed changes in animal migration and behaviour, and are now worried about the availability of some of their most important food resources, specifically moose. The community is actively adapting to the changes they see on the land. Harvesters share photos and information about conditions on the land, and actively promote harvester safety. Most importantly, sharing country food is a common practice in the community and goes a long way to ensure food is available to those who want it. With general concerns about access to food, the community identified several programs they wish to see to promote adaptation and community health, including gardening, environmental monitoring, recycling and other programs that foster community gatherings and inter-generational knowledge transfer on the land.

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Region: IN **Location:** Inuvik

Food security, ice, climate and community health
This ongoing food security research project is based on research priorities identified during the 2012 Inuit Health Survey results workshop in Inuvik. In this workshop, a strategic plan towards food security, food safety and health in the Inuvialuit Settlement Region was developed. For the current project researchers conducted a 2-day workshop in Inuvik in May 2014, working with the Inuvialuit Regional Corporation. The workshop had representatives from each of the six Inuvialuit communities, and also people who work with wildlife and the environment, and human health and nutrition. In the workshop, the participants discussed strategies to address both food security and wildlife population sustainability. They also identified priorities for food security research in the region in the short and long term. In the end, workshop participants identified three research priorities. The first is access to country food, the second is education and awareness, and the third is self-government. In response to participant interest in continuing the conversation about food security research, a regional Inuvialuit Settlement Region (ISR) Food Security Working Group was created, and teleconference meetings were held between June and December 2014. Ongoing community-based research projects include an evaluation of the Paulatuk community freezer that was initiated in the fall of 2014 and a food cost study to document the price of healthy eating in ISR communities during different seasons, in November 2014 – 2015.

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File Number: 12 410 983 **Licence No:** 15462
Region: IN **Location:** Tuktoyaktuk; Ulukhaktok; Sachs Harbour; Paulatuk

Inquiry: Listening to the Elders
The goal of this project was to create educational films that could be used in an on-line curriculum about the Mackenzie Valley Pipeline Inquiry (Berger Inquiry). The University of British Columbia had access to sixty hours of original cassettes from the Mackenzie Valley Pipeline Inquiry, recorded by Professor Michael Jackson and Drew Ann Wake during Justice Thomas Berger's hearings in the communities of the Mackenzie Delta and the Beaufort Sea in 1975-76. The tapes included speeches made by elders born as early as 1890. A northern researcher was invited to review the transcripts of the hearings and to select speeches that would be particularly suited for use in short educational films for elementary and high school classes in the North. Recommendations on ways that these films could be used to enrich lessons on language and traditional knowledge were made. Inuvialuit film maker Dennis Allen and Drew Ann Wake filmed six interviews in which present-day elders introduce some of the original speeches. The films are being incorporated into an on-line curriculum about the Berger Inquiry for southern universities, developed by the UBC Faculty of Law and the First Nations House of Learning. The original audio has been digitized and presented to Gwich'in and Inuvialuit cultural organizations.

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File Number: 12 410 991 **Licence No:** 15485
Region: NS, SS **Location:** Yellowknife; Fort Resolution

Northern spaces: Resource governance in southern Northwest Territories
No research was conducted under this NWT Scientific Research Licence in 2014.

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Region: IN **Location:** Ulukhaktok

Cultural meanings of food and food insecurity in Ulukhaktok, NT
This research focused on the cultural context of food and the relationship between food, health, and well-being in Ulukhaktok. During June and July, 2014, researchers collected information about how Ulukhaktomiut define health and well-being, and measured levels of food insecurity using the Household Food Insecurity Access Scale. This ‘scale’ is a standardized questionnaire used in many countries that helps researchers understand which households have a sustainable and nutritious food supply. Finally, the researchers asked people about social support and stress. The project found that individual well-being depends mostly on engaging in traditional activities. Healthy people are those who speak Inuinnaqtun, hunt and fish, eat country food, have elders to talk to, and teach traditional skills to young people. Additionally, Ulukhaktomiut who best fit the definition of being healthy had better access to healthy food and less reported stress and anxiety. Initial results were presented to the Ulukhaktok Community Corporation in July, 2014, at the close of the research. Formal publications are pending.

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File Number: 12 410 944
Region: SA
Licence No: 15410 (Multi-year licence - year 2 of 5)
Location: Chief T'Selehye School and community youth group in Fort Good Hope

Aboriginal youth stories of culture, identity, community and place: A rural/urban educational youth exchange through performing arts and technology
The aim of this ongoing study is to initiate a creative exchange amongst youth in three Aboriginal communities (Fort Good Hope; Kainai Reserve, Southern Alberta, Ben Calf Robe - St. Clare School, Edmonton, Alberta) through performing arts, storytelling and technology. For the Phase 2 consultation for the study, researchers hosted a two day meeting of research partners including representatives from Fort Good Hope in Edmonton. The meeting reviewed the project's vision for collaborative research and discussed project specifics such as who will make decisions about the project, timeline, and budget. The full study has received funding from the Social Sciences and Humanities Research Council of Canada and will commence in Fall 2015.

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File Number: 12 410 1006
Region: IN, GW, NS, SS
Licence No: 15561 (Multi-year licence - year 1 of 2)
Location: Tuktoyaktuk; Inuvik; Yellowknife; Hay River; Fort Smith

Improving NWT community response to sexual violence against women and girls
No research was conducted under this NWT Scientific Research Licence in 2014.

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File Number: 12 410 997
Region: IN, GW, NS
Licence No: 15533
Location: Yellowknife; Ndilo; Inuvik; Fort McPherson

Rebuilding the bridge between community and school using evidence-based practices: Impacts of the new northern studies 10 curriculum
The aim of this project was to assess the psychological impact of a new, more relevant, social studies course being offered to grade 10 students in the Northwest Territories and Nunavut. The course asks students, through a series of modules, to deal with sensitive cultural issues, including residential schools and colonialism. While the concern was that students might be negatively impacted by the collective trauma associated with key aspects of the course material, results indicate that students were not negatively affected. At the beginning of the course, students had only limited knowledge about these topics. Their opinions changed very little by the end of the course. Psychological health of the students measured over the term demonstrate that the course leads to a deeper understanding of northern identity. Yet, generally, these new insights did not translate into a positive psychological impact at the personal level for students. Overall, findings

reveal that the lack of a positive psychological impact on students was not due to the course itself, but rather, from other factors like attendance rates and course delivery technique. This research project was conducted in partnership with the department of Education, Culture and Employment of the Government of the Northwest Territories.

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File Number: 12 410 994
Region: IN, SA, NS

Licence No: 15524 (Multi-year licence - year 1 of 4)
Location: Chief Albert Wright School (Tulít'a); Mackenzie Mountain School (Norman Wells); East Three Elementary (Inuvik); Mildred Hall Elementary and NJ McPherson School (Yellowknife)

Developing a pathway to authentic empathy by study of children's drawings
This ongoing study looks at how Canadian Aboriginal students view their Aboriginal cultural identity and its importance in education. This research provides insights into the way children see themselves and their cultural identity. In 2014, the research team interviewed a total of 92 Aboriginal children and 15 teachers for this study from the Sahtú, Beaufort and Yellowknife school districts. As part of the interview, researchers asked the students to draw pictures about what their Aboriginality means to them. The drawing gave new insights into how students' think about their cultural identity and its importance in primary education. Final reports are available.

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File Number: 12 410 971
Region: SA

Licence No: 15374
Location: Déljne

Re/mediating indigenous environmental justice: Resource extraction, divergent risk perception, and economic equality in the north
The goal of this research is to examine how the Déljne Dene assessed the risks of uranium mining on Great Bear Lake, and how this assessment prompted their public and official responses. In 2014, research with records stored in the Déljne Land Corporation office resulted in significant insights into how the community responded to uranium mining. Information was also collected on the ongoing process to monitor and clean up after the effects of mining in the area. Analysis is ongoing and will continue in 2015.

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File Number: 12 410 995
Region: NS

Licence No: 15525
Location: Yellowknife

Tourism in the Northwest Territories
No research was conducted under this NWT Scientific Research Licence in 2014 due to the fire conditions in and around Yellowknife.

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File Number: 12 410 582 **Licence No:** 15469
Region: NS **Location:** Northwest Territories Aquatics Program

NWT Aquatics Program: Long-term impacts
The goal of this project is to study the lasting impacts that the Northwest Territories Aquatics Program has had on previous NWT pool supervisors and pool assistants. Data were collected from five individuals who have worked for the NWT Aquatics Program. The research shows that the people who worked for the Program learned a great deal about life in the NWT and that this had a profound impact on their lives. This research shows that those who came from the South to work in for the NWT Aquatics Program pursued further education and work that concerned the North, Aboriginal peoples, and injury prevention.

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File Number: 12 410 582 **Licence No:** 15557 (Multi-year licence - year 1 of 2)
Region: DC, NS **Location:** Fort Simpson; Yellowknife

Cultural safety and physical activity in the NWT
No research was conducted under this NWT Research Licence in 2014.

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File Number: 12 410 992 **Licence No:** 15507
Region: IN, GW, SA, DC, NS, SS **Location:** Yellowknife

Building human resources capacity in Aboriginal governments (through the GNWT)
The initial focus of this research paper was exploring existing methods the Government of the Northwest Territories (GNWT) uses to support Aboriginal capacity within Aboriginal organizations, evaluate its strengths and weaknesses, identify gaps that may exist, and recommend actions to address these gaps. Following extensive secondary research and the lack of sufficient, comparable reference material of actual, functioning, stand-alone Aboriginal self-governments with full jurisdictional law-making authority over their beneficiaries in an Aboriginal or public government model, there was a slight shift in the focus of the paper. This focus moved to exploring what are the existing bridges that are in place between the GNWT and Aboriginal organizations to support a transition to Aboriginal self-government, and how they can be strengthened. Also, if they do not have a direct positive link to Aboriginal organizations that are transitioning towards Aboriginal self-government how adjustments can be made to make them more relevant and easier to use. Finally, discussion was raised about how new bridges can be built. References and

comparisons were made to the Tłı̨chǫ Government and the Government of Nunavut – both fully implemented Aboriginal Governments. Analysis was also undertaken the strengths and weaknesses of these bridges and potential gaps. Finally non-binding recommendations were made for the GNWT and Aboriginal organizations moving forward.

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File Number: 12 410 984
Region: NS
Licence No: 15464 (Multi-year licence - year 1 of 3)
Location: Yellowknife

Diamonds are forever: an anti-colonial, feminist approach to diamond mining in Yellowknife, NWT

Since Canada's first diamond mine opened in the Northwest Territories in 1998, diamond mining has been praised as being good for the economy. However, almost twenty years in, there hasn't been much in-depth research that looks to the different experiences of the people that are impacted by diamond mining. The objective of this ongoing research is to assess the impact of the diamond mining industry on northern women – particularly, Indigenous women – and on their lives, work, and community. This project also asks whether, and how, the diamond mines have impacted Northern women's vulnerability to violence. The fieldwork plan was developed with the guidance and support of the Native Women's Association of the NWT. Fieldwork was conducted between June and September 2014. In collaboration with a wide range of community groups, including the Status of Women of the NWT, the NWT Coalition against Family Violence and the YWCA, 33 interviews and three community focus groups were conducted. Next year, findings will be presented to community stakeholders with the aim of sharing knowledge, checking analysis against community expertise and seeking guidance on next steps.

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File Number: 12 410 906
Region: IN, GW, NS, SS
Licence No: 15387 (Multi-year licence - year 4 of 5)
Location: This data is based on 2009 to 2012 reported crime through the RCMP in all NWT communities

Rural and northern community response to intimate partner violence

There are three main goals of this ongoing research. The first is to integrate several different sources of information to better understand and try to prevent intimate partner violence. The second is to record people's stories about how their community responds to this violence. Finally, the researcher are trying to use their research to help to create and sustain non-violent communities. In 2014, the researcher collected community stories about intimate partner violence using a case study approach. Stories were collected from 31 people who work for the RCMP or as Community Health Nurses, Social Workers, Shelters Workers, Victim Service Workers and a few other professions. The information was collected and then analyzed using a technique from social sciences called 'grounded theory approach,' which is a way to allow the information collected guide how it will be interpreted. The biggest theme heard from the front-line workers was "our hands are tied." There is also the feeling from the community that people who experience intimate partner violence should "put up, shut and get on with life." Front-line workers are concerned that it seems like people are caring less and less about intimate partner violence. They

are also worried about limited resources available to victims, the lack of good services. Finally, front line workers are worried about how lethal and frequent intimate partner violence is. They described interventions that they believe will assist to transform the situation for victims of this violence. A team meeting was held in Regina in June, 2014 which included community members, Aboriginal representatives and academics. The stories from front-line workers were shared in the meeting. Research will continue in 2015.

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File Number: 12 410 1007 **Licence No:** 15565
Region: IN **Location:** Inuvik; Tuktoyaktuk.

Engaging men and boys in reducing violence against women and girls
No research was conducted under this NWT Scientific Research Licence in 2014.

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File Number: 12 410 648 **Licence No:** 15436 (Multi-year licence - year 2 of 2)
Region: NS, SS **Location:** Dettah; Ndilo; Yellowknife; Łutsel K'e

Phonetics and phonology of two northern Athabaskan Languages
The goal of this ongoing project is to help to record two languages: Weledeh, and Chipewyan. Weledeh is a language spoken by some in the Akaitcho region. In 2014, the research team made a preliminary version of a Weledeh Verb Dictionary available to local schools, as well as an intermediate-level Weledeh reader. The response has been very positive and researchers have been told that YK1 and K'àlemì school are already using them. Numerous elders' stories were also recorded which are in the process of being transcribed and edited. In particular, researchers obtained a very long story about muskox from elder Fred Sangris, which should be available in 2015. Researchers also conducted some experiments to study the sounds of these languages, and work on this is continuing. In addition to these projects, the principal investigator also did research on different forms of Weledeh and Chipewyan verbs, which are words which imply action like "to walk" and "to think." They also wrote and presented a paper about some of these verb patterns in Tetsoʔ'ı̨nę, the dialect of Chipewyan spoken in Dettah and Ndilo.

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File Number: 12 410 882 **Licence No:** 15385 (Multi-year licence - year 2 of 2)
Region: NS **Location:** Ndilo; 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 affect Aboriginal populations much more than other populations. This research, which was a collaboration between the University of

Alberta and the Yellowknives Dene First Nation Community Wellness Program, explored how physical activity is practiced culturally and on a day-to-day basis in the community. A culturally relevant understanding of physical activity is important for developing effective programs to promote healthy lifestyles. Addressing physical activity at a community level can have benefits beyond a healthy lifestyle, including community engagement and participation. In 2014, the researcher returned to the community to follow-up with community members and staff about the implementation and effectiveness of the physical activity ideas that had been selected during the previous year of the project. The researcher also asked about how to improve the research. Traditional physical activity and life on the land are critical for Dene health and wellbeing. This research raised awareness in the communities about physical activity, and empowered communities to take actions themselves to improve their health. The researchers hope that their project can benefit health promotion programs in the communities, and contribute to a deeper understanding of community-level physical activity among Canadian Aboriginal peoples. This research has been presented in Ndilo and Dettah as well as nationally and internationally at academic conferences.

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File Number: 12 410 882 **Licence No:** 15384 (Multi-year licence - year 2 of 3)
Region: NS **Location:** Ndilo; Dettah; Yellowknife

Risk communication and trust in decision-maker action: Lessons from First Nations, Inuit and Métis case studies in Canada

Trust in decision-makers is known to be strongly correlated to judgments about risk issues and cooperation with risk management decisions. Two-way risk communication is critical to establishing and maintaining this trust. This requires a fair and open process of public participation and dialogue. This study is part of a three case study research project being conducted with First Nations/Inuit/Métis people in Canada to explore trust in government decision-makers, using three case studies. It involves examining the communication and public participation related to the development of a remediation plan for the residual arsenic tri-oxide from the Giant Mine, with specific emphasis on members of the Yellowknives Dene First Nation (YKDFN). The other two case studies are: (1) communication around the H1N1 pandemic and vaccination program with Manitoba Métis communities, and (2) communication with Inuit communities around contamination of country foods. The overall research project is grounded in the trust, confidence and cooperation model for risk communication. This model looks at trust (based on value similarity) and confidence (based on past performance) as interacting components influencing cooperation in acting towards a common goal. Semi-structured interviews and 2-3 person focus groups were done with 18 members of the Yellowknives Dene First Nation in 2013. The participants were 21-67 years in age, and 61% were female. Participants also completed a questionnaire measuring trust concepts across the three case studies (the results of which are still being analyzed). Three themes arose from the interviews and focus groups: (1) issues related to trust in government, (2) concerns about the remediation plan; and (3) unresolved issues related to the operation of Giant Mine (fear, fairness and loss). Distrust of the federal government was based on a perceived lack of value similarity; participants felt the government was primarily focused on money (including resource extraction), with no concern for the land or the people affected. People also felt that Indigenous peoples had been treated badly in the past by the federal government. Concerns about the remediation plan included whether the money would be available to continually fund the remediation (perpetual care) and the viability of the ‘frozen block

method'. Unresolved issues related to the historical operation of Giant Mine included fear, fairness and loss. People spoke of past incidences of arsenic poisoning of YKDFN community members, and their fear for future generations. People felt a profound sense of injustice associated with Giant Mine: although they incurred little benefit from the mine, they have been disproportionately exposed to arsenic through their drinking water and traditional foods, and have lost traditional harvesting areas due to the appropriation of land for the mining operations and urban growth of the City of Yellowknife.

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File Number: 12 410 882 **Licence No:** 15546 (Multi-year licence - year 3 of 3)
Region: SS **Location:** Ndilo

Engaging Aboriginal youth in tobacco prevention using social media

This research sought to explore if videos produced by Indigenous youth using a participatory approach could be an effective means for encouraging tobacco misuse prevention and/or cessation amongst youth and others in Indigenous communities. Researcher also wanted to know if being part of a participatory research project impacted the youth involved. The research was conducted with youth in both the K'alemi Dene School in Ndilo and the Queen Elizabeth High School in Edmonton. Three teams involving a total of 12 high school students from the K'alemi Dene School 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'alemi Dene School and during the schools' year end celebration. The videos were also posted to YouTube (www.youtube.com/channel/UCbu7HOxP-5s2sxe2WVu3SPQ). The research highlighted how engaging in participatory video can contribute to youths' journey of becoming empowered. The youth participants described how participating in the video project was an opportunity for them to act as health promoters within their school and wider communities. Through the participatory research process, youth increased their sense of belonging, purpose, and agency. These are all assets required for positive youth development. It was important to the youth to promote and preserve their culture enabling them "to show who we are, and where we came from." Many of the youth identified a need to learn leadership skills, enabling them to "be role models to our own home communities." Overall, the youth were positively impacted from participating in a research project focused on tobacco misuse. The findings provide evidence of how participation in participatory video projects has the potential to be a transformative experience for the participants.

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File Number: 12 410 974 **Licence No:** 15425
Region: IN, GW, SA, DC, NS, SS **Location:** Yellowknife

Mackenzie Basin infographic: Fracking and community-based monitoring

The primary aim of this research was to produce an easily accessible, digital map that showed detailed information about ongoing water quality monitoring in the Mackenzie River Basin. The project included finding and inventorying hundreds of water quality sampling locations from a

variety of sources. In addition to using online sources of information, such as Land and Water Board registries, the NWT Discovery Portal and Government websites, other people and organizations were contacted directly between January and June 2014. The final map was created in Google Earth, which is a free and open software program. The map includes just over 1500 water-sampling locations. Each site has a data point that has the following information: the monitoring programs' names, the groups involved, program start year, a general description and links/sources for information. Where possible, links to the latest results of the water sampling are also provided within the data point. This water quality-mapping project was developed as a part of the Walter and Duncan Gordon Foundation's 'Mackenzie River Basin Initiative'.

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File Number: 12 410 989 **Licence No:** 15483 (Multi-year licence - year 1 of 2)
Region: IN **Location:** Sachs Harbour

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

The objective of this ongoing study is to document traditional knowledge of Banks Island that could contribute to the understanding of life on the island in the past. During the summer of 2014, the researcher travelled to Sachs Harbour and participated in an ethnographic study to determine how the Ikaahuk Archaeology Project could best address community concerns and involve community members. This research built on a preliminary field season in 2013. Community members identified their concerns with archaeological research and gave ideas for future research. They also identified ways that the community could be better involved in future research and how archaeology can fit into their existing heritage management practices. 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, community meetings, flyers, and DVDs. Community opinions and ideas are diverse and sometimes conflicting. Interviews are currently being transcribed, which, with the permission of interviewees, will be made available to community members. This work will continue in the spring of 2015.

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File Number: 12 410 973 **Licence No:** 15424
Region: GW, NS **Location:** Fort McPherson; Yellowknife

Energy resilience in northern communities

This research project studied the factors for success of alternative energy initiatives in remote northern Indigenous communities, and the link between northern community energy and resilience. Resilience refers to the community's ability to adapt to change or stress, by using local resources. The case study, in the Gwich'in village of Fort McPherson, focused on a 'biomass boiler district heating project' that provides renewable heat (fueled by local wood chips) to two community buildings, and the local willow harvesting initiative that supports it. Information was collected by interviews and participant observation with Elders, youth and community members in Fort McPherson, and with energy professionals in Yellowknife. The researcher also reviewed

academic literature on relevant topics – resilience, community energy, and biomass. Success factors for this energy project include how well it aligned with local cultural identity, traditional values and connection to landscape. These values are often under-represented in more financially-driven energy decisions. Autonomy and self-reliance were shown to be critical factors in northern community energy decisions, often contributing to improved well-being, pride in place, and resilience. Community resilience was also shown to be a key component of success in northern community energy initiatives.

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File Number: 12 410 990 **Licence No:** 15484
Region: SA **Location:** Tulít'a

Gendering self-determination: Comparing indigenous women in Canada, Greenland and the Nordic Countries

This project focuses on two primary goals. The first goal is to study how gender matters in indigenous self-determination. This includes mapping out the power dynamics of the existing self-governance institutions and processes, and identifying how individual people and groups of people together understand self-determination. The second goal is to study how various political processes may prevent indigenous women's ideas and views of self-determination and self-government from being included into various important negotiations, institutions and arrangements, and attempts to address the question of violence against indigenous women. In 2014, the researcher visited Tulít'a from June 9 to July 7 to learn about community views on participation, decision-making, women's changing roles and self-government. A focus group, organized in partnership with the staff at the ʔehdzo Got'ı̨nę Gotsę́ Nákedı (Renewable Resources Board) office, took place with a group of women from Tulít'a to discuss key community issues. Themes discussed at the day-long meeting included youth leadership, creating opportunities for youth to go out on the land, and fracking. The main suggestion of the focus group was to arrange a meeting for Tulít'a youth. With the help of the staff at the Renewable Resources Board office, the researcher facilitated two youth gatherings (June 24 and July 2) where a group of young people discussed education, community involvement and a leadership program. The fieldwork also involved a set of 22 individual interviews. Interviewees included individuals in leadership positions, elders, youth and other community members.

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File Number: 12 410 980 **Licence No:** 15451
Region: NS **Location:** Yellowknife

Relationship-based child protection practice

This study explored Indigenous perspectives of relationship building and how this practice style might be adapted into a child welfare context. The study was born out of the researcher's experience working in child welfare in the community of Yellowknife. The theoretical framework draws from an Anti-Colonial perspective and the research methodology was adapted from critical ethnography to fit the scope of the research project. The sample includes 4 diploma of social work students from Aurora College in Yellowknife. In addition, data from field notes were included. Field

notes taken from the personal journals kept by the researcher during her time living in the community and from a data collection trip in the Spring of 2014. Findings provide insight to community perceptions of social workers, community standards with respect to relationship building and child rearing, a process of what relationships-based practice might look like and the perceived benefits to this practice style. Barriers to relationship-based practice are also identified as an area for further exploration.

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File Number: 12 410 987 **Licence No:** 15476
Region: SA, NS **Location:** Déljne; Yellowknife; Norman Wells

Collaborative adventure tourism in Sahtú, NT: A model for culturally sustainable economic development

The focus of this research project was to highlight and explore the development of grassroots tourist opportunities based on Sahtú Dene culture, in the community of Déljne. This project will contribute to the growing body of academic literature about partnerships between corporations and Aboriginal communities in the Northwest Territories. The researchers hope to help the community meet their tourism development goals by talking to community members, tourism operators, and Déljne's elected leadership to identify any concerns about tourism, and any specific needs that they may have. During summer of 2014, the principle researcher conducted 19 formal interviews in Yellowknife, Norman Wells, and Déljne. The interview participants included lodge owners; tourism operators (both Indigenous and non-Indigenous); Government of Northwest Territories officials from the Department of Industry, Tourism, and Investment (ITI); charter flight operators; Déljne community members; elected community leaders; local hunting and fishing guides; community development officers; and finally, young people interested in the hospitality/service/tourism industry as a source of local employment. Living in the community for an extended period provided the principal researcher opportunity to observe Sahtú Dene culture which was helpful to the goal of the project. To date, all interview data has been transcribed, analyzed and coded.

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File Number: 12 410 955 **Licence No:** 15496 (Multi-year licence - year 1 of 3)
Region: IN, GW, SA, DC, NS, SS **Location:** NWT

F.O.X.Y. participatory action research project

The goal of this ongoing study is to evaluate the effectiveness of the FOXY Peer Leader Retreat. FOXY is short for Fostering Open eXpression among Youth, which is a project to support education and leadership skills in young women, with a focus on sexual health and decision-making. For the Peer Leader Retreat, young women aged 13-17 from across the NWT joined the FOXY team for a week of sexual health education, learning about healthy relationships, the arts, leadership, and self-empowerment. Twenty-six young NWT women participated in focus groups which were held at the conclusion of the 2014 Peer Leader Retreat in July 2014, and follow-up

individual interviews will be held on schedule six months after the Retreat in January 2015. All surveys are currently being transcribed and analyzed by the Evaluation Consultant.

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File Number: 12 410 1003 **Licence No:** 15553
Region: NS **Location:** Behchokǫ̀

Northern Aboriginal girls and identity: Exploring race, place, and gender through participatory media

There are two main goals of this research. The first is to study how young Aboriginal girls in the north understand and use media to create a sense of who they are. Media is a broad term that refers to ways that people store and deliver information to each other such as photographs and art, or the internet, or TV, or storytelling. The second goal is to analyze how the girls think of and use stories in the way they think of themselves, and how media might impact the stories that they tell about themselves. In December 2014, the researcher facilitated a three-week workshop series in Behchokǫ̀ at Chief Jimmy Bruneau Regional High School. Five participants met over the three weeks to discuss and create a photography-based media project, as well as discuss issues around how the media represents them and how this affects their identity. The academic thesis focuses on the way media is integrated into the lives of these girls, and how they use the images, stories and narratives they see in media to strengthen their own unique individual and community identities. The research suggests that girls can experience conflicting bicultural identities and seek out stories about strong characters to bolster their identities as strong individuals.

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File Number: 12 410 993 **Licence No:** 15512
Region: NS **Location:** Yellowknife Education District No.1

Parent support for and understanding of the outcome-based report card: A case study from Yellowknife Education District No. 1

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

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File Number: 12 410 1009 **Licence No:** 15566
Region: NS **Location:** Yellowknife

Report on the state of alternative energy in the Arctic

This research had several objectives relating to energy use in Canada's Arctic. One objective was to provide a 'snapshot' of northern home energy provision, including electricity and heating. Another goal was to look at the finances of northern energy system planning and to better

understand how governments manage energy supply and demand. Finally, the last goal was to look at case studies of alternative energy projects, covering a variety of renewable and energy efficiency options. In addition to a literature review, the researchers held a focus group in Yellowknife and conducted a series of interviews with energy stakeholders. The researchers found that a key concern across the North is the cost of electricity and home heating. A number of policies exist at various levels (e.g. territorial, federal, municipal) to help support the use of both alternative energy such as wind and solar power, and energy efficiency programs, such as refunds for buying insulation or more efficient appliances. The researchers found that successfully lowering home energy use often hinges on having specific programs in place in combination with committed individuals and organizations that operate at arm's length from the government. Different regions have different approaches to supplying energy and planning for changes in energy demands. This research recommends enhanced communication between communities across the Arctic to compare experiences with different policies and programs regarding energy provision and conservation. This information sharing would enable regions to better compare experiences and to share lessons learned regarding challenges, success factors, funding opportunities and energy savings.

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File Number: 12 410 999 **Licence No:** 15542 (Multi-year licence - year 1 of 2)
Region: NS **Location:** Tłı̨chǫ Region

The history of Tłı̨chǫ Peoples' last names
No research was conducted under this NWT Scientific Research Licence in 2014.

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File Number: 12 410 946 **Licence No:** 15409 (Multi-year licence - year 2 of 2)
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, Northwest Territories
The overall objective of this research was to evaluate the use of computerized mapping (often called Geographic Information Systems or GIS) as a way to communicate about impacts to human health during consultation about the Nico Project in the Tłı̨chǫ Region. The researchers wanted to see if using computer-generated maps is helpful to people, and how it was helpful to people, during consultation sessions about how industrial development can affect human health. In 2013, the researchers interviewed people representing various organizations who were a part of the Nico environmental assessment process. This included representatives from 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. In 2014 in the second and final year of field work, the interviewees received a manuscript of study results for review. The research has been included in a Master's thesis and will be further published in an academic paper.

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File Number: 12 410 982 **Licence No:** 15460
Region: SA, NS, SS **Location:** Behchokǫ̀; Hay River; Fort Good Hope

Influences on the quality of life of older adults in the Northwest Territories
There has not been much research about aging in the north. Considering there are an increasing number of seniors in the NWT population, the researchers felt that it was very important to understand what can improve and threaten their quality of life. To understand these topics, the researchers focussed on three main objectives. The first objective was to study what has an influence on quality of life for older adults in the NWT. The second objective was to work with older adults to identify what currently threatens their quality of life and what might threaten it in the future. The third objective was to study the history of the NWT Seniors' Society and look at changes to services for older adults in the territory over the past thirty years. To gather this information, the researchers used individual interviews, focus groups, sharing circles, and town hall meetings. As well, researchers talked to a group of people about the NWT Seniors' Society to collectively record their history and achievements. The information gathered by the researchers about quality of life generally fit in two major categories: Good Life and Life's Struggles. Older adults described experiencing a good life when they had strong social connections and support, when they were active and independent, when they could live traditionally, and when they felt safe and secure. On the other hand, Life's Struggles were considered as pitiful times and transitions, when there was a high cost of living, when they had health concerns or housing issues, when they were isolated from friends and family, and when they had other issues.

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File Number: 12 410 958 **Licence No:** 15411 (Multi-year licence - year 2 of 2)
Region: SA **Location:** Tulít'a

Youth-Led adaptations for healthy Sahtú communities in an uncertain era of climate change
The goal of this project was to study the impacts of climate change on community health. The project was led by Tulít'a youth, Elders and other community members, with the help of climate change scientists. The project included a range of activities such as focus groups, on-the-land trips, presentations, workshops, as well as skill-building and communications work with youth participants. The research focused on Traditional Knowledge such as stories and observations of changes in the climate and environment. This included experiences with melting permafrost, changes to wildlife, and new challenges in travelling across the land. The research found that participants did not separate changes in the climate from the broader ecological, social and cultural changes taking place in the region – including resource exploration activity. Again and again, project participants said that Dene language, identity, Traditional Knowledge, stories and way of life could both be a source of community vulnerability and a way that the community could withstand climate change. The research showed that on-the-land programs, and language and cultural revitalization programs are important ways to protect the health of Sahtú communities

from the impacts of climate and environmental change. Finally, this research laid the groundwork for the formation of the Sahtú Youth Network.

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File Number: 12 410 972 **Licence No:** 15422
Region: NS **Location:** Yellowknife

Conceptions of the arctic through the lens of the media
The media – television, internet, and radio – shapes how people who live outside of the Arctic think about the Arctic. Researchers have not studied how the media portrays the Arctic, despite the fact that this is how most people get information about the Arctic. Given the region's geographical remoteness, the media have a lot of power to influence people's perceptions. This research studied how newspapers and magazines stories show resource development in the Beaufort Sea region, with a focus on offshore drilling and pipelines. The researcher was particularly interested in the differences between local newspapers and national newspapers, as well as comparing Canadian and American newspapers. To learn more about northern media, an additional component of this research included interviews with six journalists who work in the north (Fairbanks and Yellowknife). The study showed how national newspapers tend to portray industry and the federal government as the main decision-makers when it comes to resource development, whereas local newspapers tend to assert the power of local Indigenous groups and municipal/state/territorial governments.

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File Number: 12 410 968 **Licence No:** 15418 (Multi-year licence - year 2 of 2)
Region: DC, SS **Location:** K'atl'odeeche First Nation; Hay River Reserve; Yellowknife

Community technology development and use in K'atl'odeeche First Nation
No research was conducted under this NWT Scientific Research Licence in 2014.

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File Number: 12 410 996 **Licence No:** 15528
Region: DC **Location:** Fort Providence

A qualitative examination of barriers and opportunities faced by a Northern community in obtaining culturally specific food sovereignty.
This project seeks to understand the challenges and opportunities that Fort Providence faces with food sovereignty, and cultural programs started to address the issue. Food sovereignty refers to a community's right to have healthy and culturally appropriate food, harvested in a sustainable way. It also refers to the community's right to make decisions about their food supply. To

understand this topic, the researcher spent four months in Fort Providence, volunteering in the local elementary and secondary school. During her time in the community, she was able to gain an understanding of the challenges and opportunities that the people of Fort Providence face in achieving access to nutritious land-based and market foods. She had the opportunity to work on the land with elders, youth and additional community members. This research will continue with individual surveys in 2015.

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File Number: 12 410 650 **Licence No:** 15402 (Multi-year licence - year 3 of 3)
Region: IN **Location:** Ulukhaktok

Inuit Traditional Knowledge for adapting to the health effects of climate change (IK-ADAPT)
This project, had three research themes: food security, women's health and Inuit education. Food security refers to being able to access heathy food in a sustainable way. Community partners and the researcher together studied how the changing climate and changing cultural and economic conditions are affecting food security. They found that access to cold storage (freezer) as an important factor in household food security. Households with limited freezer space had to limit summer hunting activities and thus had less country food for winter months. The researchers also studied Inuit women's understanding of and approaches to health, which are different from western healthcare. Inuit women described personal health as including more than just one individual, as one's health is associated with that of the whole family. Finally, researchers studied how Inuit tell if educational opportunities were successful, compared with southern educators. They found that southern educators think that learning success is individual, so for example each person has their own grade. On the other hand, Inuit understand that learning success is collective, or contributes to the common good (e.g. family and/or community).

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File Number: 12 410 954 **Licence No:** 15550
Region: SA **Location:** Tulít'a

The Arctic and the politics of the Earth: Prioritizing indigenous representations of spatial power: the case of the Sahtú Dene, Canada
The goal of this research was to study how the residents of Tulít'a feel about oil and gas development and how they might best plan for development as a community. The researcher stayed in the community of Tulít'a for four months between November 2014 and March 2015. He studied and participated in traditional activities and mapped out how people moved in and around the community. The researcher found that community well-being could be improved if the community had political authority over economic development in their lands. This would include authority over roads and trails. Authority like this would be based on consensus decision-making, which relies on information-sharing with all residents. Authority like this also relies on respect for both elders' knowledge and the wishes of the younger generation. The research also found that Sahtú Dene traditions must guide how the wage economy unfolds, and not the other way round. Overall, this research found that Tulít'a's residents are of two minds about development. Some strongly resent the effects of the oil and gas activities, while others believe it is better to embrace

industrial development. Tulít'a residents suggest that consensus in the community into the future is important.

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File Number: 12 404 863 **Licence No:** 15510 (Multi-year licence - year 1 of 3)
Region: IN, GW, SA, DC, NS, SS **Location:** NWT

Policy Opportunity Windows: Enhancing Research Uptake in Practice! (POWER UP!)
The goal of this ongoing project is to try and create healthy lifestyles to reduce obesity. The focus is on educating the public, people who are in various jobs relating to healthcare and education, and decision makers. This is a large project that is working in Alberta, the Northwest Territories, and Quebec. In 2014, the research team met with Government of the Northwest Territories' Department of Health and Social Services leadership in July to discuss the project. This was followed by a meeting with community representatives to talk about the project and to get guidance about how to proceed. The researchers conducted a telephone survey to find out about people's knowledge, attitudes and beliefs about healthy living in October, 2014. Analysis of the data will start in 2015. The researchers also surveyed decision-makers between the end of October and December, 2014. The decision-makers contacted to participate in the survey came from various school districts and school boards, other professional workplaces, people who work for newspapers and magazines, and the municipal and territorial government.

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File Number: 12 410 943 **Licence No:** 15474 (Multi-year licence - year 2 of 3)
Region: IN, NS **Location:** Ulukhaktok; Whatì

Northern men's research project
The goal of this ongoing research is to identify what is both preventing and helping Inuit, First Nations and Métis men to be educated and employed. For the education component, the researchers are focussing in particular on reading skills and essential life skills. A total of 166 men from across the north including Yukon, NWT, Nunavut, and Labrador were involved in the research, with 29 from the NWT. Community-based researchers used questionnaires to gather information from men in the participating communities of Whatì and Ulukhaktok. The research team also held a workshop in Yellowknife. The community-based researchers from NWT, Yukon, Nunavut and Labrador each brought an Indigenous man that had been identified as a role model. Eleven men participated (three from NWT), sharing their stories and experiences of education and work. This research has found three main things out about these topics. First, Indigenous men are active in types of learning and work that do not show up in education and employment numbers kept by the government. Second, when men leave educational and work opportunities, it is often linked to experiences of oppression. Third, personal well-being is at the core of men's continuing to learn and work. Results have been documented in a 175-page final report. The report includes quotations from participants, summaries of the role models' stories, and graphs based on results from the questionnaire. It also includes 22 recommendations for supporting northern Indigenous men's participation in learning and work.

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File Number: 12 410 394
Region: NS, SS
Licence No: 15458
Location: Yellowknife; Łutsel K'e; Whatì; Wekweètì; Behchokǫ̀; Gamètì.

Resource royalties distribution and community development
The goal of this project was to gather information about the money that resource development companies have to pay the government, and how that money is distributed to various levels of government and Aboriginal communities. The research team started in 2014 by conducting an online and a phone survey in Aboriginal communities in Canada. Nine people were surveyed in Ontario and one in Yukon. However, due to a shortage of staff, the researchers were not able to do any surveys in the NWT in 2014. The team will be able to complete the surveys, including of NWT Aboriginal communities, by the end of 2015.

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File Number: 12 410 210
Region: NS
Licence No: 15562 (Multi-year licence - year 1 of 5)
Location: Behchokǫ̀; Whatì; Gamètì; Wekweètì; Yellowknife

Tłı̨chǫ on-line and print dictionary
During 2014, work continued with editing of the Tłı̨chǫ on-line dictionary and database for the iPad/ iPhone/ iPod app Yati. The font of the on-line dictionary was changed to be compatible with Unicode, making it simple to copy and paste words, phrases, and sentences from the dictionary into other documents. This is a very welcome development for users of the dictionary. Introductory material on the dictionary website was updated to show this change. Additional words, phrases, and example sentences were entered into the on-line dictionary from books and reports written in Tłı̨chǫ, and additional phrases were prepared for a revision of the Yati app. The dictionary database was edited to take out duplicate entries. The work on the dictionary and app will continue in the future as resources allow.

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File Number: 12 410 988
Region: NS
Licence No: 15477 (Multi-year licence - year 1 of 3)
Location: Yellowknife

Social work supervision: Emerging needs
No research was conducted under this NWT Scientific Research Licence in 2014. All research related activities were related to planning future data collection.

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File Number: 12 410 678 **Licence No:** 15435 (Multi-year licence - year 1 of 2)
Region: SA **Location:** Sahtú

Mapping knowledge in the Sahtú Region
This project includes five linked components. In 2014, the project team focused on three components. The first component was finishing the mathematical analysis of the Sahtú Settlement Harvest Study data. The second component is the repatriation of the Dene Mapping Project research materials and computer files. This included updating very old computer files and conserving and scanning the original maps made by Elders and researchers in the 1970s and 1980s. The scans are now available for community use. The third component was a catalogue of maps and computer map files relating to the Central Mackenzie Valley/Sahtú Region. Several hundred maps and map files were catalogued and the catalogue is available on the Sahtú Renewable Resources Board's website, www.srrb.nt.ca. Researchers who worked in the area since 1970 have been contacted to contribute more information.

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File Number: 12 410 800 **Licence No:** 15516
Region: IN, GW, SA, DC, NS, SS **Location:** NWT

Northern Canada social enterprise and social economy survey 2014
This project is part of a larger Canadian project to study social enterprises and similar organizations. Social enterprises are organizations that use a business model, but instead of just making money, they also aim to improve the world by having a social, cultural, environmental, or employment purpose. This study was looking at how these enterprises run and how much of a difference they make. To see if these enterprises are successful, the researchers looked at how much money they made, how much money they spent in the communities, how many people were employed, trained, or volunteered, and other topics. Organizations were initially contacted by email to provide current contact information and determine their interest in participating in the survey. Over 300 organizations were contacted in the Northwest Territories, and 59 responded. Of these, 38 organizations ended up completing the survey. Analysis of the results is ongoing and there will be summary report from all three territories. The researchers will also look at how things have changed by comparing these organizations now to how they were in the past. The results of this study will be communicated widely to individuals and communities in the North through summary reports and public information sessions. The list of social enterprise organizations and information about each one will be added to an existing list so that anyone who is interested can study them too.

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File Number: 12 410 1004 **Licence No:** 15554 (Multi-year licence - year 1 of 2)
Region: NS **Location:** Yellowknife

In pursuit of environmental sustainability in the Arctic: The role of Arctic Council governance norms in shaping the region's environmental governance systems.
The Arctic Council is a forum that brings together participants from a diverse range of states, indigenous organizations, inter-governmental and non-governmental organizations. The objective of this project was to study if and how the Arctic Council has influenced the way its participants work together and make decisions outside of Arctic Council situations. Further, the researchers studied if and how much of an effect the Arctic Council has had on environmental organizations that are not members. Results of this study show that the Arctic Council is currently on people's radar in Canada, because Canada holds the Chairmanship position. However, the United States will take over the Chairmanship in April 2015 and Alaska will take on a new prominence in important Arctic Council projects. It is not evident that interest in Canada's North will be maintained once the Chairmanship has left Canada.

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File Number: 12 410 875 **Licence No:** 15471
Region: IN **Location:** Inuvik

Historical perspectives on environmental knowledge and the Mackenzie Valley Pipeline
This goal of this project was to study the relationships among biologists and Mackenzie Delta residents between 1960 and 1984, specifically through the lens of pipeline development in the Delta and related environmental assessments. From May 17-31, 2014, the researcher looked at the archives in the Inuvik Centennial Library, the Inuvialuit Cultural Resource Center, and the Aurora Research Institute. He also spoke with several visiting scientists and conducted an interview with a government scientist. Archival records and interview data indicate that Inuvialuit played a much larger role in scientific research in this time than has previously been recognized by academic historians. Inuvialuit guided biologists in their fieldwork and attended scientific conferences in the south to advocate for Aboriginal rights and concerns about seismic surveys. Inuvialuit also negotiated with the federal government about how the environmental assessment for the pipeline should be conducted, as early as 1970 – years before the high-profile Berger Inquiry. These relationships ultimately factored in to Berger's decisions about the Mackenzie Valley Pipeline and negotiations with the federal government on the Inuvialuit Final Agreement. Results of the research were presented in Inuvik in May 2014.

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File Number: 12 410 1001 **Licence No:** 15547 (Multi-year licence - year 1 of 2)
Region: IN, GW, SA, DC, NS, SS **Location:** Teachers in the NWT

Determining critical design elements that bridge virtual and physical learning about the Mackenzie River.
The goal of this ongoing research is to talk to practicing NWT elementary school teachers about an online learning tool focused on the Mackenzie River that the researchers are planning on developing. In particular, the researchers wanted to focus on the way the online tool looks and works. Ten teachers who expressed interest in the project were interviewed between September and November 2014. Some interviews took place during an NWT Teachers' Association Conference in September 2014 and others were phone interviews at a time convenient to the teacher. The interviews were semi-structured and guided by a series of open-ended topics regarding teachers' needs and constraints in using online educational materials and what they would like to see as features of a Mackenzie River website. Interviews were recorded and transcribed. Copies of the transcribed interviews were provided to the teachers to review and make additions and changes as needed. Based on findings of the interviews, the researcher created a list of recommendations and technical/computer design specifications for a prototype website. The work to create the actual website is ongoing into 2015.

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File Number: 12 410 986 **Licence No:** 15468 (Multi-year licence - year 1 of 2)
Region: SA **Location:** Déljne

The wind will not wait for you: Sahtúot'ine spirituality
The purpose of the research was to develop a clear definition and description of spirituality as understood by the Sahtúot'ine of Déljne. This work studies the distinctions between spirituality (e.g. yedii, hide nene), worldview (Dene K'e KaʔedeniʔaA) and medicine power (ʔik'o). This work relied primarily on stories told by elders over many years, accessed through recordings from the Déljne community archive. Two Elders were regularly consulted throughout the project.

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File Number: 12 410 977 **Licence No:** 15440
Region: SS **Location:** Aurora College in Fort Smith

Marginalized youth and equity in public education in Canada: A pilot project
The goal of this research is to address the concern that, in Canada and abroad, too many Aboriginal youth continue to struggle in achieving academic success in public education. The project ultimately seeks to build a model of truly equitable education through a process of engaging youth voices and visions to inform beginning educators on curriculum development and implementation design. By early 2014 research ethics approvals were received from the NWT and data collection and on-going analysis began. As of June 2014, ten interviews with Aboriginal youth were completed in the NWT, another ten in Toronto, and 89 in Chile. In addition, twelve interviews with educators and key informants were done in these three places. Talking circles, as preliminary curriculum development, were finished in Toronto and Chile. During the fall of 2014, researchers analyzed the NWT interview data and field notes. Preliminary results are currently being used to guide: (1) a review of Canadian teacher education program content, (2) development of youth-attuned teacher education curriculum courses, and (3) planning for

symposium for participants to critique and expand curriculum. Information on this project can be found at the Young Lives Research Lab website http://katetilleczek.ca.

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File Number: 12 410 1002 **Licence No:** 15549
Region: SA **Location:** Déljne

Ets'ulah
The goal of this project was to see how Ets'ulah (Dene love songs) can contribute to Sahtúot'ine language revitalization. This research used materials mainly from the recordıng collections of Dr. Nicole Beaudry, made between 1988 and 1992 and in 2012-14). Two elders, Paul Andrew and Besha Blondin, were interviewed in their own language. They agreed, because they know the importance of Aboriginal language revitalization. They also have an understanding of Ets'ulah, and a musical background. The conversations were recorded on video and transcribed. Additionally, permission was sought from Leela Gilday to use her song called "Mahsi Cho." This project is part of a Master's degree in Indigenous Language Revitalization.

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File Number: 12 410 970 **Licence No:** 15373 (Multi-year licence - year 1 of 3)
Region: IN **Location:** Inuvik; Yellowknife

Inuit regional autonomy in the provincial and territorial north
The goal of this research is to compare the Inuvialuit self-government process to that of other Inuit regions in the Canadian Arctic, including Nunavik in northern Quebec and Nunatsiavut in northern Labrador. This research will help to highlight the importance of the development of Inuit and Aboriginal self-government in Canada. In February 2014, members of the research team travelled to Inuvik and Yellowknife to conduct seven one-hour interviews with officials from the territorial and Inuvialuit regional governments, as well as archival and library research. The interviews were transcribed and reviewed by all interviewees. Archival research in the Inuvik library and the Prince of Wales Archives in Yellowknife included a review of local and regional newspapers, and public documents related to self-government negotiations, intergovernmental relations and the development of the Inuvialuit Settlement Region. The interviews and archival research provided insights into the status of regional self-government and self-government negotiations, relations between regional, territorial and federal governments, and developments in key policy areas such as housing, economic development, and education.

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File Number: 12 404 872 **Licence No:** 15535
Region: IN, GW **Location:** Inuvik

RMHN: Preliminary evaluation of the Emergency Warming Centre for homeless persons with concurrent disorders in Inuvik

The goal of this project is to examine the effectiveness of the Inuvik Emergency Warming Centre on the lives of homeless persons living with mental health and substance abuse issues. The research involves the use of a quasi-experimental research design. In 2014, researchers completed interviews and health surveys with eight residents of the Emergency Warming Centre. Five staff members of the centre also participated in interviews. Although the sample size of residents is low, the data obtained has yielded important findings regarding the importance of Emergency Warming Centre in the lives of residents. Particularly, residents perceive the centre as a safe and accepting place that will have a positive impact on their survival and overall health. The second phase of data collection will continue in Spring, 2015. The data collected at this time will provide insight as to the specific aspects at work which lead to improved health outcomes for residents at the Emergency Warming Centre.

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File Number: 12 404 875
Region: NS
Licence No: 15541
Location: The Prince of Wales Northern Heritage Centre, Yellowknife

Where do we keep our past? Working towards an indigenous museum and preserving Nunavut's archaeological heritage

No research was conducted under this NWT Scientific Research Licence in 2014. All research-related activities were planning future data collection.

Traditional Knowledge

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File Number: 12 410 948
Licence No: 15372 (Multi-year licence - year 2 of 5)
Region: GW
Location: In and around Fort McPherson

Arctic Domus

In 2014, the Arctic Domus project team continued their work with Teetł'it Gwich'in researching the relations between dogs, fish, caribou and people of region. During spring break-up (May 1-18) the researchers travelled with community members on a hunting trip near Fort McPherson. Their focus was on studying hunting during this particular season and conducting further interviews with a number of Elders on the Gwich'in history of dogs, and fishing and hunting for and with dogs. The intricate relation between Aboriginal people and dogs became apparent during these interviews and informal visits. Researchers videoed the training of a young dog learning to be part of a dog-team. Later in the summer (July 18-22), the researchers returned for a second short field trip where they hired a Gwich'in Elder to make a canvas dog pack as trial. The Gwich'in woman made the pack from memory, and two other Gwich'in Elders demonstrated how to put the dog-pack on a dog. The experiences and material have shed light on the appearances and disappearances of particular crafts and skills related to dogs. In addition to the field work, researchers are using archives at the Glenbow Museum and the Public Archives of Canada. This archival research focuses on the North West Mounted Police (NWMP). This includes the NWMP introducing and influencing the breeding of northern dogs, how the police adapted to northern life with the help of Aboriginal people, and the tensions caused by their role as monitors of hunting, fishing, and trapping.

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File Number: 12 404 829
Region: SS
Licence No: 15383 (Multi-year licence - year 2 of 2)
Location: Fort Resolution; Fort Smith

SWEEP - The Slave Watershed Environmental Effects Program

This traditional knowledge project was a part of a larger project, the Slave Watershed Environmental Effects Program. The goal of this component was to develop Traditional Knowledge Indicators for a Community-Based Monitoring Program for the Slave River and Delta. Traditional Land Users and Elders shared information about how the Slave River and Delta was in the past and how things have changed over time with the researcher in interviews, which took place in the South Slave region. The participants shared information about key events in the development of the region, what things were like when they were young, how things have changed over time, where they were born and their early life experiences. They spoke about industrial developments and disease, changing foods, changing waters, changing vegetation, birds and mammals and spoke of changes related to the spiritual, social and physical connections with the Slave River and Delta. During the interviews, Traditional Land Users and Elders indicated that they wanted the results of the traditional knowledge interviews available to the community in a non-written format. For this reason, the researcher created a 13-minute animated video about the information shared. This video was shown at two workshops held in May, 2015, in Fort Smith and Fort Resolution. Copies of the video on DVD will be distributed to Traditional Land Users, Elders and members of the Slave River and Delta Partnership in the month of July. The traditional knowledge indicators identified in the interviews were also reviewed in the May workshops. These include water life, the appearance and traditional use of important animals including fish, mammals, and birds, water flow and flood extent, ice characteristics such as jamming and freeze-up, traditional rules about animals, harvesting, travel and adaptation.

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File Number: 12 410 1010
Region: IN, GW
Licence No: 15567 (Multi-year licence - year 1 of 2)
Location: Aklavik; Inuvik; Paulatuk; Sachs Harbour; Tuktoyaktuk; Ulukhaktok

ConocoPhillips Amauligak traditional land use and traditional ecological knowledge studies program 2014/2015

In 2012, ConocoPhillips Canada initiated the three-year Amauligak Study Program in order to determine if it would be feasible to develop the Amauligak lease located in the Canadian Beaufort Sea. The Traditional Land Use and Traditional Ecological Knowledge Studies Program was part of the broader Amauligak Study Program. Community-specific traditional ecological knowledge (TEK) was collected through interviews in Aklavik, Inuvik, Paulatuk, Sachs Harbour, Tuktoyaktuk and Ulukhaktok from both the Inuvialuit and Gwich'in participants. Inuvialuit and Gwich'in Community Liaison Managers from each community assisted researchers by participating in a planning workshop, identifying knowledge holders and planning the TEK collection and validation. Researchers went to each community to meet with identified Inuvialuit and Gwich'in knowledge holders. Traditional ecological knowledge collected during these interviews were recorded on

maps, in notes and in some instances using audio recording devices (where permitted through consent forms). Notes were transcribed and draft maps were digitized. All documents were then reviewed and validated in each community. Validated text and maps for each community are being held by ConocoPhillips, the local Inuvialuit Hunters and Trappers Committees and by the Gwich'in Social and Cultural Institute as appropriate.

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File Number: 12 410 976
Region: SS
Licence No: 15437 (Multi-year licence - year 1 of 2)
Location: Łutsel K'e; Whitefish Lake

Picturing the Thelon River: Restor(y)ing Denésǫliné relations en route to the headwaters
This ongoing research involves working with the community of Łutsel K'e to study and restore Denésǫliné relationships with the Thelon River watershed. In June 2014, the researchers and the Łutsel K'e Dene First Nation signed a research agreement which defined the terms and conditions of this collaborative research project. Throughout May and June 2014, community-based research focused on fostering and celebrating Denésǫliné culture by documenting and sharing local and traditional knowledge of the Thelon. 'Life-story' interviews and workshops were used to invite Elders, land users, community representatives and youth to share stories and knowledge about their experiences with the Thelon, or information passed down to them by ancestors, and describe positive and negative encounters with, and impacts of, visitors to the Thelon and other traditional lands. A total of 37 interviews and two workshops were carried out. These have been audio-recorded and transcribed, and copies shared with the Łutsel K'e Traditional Knowledge Archives for storage and use. Overall, the research is documenting how Denésǫliné knowledge, uses, and connections to the Thelon are adapting to historical and contemporary changes, and re-affirming the importance Łutsel K'e places on protecting, respecting, and occupying their lands.

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File Number: 12 410 906
Region: IN, GW
Licence No: 15416 (Multi-year licence - year 4 of 5)
Location: In and around - Aklavik; Inuvik; Tuktoyaktuk, Tsiigehtchic; Fort McPherson

Using Inuvialuit and Gwich'in observations to monitor environmental change in the Mackenzie Delta Region
The Mackenzie Delta Region is a dynamic environment that is ecologically and culturally significant. This area is experiencing rapid environmental changes that are expected to increase with continued climate warming and other man-made changes. In some areas changes are occurring so rapidly that even keeping track of them is very hard. Inuvialuit and Gwich'in land users in the region are in an excellent position to assess these changes to the land and contribute to monitoring efforts. The central objective of this research project is to document Inuvialuit and Gwich'in observations of the environment. To accomplish this, researchers used a technique called participatory photography – which means they took photographs of various landscape features and used them in interviews to prompt information sharing. The observations and information gathered in interviews, plus the photos, videos, and interviews audio and transcripts are stored in community-accessible but password protected web maps. Between 2010 and 2014,

the researchers worked with 60 monitors to record observations across the Inuvialuit and Gwich'in territories. In 2014, monitoring focused on changes in muskrat populations, water systems in the Mackenzie Delta, and the effects of human disturbances on areas used for traditional harvesting. Researchers are also studying how various impacts such as roads, seismic lines, climate change, oil and gas, and others add up to effect traditional harvesting in the Inuvialuit Settlement Region. To do this, they are mapping out disturbances to the land using a computerized mapping program. The map will help communities, planners, and scientists understand how much of the landscape has been affected. The researchers have found that impacts vary across the Inuvialuit Settlement Region. In the future, the researchers will look at where disturbances and important harvesting areas overlap.

Pearce, Tristan
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File Number: 12 410 650 **Licence No:** 15427 (Multi-year licence - year 1 of 5)
Region: IN **Location:** Ulukhaktok

Nunamin Illihakvia: Learning from the Land (year 2 onward)
The Nunamin Illihakvia: learning from the Land program aimed to support the transmission of the Inuit traditional knowledge, skills and values that are important for physical, mental, and cultural health, in a time of rapid environmental and social change. Specifically, this pilot project brought together younger Inuit with experienced hunters, sewers, and Elders to learn how to 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. Young people with these skills and this knowledge can continue to do traditional activities that have economic and social value to the Inuit. The program hoped to revive participation in winter seal hunting and traditional sewing skills, and to strengthen health and access to traditional food. Overall, more than 60 people took part in sealskin sewing classes, equipment making, and hunting trips with the guidance of Elders and experienced instructors. There were six traditional items made – harpoon, ice chisel, snow knife, butchering knife, open water boat and paddles, and sleds. Eight hunting trips on the sea ice were led by experienced hunters. Four sewing projects were completed – seal skin hat, water-proof shoes, puhitaq (sunburst for a parka), and sealskin parkas. Seven young research assistants documented the program and a youth-hosted Innuinaqtun language radio show was produced. Finally, two community feasts were held. The Nunamin Illihakvia Final Project Video can be found: https://www.youtube.com/watch?v=4nNPsw2sY4Y The Ulukhaktok Community Corporation completed the project in May 2014.

Rice, Keren
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File Number: 12 410 957 **Licence No:** 15357 (Multi-year licence - year 2 of 3)
Region: SA **Location:** Déljne

Mapping, language and stories in Déljne
This research project aims to develop a new approach to recording Dene languages. As the community of Déljne makes a transition to self-government, there has been increased interest in stories, song, and concepts of place in order to better understand what these say about self-government, or, more particularly, what is at the core of being Dene. This research is studying

how language, stories, song, and concepts of place have changed, or not changed, over time. To do this, the researchers are working with three groups of families from different traditional land use areas. They are studying archival and new research. They are also talking with relatives from neighbouring communities who speak in a different dialect to understand the role of someone's home town on their songs and stories. The team has digitized and transcribed older recordings and made new recordings as well. Listening to old recordings and comparing them to new recordings, the researchers can tell what has changed in the language among family groups in Dél̨ne. They made recordings in people's homes, in the community and on the land. A number of high-priority new and previously archived recordings have been transcribed in the Dene language and translated into English. Mapping of place names and landscape understandings was also started. Finally, the researchers look at historical documentation about the language and sounds of Dene in the area 150 years ago. It showed that some differences in how people speak now and how they spoke then, that researchers used to think changed in the late 1800s and early 1900s actually changed much earlier. Further research will help to describe this abrupt change. The project's website can be found at http://dobes.mpi.nl/projects/Deline. Recordings are digitally archived at this website and are accessible to community members.

Archaeology

Andrews, Tom
Prince of Wales Northern Heritage Centre

File Number: 2014-001 **Class of Licence:** 2
Region: SA **Location:** Selwyn and Mackenzie Mountains

NWT ice patch monitoring project (2014)
Following a 2-day delay because of poor weather, the team spent 5 days undertaking survey and monitoring of 14 ice patches in the Selwyn and Mackenzie mountains, near the NWT/Yukon border. Assisting with the work were Leon Andrew, an elder originally from Tulít'a, Sarah Bannon, an archaeologist with the Prince of Wales Northern Heritage Centre, and for just one of the five days, Keith Hickling, with GNWT's Department of Environment and Natural Resources.

Despite being a significantly warm year, with all patches we visited exhibiting extensive melting, we returned with just a few new objects. At KfTe-1, our largest and most productive ice patch, we recovered a burned stick, likely willow, that radiocarbon dated to 2360 ± 30 years BP. This represents the first evidence of the use of fire at an NWT ice patch. At another site, one that we had been monitoring since its discovery in 2009, but where we had yet to discover any artifacts, we discovered the proximal end of a dart made from a stave of birch. The dart fragment dated to 6040 years BP, making this the oldest site in the NWT ice patch study.

The site where we found the ancient dart fragment, KjRx-2, is on a mountain that is also the site of a caribou fence, also discovered in 2009. At the base of the mountain, hunters from Tulít'a still kill caribou in the fall. The combination of these sites—all in close proximity to each other—demonstrates that caribou hunting has been a persistent tradition at this location for more than 6000 years.

Blaikie-Birkigt, Kurtis
Tree Time Services Inc.
Representing: Apache Canada Inc.

File Number: 2014-023 **Class of Licence:** 2
Region: DC **Location:** Former Pointed Mountain Gas Field

Former Pointed Mountain Gas Field 2013 Phase 2 environmental site assessment
As part of the ongoing efforts to remediate and reclaim the former Apache Pointed Mountain gas field northwest of Fort Liard, WorleyParsons had to conduct environmental drilling in the vicinity of the former gas plant site. The former gas plant is on the northwest side of Fisherman Lake, on sloping ground about 500 m north of a large wetland at the north end of the lake.

From 1965 to 1972 archaeologists, including James Millar and Gloria Fedirchuk from the Universities of Calgary and New Mexico, and Johnny Klondike and other residents from Fort Liard, did archaeological surveys and excavations around Fisherman Lake. They found a large number of sites, from thousands of years old to the recent past. Some of these sites were on the north side of the lake, in and around the former gas plant.

These surveys were done before the invention of GPS technology, so our records of the locations of the site are not as accurate as sites found today. In order to make sure that the environmental drilling program didn't damage or disturb the sites, or any other archaeological or historic sites. WorleyParsons hired Tree Time Services to do an archaeological survey of the planned drilling area.

I surveyed the area around the former gas plant site on August 11 and 12, 2014. I used written descriptions of the sites from Millar and Fedirchuk's PhD theses, and historic airphotos of the gas plant area supplied by WorleyParsons to try to find the previously recorded sites. No places in the planned drilling area or the immediate surroundings matched the descriptions. I dug shovel tests, holes about 40 cm wide and 25 to 40 cm deep, in some of the most likely spots, and screened the soil from them, but I didn't find any artifacts. I also looked for other landforms that would be likely to have sites on them, such as hills, benches and terraces, but didn't find any in the planned drilling area. The drilling area was a steady slope down to wet ground at the edge of the lake basin.

While I didn't find the previously recorded sites, or any new artifacts or sites, this project was still a success. I am confident that the previously recorded sites aren't in the planned drilling area, and won't be disturbed or damaged by the environmental site assessment, or later reclamation work on the gas plant site. I'm also confident that there are still some very interesting archaeological and historic sites on Fisherman Lake, waiting to be found and studied.

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

File Number: 2014-004 **Class of Licence:** 2
Region: NS **Location:** Proposed Gahcho Kué Mine Site

Gahcho Kué 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. Jean Bussey directed the investigations under Class 2 Northwest Territories Archaeologist's Permit 2014-004. She was assisted by Gabriella Prager and Carol Rushworth, of Points West, and Maurice Boucher and Roy Desjarlais, residents of the NWT.

One objective of the 2014 field investigation was to complete the recommendations provided in the 2012 Gahcho Kué Archaeological Management Plan, which identified the type and level of archaeological investigation required at sites to be affected by development. This document was prepared in consultation with the Prince of Wales Northern Heritage Centre and indicated a need for further work at 13 of the 80 sites in the Kennady Lake area; all 13 are within the mine footprint.

In 2013, the management objectives were achieved at 10 sites. In 2014, excavation was undertaken at three sites, KiNp-15, KiNp-27 and KiNp-35; all archaeological field requirements within the mine footprint have now been met. During the winter of 2014-2015, the collected archaeological material will be analyzed and interpreted.

The second objective involved the Mackay Lake to Kennady Lake winter access road. During the winter of 2013-2014 it was necessary to improve sections, which required portage revision, aggregate sources and a new camp. As a result, archaeological investigation was conducted in summer 2014, with 15 recorded sites revisited and 20 new sites discovered. As a protection measure, stakes were installed at five recorded and four new sites. The stakes were sprayed with fluorescent paint to make them more visible in winter. Monitoring of these stakes to ensure sites are not disturbed and to replace or repaint the markers as needed, will be undertaken. This technique has been successfully used along the Tibbitt to Contwoyto Winter Road since 2003.

Twelve new sites are located on a 2 km section of esker south of Portage 15. These sites are of interest because they contain a variety of lithic (stone) materials, including quartzite, shale and siltstone-like specimens, in addition to the commonly used quartz. Also found were two small white chert tools suggestive of the Arctic Small Tool tradition. The number of sites present on this landform and their potential to contribute substantially to the prehistory of the region, resulted in a recommendation that the area south of Portage 15 be avoided in future.

Five new sites are located on an esker south of Portage 19. For safety reasons, an alternate route is required at this portage and two options were examined. Field reconnaissance determined that Option A would impact three archaeological sites, including a large and potentially significant recorded site, KjNq-2. Option B can be constructed without affecting any archaeological sites by using a site-free portion of esker that is approximately 300 m wide. The area was intensively examined and painted stakes were installed to define the eastern and western boundaries of this site-free corridor.

One new site, KlNs-16 is located within 30 m of an existing portage and more detailed archaeological investigation is recommended for 2015; stakes were installed to protect the site during the winter of 2014-2015. The final two new sites are avoidable; one is located on a discontinuous esker southwest of the new Margaret Lake camp and the other on high ground overlooking Portage 10. All 15 of the previously recorded sites that were revisited are avoidable. The 2014 investigations have confirmed that high archaeological potential is exhibited in portions of this region and all activities that could disturb the surface should be preceded by archaeological assessment.

DeGagne, Andrea
Stantec Consulting Ltd.
Representing: Department of Transportation, GNWT

File Number: 2014-009 **Class of Licence:** 2
Region: NS **Location:** The proposed Tłı̨chǫ all-weather roa

Tłı̨chǫ Settlement Area Proposed Transportation Corridor
At the request of the Government of the Northwest Territories Department of Transportation, Stantec Consulting Ltd. conducted an Archaeological Impact Assessment (AIA) for the proposed Tłı̨chǫ all-weather road (Tłı̨chǫ Road; the Project). The Project will consist of an all-weather road between the settlement of Whatì and Highway 3 west of Yellowknife, NWT.

All archaeological work was conducted under Northwest Territories Class 2 Archaeologist Permit 2014-009, issued to Andrea DeGagne. Fieldwork took place in conjunction with other discipline studies June 25 through 28, 2014, with a representative of the Department of Transportation on

site. The AIA was directed by Andrea DeGagne, M.A., and assisted by Dominica Lesniewicz, both of Stantec Consulting Ltd. The objective of this AIA was to identify sites that would potentially be impacted by the Project so that these could be avoided, as the Project was still in design phase at the outset of the field program.

The four-day long archaeological field program consisted of a helicopter-supported pedestrian survey of the proposed Project footprint between Highway 3 and Whatì. During the AIA field studies, the entire route was assessed by helicopter overflight to identify areas with archaeological potential and to assess the degree of existing disturbance along the proposed route. Areas with high archaeological potential within a 1 km buffer of the proposed route were also observed to confirm archaeological potential should re-routes be necessary. Ground truthing of areas with high archaeological potential within the Project right-of-way was conducted through visual assessment and shovel testing. Overall, the degree of existing disturbance along the right-of-way was high. The northern extent of the Project currently exists as a high grade gravel road running east from Whatì to the La Martre Falls. West of the falls, the proposed Project footprint continues south along an old winter road.

Disturbance related to modern use of the area was noted throughout the Project area. No new archaeological sites were identified during the field assessment. One area of high archaeological potential was identified along the north shore of the La Martre River, immediately upstream from the La Martre Rapids. Modern use of this area was observed, related to the use of the old winter road to access the rapids. However, as this area was outside of the proposed Project footprint at the time of the assessment, no testing was undertaken to determine whether precontact use of the area also took place. One indigenous historic site located near the La Martre Rapids (site KgPo-3), previously recorded in 1986, was revisited during the current study; the site will not be impacted by the Project.

Friesen, Max
University of Toronto

File Number: 2014-006 **Class of Licence:** 2
Region: IN **Location:** Inuvialuit Settlement Area

Arctic cultural heritage at risk: Climate change impact on the Inuvialuit archaeological record

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 the story of Inuvialuit life over many centuries. This region includes the major settlements of Kitigaaryuit (Kittigazuit), Kuukpak, and Nuvugaq (Atkinson Point), but also many other winter villages, smaller camps, and areas which saw specialized hunting and fishing.

However, 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. Warmer temperatures are also causing the permafrost to thaw, so delicate artifacts that have been frozen for centuries are now rotting and being destroyed.

The project “Arctic Cultural Heritage at Risk” (Arctic CHAR) is a collaboration between the University of Toronto and the Inuvialuit Cultural Resource Centre in Inuvik. The project is designed to reveal which parts of the coast are being eroded most quickly, and which heritage sites are being destroyed. Once we understand which sites are most at risk, we will decide which should be excavated, in order to save their contents before they are destroyed.

The 2014 field season saw intensive excavations at Kuukpak, on Richards Island. Kuukpak is an extremely important Inuvialuit heritage site – it was the central village of the Kuukpangmiut, a large and powerful regional group who lived across Kugmallit Bay from Kitigaaryuit. Kuukpak is the largest site in the entire Inuvialuit region. It stretches for almost a kilometre along the bank of the Mackenzie River, where shallow waters led to a highly successful beluga whale hunt every summer. The site currently holds the remains of at least 23 large houses, however serious erosion has affected large areas, and it probably once held over 40 houses. Inuvialuit traditional knowledge indicates that the site was abandoned during the 1800s, after which time its inhabitants moved across Kugmallit Bay to join the Kitigaaryungmiut in the late 1800s; their descendants eventually moved to modern Tuktoyaktuk.

In 2014, a team of ten people worked at Kuukpak for six weeks. During that time, we produced a map of the site, recorded erosion damage, and excavated parts of two houses. Most importantly, we excavated a large 3-alcove "cruciform" winter house, of a kind that is well known in Inuvialuit traditional knowledge, but remains poorly understood. The house yielded three perfectly preserved driftwood-floored alcoves, a central floor area containing a series of hearths, and a large sample of artifacts and animal bones which will yield insights into the occupants' economy and social organization.

We also performed a test excavation of a second house at Kuukpak. This house is also extremely important, because it yielded glass trade beads indicating that it was occupied during the 1800s. This period is not well understood in the region, so the house will add an important chapter to the area's history, linking the distant past with recent Inuvialuit history. In a future field season, we plan to complete the excavation of this house.

Hodgetts, Lisa
University of Western Ontario

File Number: 2014-015 **Class of Licence:** 2
Region: IN **Location:** Agvik site

Ikaaluk archaeology project

This summer, our team excavated a dwelling at the Agvik site (OkRn-1) on the south coast of Banks Island. Our crew consisted of two field assistants and two wildlife monitors from Sachs Harbour, and three graduate students and the project director from the Anthropology Department at Western University. Agvik includes the remains of at least 14 dwelling structures and appears to have been used at two different times, initially around 1400 AD, and later around 1550 AD. This period of Banks Island's history is poorly understood. Many of the dwellings cluster around the edge of a rapidly eroding gully, and we chose to excavate one of the dwellings closest to the gully in order to better understand how it was used before it is destroyed by erosion.

Before beginning excavation, we used a gradiometer and a magnetic susceptibility meter to measure tiny differences in the magnetic properties of the soils across the surface of the dwelling. These techniques can indicate the presence of buried archaeological features, since human activities such as burning, garbage disposal and digging can affect soil magnetism. Initial survey with both instruments across other areas of the site in 2013 produced promising results, and we hoped to be able to map the internal structure of the dwelling prior to excavation. Unfortunately, a great deal of permafrost activity near the gully edge made it difficult to identify more subtle magnetic differences caused by the archaeological features.

Our excavation of the dwelling revealed a shallow circular depression approximately 3.7 m across. The structure had an earth floor and was surrounded by a turf wall and accessed through an entrance tunnel, which was supported by a few short whale bone posts. There was a "kitchen"

area close to where the tunnel entered the dwelling, indicated by a concentration of burnt soil, ash and burnt bone. We also found a series of round pits outside the rear of the dwelling, filled with animal bone, skins, and in some cases tools and other artifacts. There were large amounts of refuse material in the entrance tunnel, within and above the collapsed wall, and immediately around the dwelling. We believe that this structure is a qarmat, a shallow semi-subterranean dwelling with sod walls and a skin roof. Historically, these dwellings were occupied primarily in spring and fall, though they were sometimes used throughout the winter.

Huge numbers of slate ulu fragments and Arctic fox skulls were recovered from within and around the dwelling, which suggests that preparing fox skins was an important activity in the qarmat. Such work was likely done by women. The diverse animal bones, including large quantities of ringed seal, Arctic fox, caribou, snow goose, and fish, and smaller amounts of bearded seal, polar bear and muskox indicate that the occupants ate a varied diet. In addition to hunting tools such as harpoons, we also found fishing lures, boat parts, amber beads, polar bear tooth pendants, pottery fragments and a range of other items which are currently being stabilized at the Canadian Conservation Institute in Ottawa before they are returned to Western University for further study.

More photos and information about the project, as well as links to 3D models of the excavation area and some of our finds are available on our project Facebook page: https://www.facebook.com/pages/Ikaahuk-Archaeology-Project/611819408850030

Kasstan, Steve
TERA Environmental Consultants
Representing: Simon Fraser University, Athabasca Denesuline Ne Ne Land Corporation

File Number: 2014-011 **Class of Licence:** 2
Region: SS **Location:** Akaitcho

Respect for caribou: Indigenous heritage and archaeology of Ethen-eldeli Denesuline
Cancelled

Kristensen, Todd
University of Alberta
Representing: Himself, University of Alberta

File Number: 2014-021 **Class of Licence:** 2
Region: 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 Tulít'a Dene Band continued their research of pre-contact and historic adaptations to the Selwyn Mountains of the Northwest Territories. This was the last year of fieldwork that will contribute to Mr. Kristensen's PhD research at the University of Alberta. This year's goals were to return to two previously identified archaeology sites in the O'Grady Lake area for small excavations and to complete four traditional knowledge interviews with Tulít'a Elders. The work at O'Grady Lake was done at the same time as neighbouring ice patch survey work in alpine areas led by the Prince of Wales Northern Heritage Centre.

Mike Donnelly and Todd Kristensen dug at two sites and uncovered a variety of stone tools including a spear head, microblades, scrapers, and stone knives. We focused our work on what looks like a small camp where people made microblades and other tools for meat and hide processing over 2000 years ago. Angus Lennie from Tulít'a continued to provide assistance with interviews of four Elders who spent much of their lives in the Mackenzie Mountains. In total, eight

Elders have been interviewed for the current research project. Past archaeology work at O'Grady Lake was done under permits 2012-007 and 2013-011.

Our archaeological work at O'Grady Lake over the past three years tells us that small groups of people visited the area over several thousand years to hunt caribou and birds and catch fish. Lake cores, blood residue analysis on stone tools, and sourcing studies of obsidian from the area combined with Elder stories will hopefully tell us more about the variety of human activities and environments at O'Grady Lake. This year's field program benefited greatly from assistance provided by Tom Andrews and Glen MacKay (Prince of Wales Northern Heritage Centre), Jack Ives (University of Alberta), Richard Popko (Department of Energy and Renewable Resources), Keith Hickling from Norman Wells, Leon Andrew and Angus Lennie from Tulít'a, the Tulít'a Land Corporation, and Al Pace and Lin Ward (Canoe North Adventures).

Leyden, Jeremy
Stantec Consulting Ltd.
Representing: Department of Finance, GNWT

File Number: 2014-017 **Class of Licence:** 2
Region: GW, SA, DC **Location:** Mackenzie Valley Fibre Link Corridor

Mackenzie Valley Fibre Link Project
On behalf of the Government of the Northwest Territories (GNWT), Stantec Consulting Ltd. is conducting an Archaeological Impact Assessment for the proposed Mackenzie Valley Fibre Link Project. The proposed Project will involve the burial and operation of a fibre optic telecommunications cable and related facilities between the McGill Lake Microwave Site, just southeast of the junction of Highways 1 and 7, and the Town of Inuvik. The proposed cable will traverse some undisturbed lands, but will also parallel disturbances associated with an existing winter road and various highways over an approximate distance of 1,130 kilometers. It will travel through, or near, the communities of Fort Simpson, Wrigley, Tulít'a, Norman Wells and Fort Good Hope; and through lands associated with three Aboriginal Settlement Areas including: The Gwich'in Settlement Area, the Sahtú Settlement Area and the Dehcho Territory.

Investigations for the project in 2014 were completed under Class 2 Archaeologist Permit # 2014-017. In-field assessments were conducted by two separate crews under the supervision of Jeremy J. Leyden, M.A. and Andrea DeGagne, M.A. Both crews worked simultaneously throughout the early summer to complete assessments north of Wrigley, while a single crew returned in the latter half of September to conduct assessments south of the N'Dulee ferry crossing along the Mackenzie Highway. Each crew consisted of three archaeologists along with a wildlife monitor and a community assistant provided on a rotating basis by participating communities along the route of the assessment. The participants included representatives from the Gwichya Gwich'in, Nihtat Gwich'in, K'asho Got'ine, Begade Shotagotine, Pehdzeh Ki and Liidli Kue First Nation communities and the Norman Wells Métis.

During the field program, a visual review of the entirety of the Project footprint was undertaken through either drive-by or helicopter over-flight and at the discretion of each crew lead, specific areas of significant heritage potential were subject to a more intensive field assessment including pedestrian traverse and intensive surface examination to determine the presence of any unrecorded archaeological or cultural sites. Shovel tests were also excavated in areas with a potential for buried cultural materials. Revisits were conducted for any previously recorded sites occurring within the assessment footprint, but were also completed where necessary, to confirm the locations of any known archaeological sites within 250 meters or any burials within 500 meters of the disturbance footprint.

By the conclusion of the 2014 field program over 250 discrete areas were subject to pedestrian traverse with over 2500 total shovel tests excavated at more than 200 of these locations. A total of 139 cultural sites were identified including 89 that were newly identified and 50 revisits of previously recorded sites. While 81 of these sites were found to have a contemporary association, 58 sites were determined to be of an Archaeological, Historic or Palaeontological nature. These sites include fossil sites, several precontact period lithic scatters and campsites, and a variety of historic period sites including: artifact scatters, historic structures, camps/settlements/trading posts, burials/cemeteries, barge landings, foundation/pit features and a historic food cache. The GNWT has committed to avoiding all historical, archaeological or burial sites that occur within the assessment footprint by at least 30 meters and is currently developing an avoidance strategy for the Project. As of December 2014, field evaluations are complete for all assessment areas with exception of that between the N'Dulee ferry crossing at the Mackenzie River and the town of Wrigley. Completion of this outstanding work is currently projected to be undertaken in early 2015.

MacKay, Glen R
Prince of Wales Northern Heritage Centre
Representing: Sambaa K'e Dene Band, Prince of Wales Northern Heritage Centre

File Number: 2014-013 **Class of Licence:** 2
Region: DC **Location:** Dehcho Settlement Area

Sambaa K'e archaeology project

Glen MacKay and Sarah Bannon of the Prince of Wales Northern Heritage Centre continued an archaeological survey of the traditional land use area of the Sambaa K'e (Trout Lake) got'ine under NWT Archaeologists Permit 2014-013.

A collaborative effort between Elders, students, and archaeologists, the Sambaa K'e Archaeology Project involves visiting important cultural places identified by the Elders of the Sambaa K'e Dene Band, and documenting them as archaeological sites. The project has a strong educational component for high school students from the community, with students receiving instruction in archaeological survey methods and learning about important cultural places from community elders.

Traveling by boat around Sambaa K'e, we recorded 12 new archaeological sites, consisting mainly of precontact camps containing stone tools, and historic camps.

MacKay, Glen R
Prince of Wales Northern Heritage Centre
Representing: Yellowknives Dene First Nation, Prince of Wales Northern Heritage Centre

File Number: 2014-014 **Class of Licence:** 2
Region: NS **Location:** Yellowknife Bay

Yellowknife Bay Archaeology Project

Glen MacKay from the Prince of Wales Northern Heritage Centre (PWNHC) continued an archaeological survey of the Yellowknife Bay area in collaboration with the Yellowknives Dene First Nation (YKDFN). 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.

The archaeological work under this permit consisted of recording and mapping the features at the camp site for the Burwash Mine. This camp was used from 1935-36 to support gold mining on the high bedrock ridge to the north of the campsite. The remains of the camp consist of at least 7

building foundations, which include a mess hall, bunkhouse, assay lab, and warehouses. Historic artifacts are scattered throughout the camp area, and include fragmented drill core, core boxes, cans, a stove, and other assorted items. The foundation of the assay lab contains a small concrete pedestal that may have served as a platform for a piece of assay equipment, such as a balance or small crusher. Ryan Silke of the PWNHC, and Fred Sangris and Randy Freeman of the YKDFN participated in this project.

MacKay, Glen R
Prince of Wales Northern Heritage Centre
Representing: Department of Transportation, GNWT

File Number: 2014-018 **Class of Licence:** 2
Region: GW **Location:** Gravel Quarry at KM251 of the Dempster Highway

AIA of gravel quarry at KM251 of the Dempster Highway

Glen MacKay of the Prince of Wales Northern Heritage Centre (PWNHC) conducted an archaeological impact assessment (AIA) of a proposed expansion of an existing gravel quarry at KM 251 of the Dempster Highway (near Inuvik). This included an inspection of a stone ring feature near the active quarry that was reported to the PWNHC by staff of the Gwich'in Renewable Resources Board.

The results of the AIA indicate that there are no archaeological sites at risk of impact from continued operation/expansion of the quarry. The stone ring feature appears to have been built recently, based on patterns of lichen growth on the stones, and the presence of small pieces of modern fabric in the vicinity of the ring. As such, it was not recorded as an archaeological site.

Mooney, James
Ecofor Consulting Ltd.
Representing: WESA and Northern Contaminated Sites Group of PWGSC

File Number: 2014-024 **Class of Licence:** 2
Region: NS **Location:** Ray Rock Mine Site

Rayrock Mine archaeological impact assessment

In September of 2014, Ecofor Consulting Ltd., conducted a brief Archaeological Site Assessment of the Rayrock Mine Site, located approximately 156 km northwest of Yellowknife. The intention of this assessment was to document Tłı̨chǫ and non-Tłı̨chǫ use of the Rayrock site and surrounding area, to ensure culturally significant locations are left undisturbed during planned remediation efforts. This assessment effort was conducted under the direction of WESA BluMetric Environmental Inc., on behalf of the Northern Contaminated Site Group, Public Works and Government Services Canada, and Aboriginal Affairs and Northern Development Canada. These efforts were led by James Mooney and assisted by archaeological technician Pierre-Luc Fortin of Ecofor Consulting Ltd., and Noel Drybones (Tłı̨chǫ elder), Samuelle Lamuelle (Tłı̨chǫ wildlife monitor), Renee Ekendia (Tłı̨chǫ job shadow), and Leon Sanspariel (Tłı̨chǫ wildlife monitor).

Although no specific areas of potential impact were presented as priority areas to assess, the team conducted the survey by four main tasks: 1) review and record historic structural remains; 2) survey the northern higher elevation area; 3) assess the exploration area on Maryleer Lake; 4) assess the northern ~2.5 km of access road to the mine site and the southern and central site area.

The buildings at the mine site have been burned or removed and few structural remains are present. Those identified are from the mill, the crusher, screens & transfer house, the powerhouse, an unknown building east of the mill, the compressor building, the boiler house, a staff house, cook house, bunk houses 1 through 4, the manager's house, a series of five duplexes, scattered disturbed remains of a structure west of the recreation hall, the recreation hall and curling rink. Our team also identified the power line poles heading northeast away from the mine area, and two of the closed and capped raise vents. The area around the shore of Maryleer Lake was flown and inspected from the air, but none of the air crew or field crew spotted any exploration camp remains, as such the shore of Maryleer Lake was not assessed on foot. The team identified three areas of increased archaeological potential; however, no shovel testing was conducted and no prehistoric materials were identified. Due to time constraints, the time spent transecting this large area for prehistoric resources did not provide full assessment of the entire study area. If impacts are planned for any of these three areas of potential, then these areas are recommended to be avoided, or subsurface testing is recommended in these three areas, in advance of planned impacts.

Murphy, Brent
Golder Associates Ltd.
Representing: AECOM

File Number: 2014-022 **Class of Licence:** 2
Region: IN **Location:** Tununuk Point

Remediation Services Tununuk Point, former BAR-C DEW Line Site
Cancelled

Prager, Gabriella
Points West Heritage Consulting Ltd.
Representing: Avalon Rare Metals Inc.

File Number: 2014-005 **Class of Licence:** 2
Region: NS **Location:** Nechalacho Rare Earth Metals Mine

Nechalacho Rare Earth Metals Mine Project
Cancelled

Prager, Gabriella
Points West Heritage Consulting Ltd.
Representing: Hamlet of Aklavik

File Number: 2014-008 **Class of Licence:** 2
Region: IN, GW **Location:** Aklavik Bridge

Aklavik Bridge and Road Project
Cancelled

Ross, Julie M.
Golder Associates Ltd.
Representing: Aboriginal Affairs and Northern Development Canada

File Number: 2014-007 **Class of Licence:** 2
Region: SS **Location:** Outpost Island, Blanchet Island and Copper Pass mine sites

Archaeological impact assessment Outpost, Blanchet and Copper Pass Abandoned Mines
Golder Associates Ltd. (Golder) was retained by ARCADIS SENES Canada Inc. (SENES) to complete an Archaeological Impact Assessment (AIA) at the Outpost Island, Blanchet Island and Copper Pass mine sites. The mine sites are between 90 km and 130 km southwest of Yellowknife on the East Arm of Great Slave Lake. The AIA was initiated in support of SENES's Environmental Site Assessments (ESA) at the abandoned mine sites in preparation for planned remediation activities. SENES is conducting the ESAs on behalf of Public Works and Government Services Canada (PWGSC) and Aboriginal Affairs and Northern Development Canada (AANDC). Modeste Sangris, Angus Charlo and Sarah Black of the Yellowknives Dene First Nation (YKDFN) acted as field assistants and wildlife monitors. Modeste Sangris and Angus Charlo also contributed their knowledge to identifying archaeological and traditional land use sites.

As a result of the AIA two previously unrecorded archaeological sites (JkPi-1 and KcNx-3) and two traditional land use sites were documented. The Outpost Mine is classified as JkPi-1 and consists of historic mining infrastructure and debris, early exploration camp remains and debris, a white cross, rolled birch bark, old moorings, dishware, scraps of apparel, two square tent outlines, two tent rings, an outhouse, boat repair area and radio towers. KcNx-3 is located 700 m south of a proposed access road from Hamilton Bay to Sachowia Lake (Copper Pass Mine) and consists of a partially buried line of large stones located at the base of a tree which has been identified as a possible grave site.

Land Use Site 1 is located on the north shore of an unnamed lake south of Sachowia Lake and consists of axe-cut trees, a tire, and assorted metal containers including syrup and tobacco. Land Use Site 2 is east of the Blanchet Island Mine and consists of evidence of a possible hearth feature. The lack of material culture, the limited amount of lichen and the hearth location, so close to the lake shore, all suggest a recent occupation of the site.

Avoidance is the preferred management recommendation for all sites. If avoidance is not possible, then systematic data recovery is recommended. No impacts are anticipated for sites identified and documented in 2014.

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

File Number: 2014-010 **Class of Licence:** 2
Region: NS **Location:** Chedabucto Lake/Whitebeach Point area

Chedabucto Lake archaeological impact assessment
Golder Associates Ltd. (Golder) was retained by Aurora Geosciences Ltd. to complete an Archaeological Impact Assessment (AIA) in the Chedabucto Lake/Whitebeach Point area. The project area encompasses approximately 195 km2 and is located approximately 50 km west of Yellowknife. The AIA was carried out for Aurora Geosciences Ltd. on behalf of Husky Oil Operations Limited (Husky). One hundred proposed drill location were included in the assessment. Paul Mackenzie and Fred Sangris of the Yellowknives Dene First Nation (YKDFN) acted as field assistants and wildlife monitors and each contributed their knowledge to identifying and interpreting archaeological and land use sites. Site visits with representatives of Tłı̨chǫ communities, the YKDFN and the North Slave Métis also occurred.

Nineteen previously unrecorded archaeological sites were documented as a result of the AIA. Though site composition varied, the main components include lithic scatters and cores of primarily quartz and chert, formed chert tools, several tent rings, camp/cabin foundations, and axe-cut trees. Six previously recorded sites, including a previously recorded shipwrecked barge, KcPj-1, were also revisited and evidence of ongoing traditional use activities are extensive within the project area along the shores of Great Slave Lake and Chedabucto Lake. Three formed tools were collected. Coastal areas, the shoreline of Chedabucto Lake, and river ridges in the region are considered to be of high archaeological potential. Sand dunes, exposures, and open areas subject to erosion are also of high archaeological potential. The majority of these features are located within 500 m of the coast.

Avoidance is the preferred management recommendation for all recorded sites. If avoidance is not possible, then systematic data recovery including follow-up archaeological studies is recommended.

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

File Number: 2014-019 **Class of Licence:** 2
Region: NS **Location:** Jay Project

Archaeological assessment of Dominion Diamond's Jay Project Footprint 2014
Golder Associates Ltd. (Golder) was retained by Dominion Diamond Ekati Corporation (Dominion Diamond) to complete an Archaeological Impact Assessment (AIA) for proposed infrastructure associated with the Jay Project. The AIA focused on the proposed Jay Project infrastructure footprints, including a waste rock storage area, dike alignment, roads, pipelines and power lines and proposed expansions to the Misery Camp. Dominion Diamond summer students Jeffrey Mantla, Yellowknives Dene First Nation (YKDFN) community member, and Tyanna Steinwand, Tłı̨chǫ community member, acted as field assistants. A site visit with representatives from the YKDFN contributed to the incorporation of community knowledge into identifying and interpreting archaeological sites. Site visit participants included Peter Sangris, Jonas Sangris, Jonas Noel, James Sangris, Lena Drygeese and Randy Freeman.

As a result of the AIA, nine previously recorded archaeological sites were revisited and two previously unrecorded sites were identified. Five revisited sites are within 500 m of the Project footprint (LdNs-2, LdNs-3, LdNs-4, LdNs-5, and LdNs-16) and four sites were revisited as part of an archaeological site visit with the YKDFN (LdNs-8, LdNs-11, LdNs-30, and LeNs-4). Two previously unrecorded archaeological sites (LdNs-52 and LdNs-53) were documented as a result of the AIA. Both sites were identified within the proposed Jay Waste Rock Storage Area. LdNs-52 consists of two stone features, possible caches and LdNs-53 consists of a collection of quartz flakes that may represent a potential workshop or camp site. LdNs-52 was mitigated during the AIA.

Avoidance is the preferred management recommendation for all sites. If avoidance is not possible, then systematic data recovery is recommended. Additional archaeological studies are planned to mitigate disturbance to site LdNs-53.

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

File Number: 2014-003 **Class of Licence:** 1
Region: DC **Location:** Cantung Minesite

Archaeological assessment of the Cantung Minesite
At the request of the North American Tungsten Corporation, Kleanza Consulting Ltd. (Kleanza) conducted an archaeological assessment at the Cantung Minesite (Cantung) in June 2014. The assessment included a preliminary field reconnaissance (PFR) of a proposed tailings storage facility and road corridor extensions. The objective was to assess the overall archaeological potential of the project area, and determine the scope of future archaeological work. The PFR was planned in conjunction with the Nahanni Butte, and Dehcho First Nations.

The field crew consisted of Naomi Smethurst (Kleanza), and Jenny Lewis (Kleanza), Cantung employees, as well as experienced hunters Ernie Ceasar (Liard First Nation), and Frank Fairclough (Tahltan First Nation). At the time of survey, participants from the Nahanni Butte, and Dehcho First Nations were unavailable to join the crew. Mr. Ceasar and Mr. Fairclough were invaluable resources sharing their experience, traditional knowledge, and advice regarding cultural significance of the project area.

The PFR for the tailings storage facility and road corridor extensions took three days to complete. Particular attention was paid to the southwest portion of the proposed tailings storage facility as it is adjacent to the Flat River. A significant portion of the project area has been previously cleared of vegetation and the terrain has been levelled. Two historical era features were identified within and adjacent to the proposed tailings storage facility. Both features (described below) are thought to be associated with mining exploration activities and a general use of the area by residents of the Town of Tungsten. No new archaeological sites were identified during fieldwork.

The first historical era feature was a well-used game trail that was likely a hiking path for the residents of Tungsten. No trail markers (eg. blazed trees) were identified along this trail, however refuse along the trail indicated it was likely used during the latter half of the 20th century (1970's and 1980's) for recreational hiking activities.

The second historical era feature identified within the project area was a straight cutline located within the boundaries of the proposed tailings storage facility. The cutline consisted of a cleared 1.5 m wide section of forest. On either side of the cutline were blazed trees. Kleanza collected an increment core sample from one of the trees in an effort to date the construction of the line. The date of modification of the tree is no older than about 1961 and the cutline is likely associated with mining exploration (possibly seismic) activities. Though the cutline may have been made slightly over or up to 50 years ago, Kleanza believes that it is likely associated with mining activities of the 1960's or 1970's and does not meet all the criteria required to be designated as an archaeological site under the Northwest Territories Archaeological Site Regulations.

Walker, Daniel
ERM Consultants Canada Ltd.
Representing: ERM Rescan

File Number: 2014-002 **Class of Licence:** 2
Region: NS **Location:** Courageous Lake Project

Seabridge Gold Inc. Courageous Lake Project
Cancelled

Walker, Daniel
ERM Consultants Canada Ltd.
Representing: TerraX Minerals Inc.

File Number: 2014-020 **Class of Licence:** 2
Region: NS **Location:** Yellowknife City Gold Project

Yellowknife City gold project
Archaeological investigations of the proposed Yellowknife City Gold Project were conducted by ERM Rescan Consultants Canada (ERM Rescan), on behalf of TerraX Minerals Inc. in 2014. The southern boundaries are located within the city of Yellowknife and the Project extends approximately 18 km north. The 2014 assessment included the development of an archaeological potential model for the Project area and a short field program conducted area on September 11th and 12th of 2014 with the assistance of Veronique Bjorkman. The field investigations were conducted at potential drill areas at the north end of Walsh Lake, along the southeast shore of Banting Lake, and the east side of Ryan Lake.

No archaeological objects or features were located during the pedestrian survey. Historic features identified in the area include cabins and campsites associated with recreational use of the area and claim posts, pickets, core boxes, trenches, and drill collars associated with mineral exploration. The high density of modern campsites in the area corroborates the assessment of the potential model that these relatively level bedrock exposures overlooking the water make good temporary camp locations, however no prehistoric materials were located during the survey.

Young, Patrick
Golder Associates Ltd.
Representing: Aurora Geosciences Ltd.

File Number: 2014-012 **Class of Licence:** 2
Region: NS **Location:** Kennady North Property

Kennady North Property archaeological impact assessment
In August 2014, Golder Associates Ltd. (Golder) conducted an archaeological survey on behalf of Aurora Geosciences Ltd. (Aurora Geosciences) for the Kennady North Property located approximately 400 km northeast of Yellowknife, NT. The survey was completed under Class 2 Archaeologist Permit No. 2014-012. The field crew consisted of Patrick Young and Jessica Hill of Golder Associates Ltd. as well as Herman Abel and Richard Abel of Łutselk'e Dene First Nation.

The objective of the 2014 archaeological survey was to examine potential winter road options, a short all season road option, and field camp options for ongoing diamond exploration activities. The archaeological investigation included a combination of low level helicopter and pedestrian survey of overland road portages along road corridors and potential camp options adjacent to Kelvin Lake.

Over the course of the seven day field program, nine previously recorded archaeological sites were revisited and 10 new archaeological sites were recorded. Fifteen of the sites consisted of lithic quartz scatters produced as a result of stone tool manufacture. One of these sites produced a Late Taltheilei (ancestral Dene) side-notched arrow head that dates from approximately 1,300 to 200 years ago. The remaining sites consisted of two quartz vein quarry sites; one camp site containing a hearth and sparse lithic scatter; and one Indigenous Historic site believed to relate to trapping activities. As a result of the archaeological reconnaissance and inventory, the location of each site will be incorporated into future project planning and exploration activities in the Kennady North Property.

Wildlife Permits

Armstrong, Terry
Environment and Natural Resources - South Slave
terry_armstrong@gov.nt.ca

Permit No: 500267
Region: NS, SS
Species Studied: Wood bison
Location: North and South Slave regions

Mackenzie wood bison population and disease studies
The objectives of this project were: 1) To estimate calf, yearling and bull to cow ratios during the post-calving period; 2) To monitor for the presences of brucellosis and tuberculosis in addition to other diseases and parasites; 3) To monitor the population for the occurrence of anthrax-caused mortalities through the summer.

Armstrong, Terry
Environment and Natural Resources - South Slave
terry_armstrong@gov.nt.ca

Permit No: 500112
Region: NS, DC
Species Studied: Wood bison
Location: In and around Fort Providence and Behchokǫ̀

Mackenzie wood bison population monitoring
The objectives of this project were: 1) To measure calf, yearling, and bull:cow ratios during the post calving period; 2) To monitor the Mackenzie bison population for the presence of brucellosis and tuberculosis, in addition to other diseases and parasites; 3) To monitor the Mackenzie herd for the occurrence of anthrax related mortalities in summer; 4) To conduct a census of the Mackenzie bison population.

Bidwell, Mark
Canadian Wildlife Service
mark.bidwell@ec.gc.ca

Permit No: 500240
Region: SA
Species Studied: Whooping cranes
Location: Near Fort Smith

Whooping crane ecology and rehabilitation
The objective of this project was: Population Monitoring: to monitor and understand the breeding ecology of whooping cranes in Wood Buffalo National Park (WBNP) and the surrounding area. Datasets acquired during monitoring are used to identify and designate areas as Critical Habitat (CH) under the Species at Risk Act (SARA) and to estimate the relative abundance and productivity of breeding pairs annually.

Branigan, Marsha
Environment and Natural Resources - Inuvik Region
marsha_branigan@gov.nt.ca

Permit No: 500258
Region: IN
Species Studied: Grizzly bears
Location: Along proposed Inuvik to Tuktoyaktuk Highway and adjacent areas

Grizzly bear DNA monitoring program Inuvik to Tuktoyaktuk Highway
The objective of this project was to understand the impact of the Inuvik to Tuktoyaktuk highway on the grizzly bear population in the area. In particular, the grizzly bear DNA data and mortality data from harvesting and other factors will be used to:

- Estimate grizzly bear abundance and distribution during the pre-construction period; and,
- Build baseline habitat-based models of grizzly bear distribution relative to the road, to be used to infer changes in bear distribution and density relative to the road once construction occurs.

Pongracz, Jodie
Environment and Natural Resources - Inuvik Region
jodie_pongracz@gov.nt.ca

Permit No: 500236
Region: IN
Species Studied: Polar bears
Location: Viscount Melville Sound

Viscount Melville Sound polar bear subpopulation survey
The objectives of this project were: 1) To conduct mark-recapture to estimate the current population size and demographic parameters of the Viscount Melville (VM) polar bear subpopulation; 2) To assess the current boundaries of the VM polar bear subpopulation; 3) To assess polar bear habitat use of changing sea ice habitat in the area of VM Sound.

Branigan, Marsha
Environment and Natural Resources - Inuvik Region
marsha_branigan@gov.nt.ca

Permit No: 500277
Region: IN
Species Studied: Grizzly bears
Location: Along the proposed construction area for Inuvik to Tuktoyaktuk highway

Grizzly bear denning survey for the Inuvik to Tuktoyaktuk Highway
The objective of this project was to determine locations of active dens in winter work areas, in the fall of 2014.

Carriere, Suzanne
Environment and Natural Resources - Wildlife Division
suzanne_carriere@gov.nt.ca

Permit No: 500253 **Species Studied:** Spiders, insects
Region: IN, GW, DC, NS, SS, SA **Location:** NWT Wide

Barcode of life project in Canada: Northwest Territories volunteer sites
The objectives of this project were: 1) Large-scale trapping of arthropods (insects and spiders) in environmentally significant areas across Canada to obtain tissue material and subsequently determine Canadian species diversity using DNA barcoding; 2) Over the long term, creation of a complete DNA barcode library for all eukaryote species that occur in Canada.

Carriere, Suzanne
Environment and Natural Resources - Wildlife Division
suzanne_carriere@gov.nt.ca

Permit No: 500254 **Species Studied:** Mice, voles, lemmings, shrews, snowshoe hares
Region: IN, GW, DC, NS, SS, SA **Location:** NWT Wide

NWT Small Mammal and Hare Survey
The objective of this project was: The NWT Small Mammal Survey (SMS) monitors changes in density of voles, mice, lemmings and shrews across five ecozones in the NWT. The Hare Transect Survey (HTS) monitors snowshoe hare density across all forested ecozones and an abundance index for Arctic hare at the tundra site.

Cluff, Dean
Environment and Natural Resources - North Slave
dean_cluff@gov.nt.ca

Permit No: 500132 **Species Studied:** Wolves and caribou
Region: NS **Location:** Bathurst caribou summer range

Population dynamics and movements of tundra wolves denning on barren-ground caribou range in the central Canadian Arctic
The objectives of this project were: 1) To describe movement characteristics of tundra wolf packs to successive home sites (den and rendezvous sites) throughout the denning period; 2) To document wolf pup recruitment at a time of low caribou abundance; 3) To provide insight on the behavioral and numerical responses of wolves relative to changes in the distribution and abundance of caribou.

Coulton, Daniel
Golder Associates
daniel_coulton@golder.com

Permit No: 500218 **Species Studied:** Moose, caribou, hawks, eagles, falcons, owls
Region: NS **Location:** 15km radius of NICO project camp

Baseline wildlife studies for the Fortune Minerals Limited NICO project
The objectives of this project were: 1) To further describe the occurrence, relative abundance, distribution, and habitat use of wildlife in the study area; 2) To predict effects to the environment and wildlife from project development; 3) To provide baseline data for testing environmental effects predictions and the effectiveness of mitigation; 4) To guide further mitigation and adaptive management for reducing unexpected effects.

Cox, Karl
Environment and Natural Resources - South Slave
karl_cox@gov.nt.ca

Permit No: 500102
Region: SS, DC

Species Studied: Wood bison
Location: Fort Providence and Hay River (Bison Control Area between the NWT/Alberta border and the Mackenzie River and Great Slave Lake)

Bison control area program 2012/2013 surveillance season
The goal of the Bison Control Program in the Northwest Territories is to reduce the risk of infection of the Mackenzie and Nahanni-Liard herds with tuberculosis and brucellosis. Objectives of the program are:

- To continue surveillance of the Bison Control Area (BCA).
- To maintain the BCA free of bison and prevent the establishment of any herds within its boundaries.
- To increase public awareness of the Bison Control Program.

Armstrong, Terry
Environment and Natural Resources - South Slave
armstrong_terry@gov.nt.ca

Permit No: 500154
Region: SS

Species Studied: Wood bison
Location: Slave River Lowlands

Slave river lowland's bison population studies
The objectives of this project were: 1) To measure calf, yearling and bull to cow ratios during the post-calving period; 2) To monitor Slave River Lowlands (SRL) bison for the occurrence of anthrax related mortalities in summer; 3) To conduct a census of the SRL bison population.

Branigan, Marsha
Environment and Natural Resources - Inuvik Region
marsha_branigan@gov.nt.ca

Permit No: 500285
Region: GW

Species Studied: Bears
Location: Inuvik and Tsiigehtchic

Bear denning survey for the Mackenzie Valley Fiber Link
The objective of this project was to determine locations of active dens in winter work areas, in the fall of 2014.

Croft, Bruno
Environment and Natural Resources - North Slave
bruno_croft@gov.nt.ca

Permit No: 500118
Region: SA, NS

Species Studied: Caribou
Location: Délîne, South of Great Bear Lake, Keller Lake, and Grandin Lake, all areas between North Slave Region

Monitoring of the Bathurst and Bluenose-east caribou herds
The objective of this project was to continue to acquire location data from satellite collars currently deployed on up to 20 cows on the Bathurst barren-ground caribou herd.

Croft, Bruno
Environment and Natural Resources - North Slave
bruno_croft@gov.nt.ca

Permit No: 500119
Region: NS
Species Studied: Caribou
Location: Bathurst, Bluenose-East and Beverly/Ahiak caribou ranges

Bathurst, Bluenose-East and Beverly/Ahiak caribou health, condition and contaminants monitoring
The objectives of this project were: 1) To collect basic information on the health, diseases and parasites of Bathurst, Bluenose-East, Beverly, and Ahiak barren-ground caribou to assess current status and monitor trends over time; 2) To collect basic information on body condition of caribou on the Bathurst, Bluenose-East, Beverly and Ahiak range during the fall and winter, which can be used to assess nutritional status and pregnancy rates; 3) To collect information on the presence of environmental contaminants in caribou, and to assess current exposure and trends over time; 4) To compare this information to previous information from the Bathurst, Bluenose-East, Beverly and Ahiak caribou herds and other caribou herds across the north using a standardized protocol developed by the Circum Arctic Rangifer Monitoring and Assessment Network (CARMA) and previous collections by the Department of Environment and Natural Resources (ENR).

Callaghan, Kristen
Gwich'in Renewable Resources Board
KCallaghan@grrb.nt.ca

Permit No: 500257
Region: GW
Species Studied: Dall sheep
Location: Northern Richardson mountains

Dall's sheep aerial survey in the Richardson Mountains
The objective of this study is to estimate population abundance of Dall sheep in the northern Richardson Mountains and sex/age structure.

Davison, Tracy
Environment and Natural Resources - Inuvik Region
tracy_davison@gov.nt.ca

Permit No: 500145
Region: IN
Species Studied: Muskox and caribou
Location: Banks Island

Banks Island muskox and caribou population survey
The objective of this study is to update the population estimate for Peary caribou and muskoxen.

Davison, Tracy
Environment and Natural Resources - Inuvik Region

Permit No: 500274
Region: IN
Species Studied: Barren ground caribou
Location: Nalluk

Collaring of barren-ground caribou at water crossings
The objectives for this project were: 1) To collar caribou at water crossings to determine feasibility for the future; 2) Monitoring of caribou movement and range use by GPS collars.

Elkin, Brett
Environment and Natural Resources – Wildlife Division
brett_elkin@gov.nt.ca

Permit No: 500199 **Species Studied:** All wildlife species
Region: IN, GW, DC, NS, SS, SA **Location:** NWT Wide

Wildlife health, condition, stress and genetic monitoring
The objectives of this project were: 1) To determine the cause of sick or dead wildlife found, harvested or handled by hunters, trappers, biologists, wildlife researchers, Renewable Resource Officers, or the general public; 2) To assist hunters and trappers by testing samples from harvested wildlife to determine what diseases or parasites are present, and the implications for their use or consumption; 3) To work co-operatively with hunters, trappers, Renewable Resource Officers, biologists, researchers, wildlife managers and members of the general public to monitor the health and condition of wildlife on an ongoing basis; 4) To identify the types, relative levels and geographical distribution of diseases, parasites and contaminants found in wildlife across the Northwest Territories (NT); 5) To monitor the overall health, condition, and stress in wildlife across the NT; 6) To collect genetic information that will contribute to the understanding and management of wildlife populations; 7) To increase public awareness of wildlife diseases and parasites, contaminants and wildlife health and condition.

Farnell, Richard
Selwyn Chihong Mining Ltd.
rangifer@northwestel.net

Permit No: 500115 & 500223 **Species Studied:** Woodland caribou and moose
Region: SA **Location:** Howard Pass Access Road

Selwyn Project - Howards Pass access road wildlife baseline studies
The objectives of this project were: 1) To support permit applications and the environmental review process; 2) To predict and mitigate effects to the environment and wildlife that may result from project development; 3) To provide pre-development information in support of any future environmental affects monitoring program; 4) To contribute to regional studies for assessing and managing potential cumulative effects.

Fronczak, David
U.S. Fish and Wildlife Service
dave_fronczak@fws.gov

Permit No: 500272 **Species Studied:** Waterfowl
Region: NS **Location:** Mills Lake Marsh

Western Canada cooperative preseason waterfowl banding program - Mills Lake Station
The objective of this project was to preseason band 1,000 mallards (of each cohort) for the combined banding effort within the Northwest Territories.

Gahbauer, Marcel
Kavik-Stantec Inc.
marcel.gahbauer@stantec.com

Permit No: 500195 **Species Studied:** Muskrats
Region: IN **Location:** Along the Inuvik to Tuktoyaktuk highway

Inuvik to Tuktoyaktuk Highway fall muskrat push-up surveys
The objective of this project was to locate muskrat push-ups on those lakes proposed for winter snow removal and/or winter water withdrawal during Year 1 of construction. Information will be used by the project team to avoid and/or mitigate potential project interactions with muskrats and muskrat habitat.

Heck, Darren
MWH Canada, Inc.
darren.heck@mwhglobal.com

Permit No: 500173
Species Studied: Species at risk, caribou, moose, wolverines, beasr, wolve, fur-bearers, waterfowl, breeding birds
Region: SA
Location: Southeast of Norman Wells and southwest of Tulít'a in Husky EL494.

Baseline Wildlife and habitat assessment for Husky Oil Operations – EL 494 (EL462 and EL463)
The objectives of this project were: 1) To collect baseline data on relative abundance of wildlife species at risk and important economic and cultural species; 2) To map habitat types and assess the suitability of these habitats for each targeted species; 3) To use the assessment of habitat suitability to identify important areas for species at risk and important economic and cultural species; 4) To assess and monitor potential project effects on species at risk and important economic and cultural species.

Hodson, Keith
khhodson72@gmail.com

Permit No: 500264
Species Studied: Peregrine falcon
Region: SA, GW, DC
Location: Wrigley, Tulít'a, Norman Wells, Fort Good Hope, and Tsiigehtchic

Bioelectronic monitoring of peregrine falcons along the Mackenzie River, NWT
The objectives of this project were: 1) To determine population status on a yearly survey, second year of study; 2) To "chip" band falcons at nesting sites; 3) To determine age and location of banded birds when they reach breeding age; 4) To determine duration of breeding lifespan; 5) To determine nest site reuse; 6) To determine prey utilized by peregrines.

Hood, Alexandra
De Beers Canada Inc.
alexandra.hood@debeerscanada.com

Permit No: 500201
Species Studied: All wildlife species
Region: NS
Location: Snap Lake Mine area

De Beers Snap Lake Mine annual wildlife effects monitoring program
The objective of this project was: To obtain and determine annual variability of:

- relative abundance, distribution, group composition and behavior of caribou;
- relative activity of grizzly bears;
- relative activity of wolverines;
- presence and production of wolves; and
- presence and production of falcons nesting in the study area.

Kelly, Allicia
Environment and Natural Resources - South Slave
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Permit No: 500106
Region: DC
Species Studied: Boreal caribou
Location: Hay River Lowlands

Boreal caribou trends and habitat use in the Hay River Lowlands
The objectives of this project were: 1) To monitor population demographics: adult female survival, calf production, ten-month calf recruitment, and finite rate of population increase; 2) To document seasonal range use, annual home ranges and fidelity to calving areas; 3) To examine boreal caribou habitat use and selection in relation to natural and human caused disturbance and landscape features.

Kelly, Allicia
Environment and Natural Resources - South Slave
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Permit No: 500111
Region: SS
Species Studied: Bats
Location: Fort Smith area and throughout the South Slave Region

Bat research and monitoring in the South Slave region
The objectives of this project were: 1) To determine bat species diversity in the South Slave region (specifically Kakisa and Fort Smith areas); 2) To establish baseline bat data for key bat areas in the South Slave region; 3) To document known bat overwintering sites (use by bats, temperature/humidity profiles, resource inventories, etc.); 4) To take samples from bats to test for Geomyces destructans (WNS).

Kutz, Susan
University of Calgary

Permit No: 500125
Region: SA
Species Studied: Woodland and barren-ground caribou, moose, muskox
Location: Sahtú Settlement Area

Community-based monitoring of wildlife health phase 2: Stress and pathogens in a changing landscape
The objectives of this study were: 1) to provide baselines on body condition, body size, age, stress and disease for caribou and moose of the Sahtú Settlement Area; 2) to maintian an on-going community-based wildlife health monitoring program; 3) to share knowledge about wildlife health.

Larter, Nic
Environment and Natural Resources - Dehcho
nic_larter@gov.nt.ca

Permit No: 500182
Region: DC
Species Studied: Moose
Location: The Mackenzie and Liard River extended corridor

Moose population monitoring
The objectives of this project were: 1) To monitor the density and distribution of moose in areas north of the Mackenzie River, including the proposed pipeline right-of-way, and areas in the Liard Valley deemed to be important by local First Nations; 2) To derive estimates of cow: calf ratios during early winter in the Mackenzie and Liard Valleys; 3) To collect various biological samples from moose harvested throughout the region in order to address local concerns about the health and condition and the levels of various contaminants found in a primary country food resource.

Larter, Nic
Environment and Natural Resources - Dehcho
nic_larter@gov.nt.ca

Permit No: 5039
Region: DC
Species Studied: Boreal caribou
Location: Dehcho Region

Dehcho boreal caribou collar deployment
The objectives of this study were: 1) to monitor annual calf production, calf survival, and adult survival in order to make annual estimates; 2) to ensure that the distribution of collared boreal caribou covers key areas throughout the range of boreal caribou in the Dehcho region; 3) to determine the calving period and the degree of fidelity of female caribou to calving areas over multiple years in areas with a range of seismic and fire disturbance history; 4) to use location data of female boreal caribou over multiple years overlaid with the current human footprint and wildfires to determine areas of high use and areas of avoidance by female boreal caribou in the landscape, and whether there is a seasonal component; 5) to provide empirical data to determine areas of secure boreal caribou habitat, given the current human footprint, and to compare this to the predictions and robustness of the study completed to predict high value boreal caribou habitats in the Dehcho; 6) to provide empirical data for assisting in the development of range plans as part of the National Recovery Strategy; 7) to provide empirical data for Resource Selection Function (RSF) modeling to assist with assessing important habitat types/areas; 8) to provide current knowledge of boreal caribou ecology to the Dehcho Boreal Caribou Working Group and for use with evaluating land use applications made in the Dehcho; 9) to assess responses of female caribou in relation to their use of space in the landscape as development occurs; 10) to continue to document cause of death of collared animals as the opportunities arise; 11) to continue to document and assess disease and parasites in boreal caribou.

Larter, Nic
Environment and Natural Resources - Dehcho
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Permit No: 5040
Region: DC
Species Studied: Wood bison
Location: Liard, South Nahanni and Kotaneelee River Valleys

Monitoring of the Nahanni wood bison population
The objectives of this study are: 1) to measure calf, yearling, and bull:cow ratios during the post calving period; 2) to monitor annual calf production and estimate overwinter survival of calf bison; 3) to collect biological samples as and when available from harvested animals or those involved in motor vehicle collisions; 4) to document seasonal movement patterns and range use of male and female bison throughout the range, delineate the area used by the population and document animal movement into new areas of the range; 5) to document the frequency of river crossings by collared wood bison; 6) to identify and monitor the presence, movements, and behaviour of bison in communities; 7) to provide empirical data for the community bison working groups and

for use in drafting a management plan for the Nahanni wood bison population; 8) to monitor the Nahanni wood bison population for the presence of brucellosis and tuberculosis.

Lee, Claudine
Dominion Diamond Ekati Corporation
claudine.lee@ekati.ddcorp.ca

Permit No: 500167
Region: NS
Species Studied: Caribou, grizzly bears, wolves, wolverine, upland breeding birds, raptors and foxes
Location: Ekati property

Wildlife Effects Monitoring Program (WEMP)

The objectives of this project were: 1) to monitor the environmental impact predictions and potential effects on Valued Ecosystem Component (VEC) species, and 2) to address key residual environmental risks to wildlife as identified in the environmental impacts review process. There are eight main objectives for the WEMP:

- To monitor caribou;
- To monitor carnivores, including grizzly bears, wolves, wolverine, and foxes;
- To monitor upland breeding birds and raptors;
- To monitor interactions between wildlife and traffic, and assessing success of mitigation efforts;
- To monitor wildlife mortalities and incidents and assessing the effectiveness of mitigation efforts;
- To monitor potential wildlife attractants and assessing the effectiveness of waste management efforts;
- To inspect buildings (i.e., accommodation skirting) and fencing structures at the Dominion Diamond Ekati Corporation and Misery camps for evidence of interaction with or disturbance by wildlife; and
- To monitor wildlife interactions with the Long Lake containment facility.

Lennie, Leighanne
Gwich'in Renewable Resource Board
gwichyarrcb@hotmail.com

Permit No: 500275
Region: GW
Species Studied: Bank swallows
Location: The Mackenzie and Arctic Red River banks around Tsiigehtchic

Bank swallow - Mackenzie and Arctic Red River survey - species at risk stewardship

The objectives of this project were: 1) To encourage involvement in stewardship activities through outreach, education and awareness-building; 2) To increase stewardship-related knowledge and skills of landowners or other groups; 3) To increase knowledge and education on bank swallows within the Gwich'in settlement area; 4) To document colony sites and population numbers of bank swallows around Tsiigehtchic.

Haché, Samuel
Canadian Wildlife Service
samuel.hache@ec.gc.ca

Permit No: 500203
Region: DC
Species Studied: Forest songbirds
Location: Fort Liard area

Long-term population monitoring of songbirds at Fort Liard, NWT
The objective of this project was to count songbirds repeatedly over time to detect any long-term changes to their numbers in the Fort Liard area.

Martin, Pamela
Environment Canada
pamela.martin@ec.gc.ca

Permit No: 500250
Region: NS
Species Studied: Herring gulls
Location: North Arm of Great Slave Lake

Chemicals management plan national wildlife monitoring program
The objective of this project was to assess the toxicological characteristics of local water birds in relation to national data.

McLean, Sarah
DeBeers
sarah.mclean@debeersgroup.com

Permit No: 500217
Region: NS
Species Studied: Caribou, wolverines, grizzly bears
Location: Gahcho Kue project site

Baseline Wildlife Studies for the De Beers Canada Gahcho Kue Mine The objectives of this project were: 1) To further describe the occurrence, relative abundance, distribution, and habitat use of wildlife in the study area; 2) To provide data for testing environmental effects predictions and the effectiveness of mitigation; 3) To guide ongoing mitigation and adaptive management.

Mulders, Robert
Environment and Natural Resources - Wildlife Division
robert_mulders@gov.nt.ca

Permit No: 500235
Region: NS
Species Studied: Wolverines
Location: Daring Lake study area

Wolverine DNA sampling at Daring Lake
The objectives of this project were: 1) To obtain wolverine abundance and density estimates; 2) To obtain demographic data on longer-term changes in the wolverine population.

Obst, Joachim
jobst@ssimicro.com

Permit No: 500248
Region: NS
Species Studied: Songbirds, shorebirds, loons
Location: Daring Lake study area

Climate change impacts on habitats, breeding densities and population trends of tundra birds at Daring Lake
The objectives of this project were: 1) To monitor the impacts of climate change on habitats and population trends of tundra birds; 2) To provide the data for monitoring the state of the environment, education and species conservation.

Polfus, Jean
University of Manitoba
jeanpolfus@gmail.com

Permit No: 500227
Region: SA
Species Studied: Caribou, moose
Location: Sahtú Settlement Area

Caribou Population Study in the Sahtú Region
The objective of this project was to create an assemblage of knowledge by exploring aboriginal and western science descriptions of species variation, population structure, and spatial dynamics.

- Caribou diversity: within the study region caribou belong to three different designatable units: barren-ground, boreal, and mountain.
- Spatial organization of caribou: phylogenetic and population genetic analyses will help delineate and characterize the main population units.
- Traditional knowledge: this study will shed light on how people identify different groups and types of caribou.

Rausch, Jennie
Canadian Wildlife Service
jennie.rausch@ec.gc.ca

Permit No: 500252
Region: IN
Species Studied: Shorebirds
Location: Mackenzie Delta, Queen Elizabeth Islands

Arctic shorebird monitoring program
The objective of this project was to contribute as a part of a larger program called the Arctic Program for Regional and International Shorebird Monitoring (Arctic PRISM). The purpose of the program is to:

- generate population estimates for all Arctic breeding shorebirds;
- produce maps of shorebird distribution and abundance across the North American Arctic;
- identify highest-quality habitats for each shorebird species;
- provide shorebird densities and breeding ecology information at each survey site; and,
- assist local managers in meeting their conservation goals.

Guertin, Daniel
Golder Associates Ltd.
daniel_guertin@golder.com

Permit No: 500260
Region: DC
Species Studied: Caribou
Location: Prairie Creek mine road

Mountain caribou pellet survey
The objective of this project was to determine the presence of caribou along the proposed road in summer and to use this data to estimate the probability of future caribou occurrence.

Robertson, Myra
Canadian Wildlife Service
myra.roberston@ec.gc.ca

Permit No: 500251
Region: NS
Species Studied: Ducks, loons, grebes, geese
Location: Within 400 metres of each side of Yellowknife Highway

Abundance and productivity of waterfowl and other aquatic birds breeding in the boreal forest
The objectives of this project were: 1) To determine factors that limits the size, composition, and productivity of the breeding populations of aquatic birds near Yellowknife; 2) To delineate the distribution of breeding Canada and cackling geese throughout the Northwest Territories.

Sayine-Crawford, Heather
Environment and Natural Resources - Sahtú Region
heather_sayine-crawford@gov.nt.ca

Permit No: 500244
Region: SA
Species Studied: Dall sheep
Location: Katherine Creek and Palmer Lake

Mackenzie Mountain Dall sheep monitoring
The objectives of this project were: 1) To obtain estimates of sex ratios and recruitment rates in both the Palmer Lake and Katherine Creek study areas; 2) To obtain basic biodiversity information about the presence of other species in the study area.

Symes, Stephen
Worley/Parsons Canada Services Ltd.
stephen.symes@worleypersons.com

Permit No: 500262
Region: DC
Species Studied: All ground nesting migratory birds
Location: 30 km NW of Fort Liard

Former Pointed Mountain Gas Fields nest search
The objectives of this project were: 1) To identify nesting locations (if any) of migratory birds at the plant site; 2) To identify nesting locations (if any) of at-risk birds at the plant site; 3) To determine whether nesting individuals will be negatively impacted by activities relating to the construction of a camp used for future remediation activities; 4) To buffer nesting locations with an appropriate species-specific setback based government recommendations (Canada Wildlife Service guidelines); 5) To monitor (if required) nesting birds to ensure construction activities do not negatively impact nesting birds; 6) To identify incidental detections of all wildlife encountered; 7) To submit list of all wildlife species (including nesting breeding birds) to the NWT wildlife database.

Tate, Doug
Parks Canada - Nahanni National Park Reserve
doug.tate@pc.gc.ca

Permit No: 500211
Region: DC
Species Studied: Mountain caribou
Location: Prairie Creek Mine access road alignment and 20 km buffer on either side of the road

Occupancy survey and genetic study of northern mountain caribou in the proposed Prairie Creek road area
The objectives of this project were: 1) To determine current caribou occupancy in the vicinity of the proposed Prairie Creek access road; 2) To compare the results with previous survey work in the area; 3) To use DNA analysis to determine genetic composition of caribou in the Prairie Creek area, in relation to other regional mountain caribou herds and boreal caribou populations.

Thomas, Crystal
Suncor Energy Inc.
crystal.r.thomas@mwhglobal.com

Permit No: 500297
Region: SA
Species Studied: Grizzly bears
Location: 13 km south of Coville Lake

2014 Bear denning survey, Tweed Lake M-47 well re-suspension
The objectives of this study were: 1) to survey for bear dens or signs of denning bears within 800 m of the program area; 2) to observe the potential for bear denning habitat.

Tout, Ann Marie
Enbridge Pipelines (NW) Inc.
annmarie.tout@enbridge.com

Permit No: 500198
Region: DC, SA
Species Studied: All wildlife species
Location: Enbridge Right-of-Way

Wildlife monitoring along the Enbridge Right-of-Way
The objective of this project was to support and encourage community-based programs to document wildlife sightings and wildlife tracks along the Enbridge Right-of-Way.

Wells, David
Diavik Diamond Mines Inc.
david.wells@riotinto.com

Permit No: 500171
Region: NS
Species Studied: Caribou, wolverines, grizzly bears, raptors, waterfowl/shorebirds
Location: Diavik Mine site

Wildlife monitoring program for the Diavik Diamond Mine
The objectives of this project were: 1) To verify the accuracy of the predicted effects determined in the Environmental Effects Report (Wildlife 1998) and the Comprehensive Study Report (June 1998); 2) To ensure that management and mitigation measures for wildlife and wildlife habitat are effective in preventing significant adverse impacts to wildlife.

Wood, Cindy
Canadian Wildlife Service
cindy.wood@ec.gc.ca

Permit No: 500259
Region: NS, SS
Species Studied: Ducks, waterfowl
Location: North and South Slave regions

Canadian barrenlands breeding sea duck survey in the Northwest Territories
The objective of this project was to determine the extent of breeding area and relative breeding densities for black scoters and other waterfowl species.

Wood, Cindy
Canadian Wildlife Service
cindy.wood@ec.gc.ca

Permit No: 500246
Region: IN
Species Studied: Waterfowl
Location: Mackenzie Valley region

Cooperative waterfowl population surveys in the Northwest Territories
The objective of this project was to determine the species, number of ducks and other waterfowl in the Mackenzie River drainage during the breeding season.

Zimpfer, Nathan
U.S. Fish and Wildlife

Permit No: 500273
Region: SA
Species Studied: Waterfowl
Location: Willow Lake

Western Canada cooperative waterfowl banding program at Willow Lake, Sahtú Settlement Area, NWT, 2014
The objective of this project was to band 2,000 mallards, 2,000 northern pintails and all incidentally captured waterfowl (preferably 1,000 per species), prior to the opening of duck hunting season (September 1 annually).

Fisheries Permits

Blackie, Craig
De Beers Canada Inc.
craig.blackie@debeersgroup.com

Licence Number: S-14/15-3007-YK-A1
Species: All fish species **Location:** Kennady Lake

Gahcho Kué Project - Kennady Lake fish out
De Beers Canada Inc. (De Beers) proposes to develop a diamond mine at Kennady Lake, Northwest Territories (NWT). To access the ore-bodies, the main basins of Kennady Lake (Areas 2 to 7), will need to be dewatered, as well as a small unnamed lake (Lake D1) within the watershed. Dykes will be built at the narrows between Area 7 and 8 of Kennady Lake and to divert the upper watersheds. A fish-out will be necessary to remove fish from the areas that will be dewatered. De Beers has submitted an Application for Authorization for Works or Undertakings Affecting Fish Habitat for the Gahcho Kué Project to DFO.

The objectives of the fish-out of Areas 2 to 7 of Kennady Lake and Lake D1 are as follows: 1) to engage local communities and ensure that fish harvested during the fish-out are fully utilized by northern communities; 2)to collect additional ecological information (biological, limnological, and habitat) on the lakes during the fish-out; and 3) to remove all fish from Areas 2 to 7 of Kennady Lake and Lake D1 prior to development of the Project.

Note that the previous licences for the Gahcho Kué Project (i.e., 2013 and previous years) were for baseline fish and fish habitat sampling, as De Beers has been conducting baseline sampling in the area for more than six years.

Blackie, Craig
De Beers Canada Inc.
craig.blackie@debeersgroup.com

Licence Number: S-14/15-3014-YK-A3
Species: Arctic grayling **Location:** Kennady Lake watershed

Gahcho Kué Project - Arctic grayling movement baseline
The objectives of this study were: 1) to assess the timing and duration of fish (e.g. spawning Arctic grayling) movement into streams downstream of the proposed Gahcho Kue mine and correlate that with hydrological data. This will inform what supplemental flow is required during mine operations to protect the downstream environment; 2) broader (i.e. watershed level) movements of grayling; 3) where grayling overwinter in the Kennady Lake watershed; and 4) habitat occupancy of young of year grayling in stream habitats downstream of Kennady Lake.

Blanchfield, Paul
Fisheries and Oceans Canada
paul.blanchfield@dfo-mpo.gc.ca

Licence Number: S-14/15-3008-YK
Species: Burbot, northern pike, lake trout **Location:** Alexie Lake

Habitat use of predatory fish species in an NWT lake, with a focus on spawning and over-wintering
The objective of this study was to quantify habitat use of fish species that contribute to commercial, recreational and aboriginal fisheries in a northern boreal lake. While the study primarily focuses on lake trout, with an emphasis on quantifying critical habitat such as spawning and over-wintering areas, we also examine interactions with potential top-predator competitors (northern pike and burbot). This research is directly associated to fish habitat compensation initiatives and regulatory decision making for northern developments. The results will provide the foundation for more investigations on predatory fish habitat in the future and is critical if we are to better understand, predict, and mitigate the potential impacts of industry to fish and fish habitat. The research will also provide a rich data set to hypothesize and model on the effects of climate change to cold-water fish species such as lake trout in northern lakes, which are predicted to be most severely affected by climate change.

Byrne, Geraldine
Northwest Territories Power Corporation
gbryne@ntpc.com

Licence Number: S-14/15-1034-NU
Species: All species (excludes marine mammals) **Location:** Taltson River System

Taltson Twin Gorges Hydro Generating Facility Aquatic Effects Monitoring Program
The Northwest Territories Power Corporation (NTPC) is required to conduct an Aquatic Effects Monitoring Program under the terms of Water License MV2011L4-0002. As part of the AEMP, NTPC will be conducting the following studies in 2014:

Trudel Creek and Lower Taltson River Fish Stranding Monitoring: Studying the potential for fish to become stranded during the annual maintenance rampdown in Trudel Creek and lower Taltson River.

As a component of the Trudel Creek and Lower Taltson River Fish Stranding Monitoring Program field crews will be prepared to salvage and relocate fish that become isolated or stranded during the rampdown event. Salvaged fish will be identified to species and enumerated. A sub-sample of each species and age class (n = 30 max) will be measured and weighed and have aging structures (e.g. fin rays, scales) collected to provide basic fish community data. (e.g. weighed, measured, sampled).

Chetelat, John
Environment Canada
john.chetelat@ec.gc.ca

Licence Number: S-14/15-1033-NU-A2
Species: All fish species
Location: Yellowknife Bay, Great Slave Lake

Cumulative impacts monitoring of aquatic ecosystem health of Yellowknife Bay, Great Slave Lake
The ecosystem health of Yellowknife Bay has been impacted by historical mining releases of metals (particularly arsenic), as well as long-range atmospheric transport of metals such as mercury from far-away human emission sources. There is local concern over arsenic exposure from legacy pollution and more recent observations of increasing mercury levels in fish of Great Slave Lake. This project will contribute to cumulative impact monitoring by: 1) characterizing environmental processes that are potentially driving the increasing trends in metal bioaccumulation; and 2) estimating the relative contributions of different sources and pathways to total metal loadings to the study aquatic ecosystems.

Darwish, Tamara
Golder Associates Ltd.

Licence Number: S-14/15-1028-NU
Species: Round whitefish, cisco, lake trout, northern pike, arctic grayling, lake whitefish
Location: Lac de Gras Area, Lac du Sauvage

Diavik Diamond Mines Inc. Aquatic Effects Monitoring Program - Non-lethal mercury in Lake Trout
In association with the annual Diavik Mine Aquatics Effects Monitoring Program (AEMP) on Lac de Gras, Diavik Diamond Mines Inc. (DDMI) will complete non-lethal tissue sampling in Lake Trout. The samples will be analyzed for mercury, and the data will be used to assess mercury concentrations in large-bodied fish in Lac de Gras and Lac du Sauvage.

Eggers, Kelly
Fisheries & Oceans
Kelly.Eggers@dfo-mpo.gc.ca

Licence Number: S-14/15-3031-YK
Species: Lake whitefish, cisco
Location: Bluefish Lake, Tartan Rapids (Yellowknife River)

DFO Yellowknife River Tartan Rapids cisco monitoring
The objective of this study was to assess the timing and duration of the spawning migration, determine spawning locations and take a sub-sample of fish throughout the run and process for fish health, length, weight, and age.

Evans, Marlene
Environment Canada
marlene.evans@ec.gc.ca

Licence Number: S-14/15-1036-NU
Species: Lake trout, burbot, northern pike
Location: Great Slave Lake Area

Spatial and long-term trends in persistent organic contaminants and metals in fish from the NWT
The objective of this study was to investigate whether contaminant levels are changing in fish in the Northwest Territories with a focus on Great Slave Lake which has been studied since the early 1990s. The plan was to collect lake trout from Great Slave Lake (Hay River area and ŁutselK'e area. The study also collected burbot from the ŁutselK'e and Fort Resolution areas of Great Slave Lake, and northern pike from the Fort Resolution area of Great Slave Lake.

Evans, Marlene
Environment Canada
marlene.evans@ec.gc.ca

Licence Number: S-14/15-3032-YK
Species: Cisco, lake trout **Location:** Great Bear Lake

Monitoring of mercury, flame retardants and other chemicals in lake trout and cisco from Great Bear Lake
The objective of this study was to determine the levels of contaminants of concern in lake trout and cisco from Great Bear Lake. Previous data exists for some of these contaminants (Hg, etc.), so we will be able to determine whether contaminants levels are changing over time.

Gallagher, Colin
Fisheries and Oceans Canada
colin.gallagher@dfo-mpo.gc.ca

Licence Number: S-14/15-3033-YK
Species: Walleye **Location:** Tathlina Lake

Assessment of walleye in Tathlina Lake 2014
The objective of this study was to collect fisheries information to use in a population assessment of walleye from Tathlina Lake. Walleye have been periodically sampled in past years to collect information to characterize life history and population status. The fishery for walleye has been identified as a regional priority for DFO Fisheries Management.

Harwood, Lois
Fisheries and Oceans Canada
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Licence Number: S-14/15-1027-NU
Species: Bowhead whale **Location:** Beaufort Sea (Offshore)

Bowhead whale tagging - Beaufort Sea 2014
The objective of this study was to place satellite-linked transmitters and acoustic instruments on bowhead whales to determine movements, feeding areas, diving behavior, residence times, and behavior in the vicinity of seismic operations or other industrial noises. Acoustic tags will provide bowhead whale call rates relative to ambient noise.

Harwood, Lois
Fisheries and Oceans Canada
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Licence Number: S-14/15-3010-YK
Species: Bearded seal, ringed seal
Location: Ulukhaktok Area - Coastal Marine Waters

Ulukhaktok harvest based monitoring of ringed and bearded seals
The objectives of this study were: 1) to assess reproduction, condition disease and contaminants of ringed seals and bearded seals through harvest-based monitoring at Ulukhaktok, NT, 2012; 2) to sample and measure ringed seals taken in the annual harvest in the Ulukhaktok area, using reproductive status and body condition as indicators of ecosystem productivity and fluctuations in the seal population; 2) to examine the aspects in objective 1 in the context of regional ice conditions; to co-ordinate with, and provide samples for, diet and stock health studies, such as disease, particularly relevant given the UME in Alaska, NWT, Nunavut and Russia; and 3) to sample and measure any bearded seals that happen to be taken in the annual harvest in the Ulukhaktok areas, to examine reproductive rates, growth, condition and prey preferences.

Howland, Kimberly
Fisheries and Oceans Canada
kimberly.howland@dfo-mpo.gc.ca

Licence Number: S-14/15-1030-NU
Species: Dolly varden
Location: Big Fish River, Babbage River, Firth River, Joe Creek

Population studies on Dolly Varden from the NT & Yukon North Slope
The objectives of this study were: 1) to conduct mark recapture studies (live-sample): recapture tagged Dolly Varden in the Big Fish and Babbage rivers, and then tag Dolly Varden from the Big Fish River, Babbage River, Firth River and Joe Creek; 2) to apply 10 satellite tags and 20 radio tags to anadromous Dolly Varden from the Big Fish River; 3) to dead-sample small-sized anadromous Dolly Varden in spawning condition; 4) to dead-sample 20 resident Dolly Varden from the Big Fish Babbage, Firth rivers and Joe Creek during the fall in order to obtain biological information such as length, weight, age, sex and maturity and diet, and tissue samples for mercury analysis; and 5) to sample subsistence catch of Dolly Varden for biological information at Herschel Island and Ptarmigan Bay, Yukon.

Howland, Kimberly
Fisheries and Oceans Canada
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Licence Number: S-14/15-3023-YK
Species: Arctic char
Location: Darnley Bay

Arctic char monitoring in Darnley Bay NT, 2014
The objectives of this study were: 1) to maintain char monitoring project and continue to provide information on status and life history of Arctic char captured at the mouth of the Hornaday and Lasard Creek; 2) to confirm the identification of 'blue char' captured near Tippi (western Darnley Bay); 3) to continue to provide important support information for the formulation, delivery and compliance of the Paulatuk Char Management Plan; and 4) to collect water quality information, benthic and pelagic invertebrates from Darnley Bay.

Howland, Kimberly
Fisheries and Oceans Canada
kimberly.howland@dfo-mpo.gc.ca

Licence Number: S-14/15-3026-YK
Species: Lake trout **Location:** Great Bear Lake

Long-term monitoring of cumulative impacts to fisheries and ecosystem in Great Bear Lake
The objectives of this study were: 1) to monitor size and age structure, fecundity (egg number per female), growth and mortality of lake trout populations from Dareli (Keith), Turili (McVicar), Kwit tla (McTavish), Tugacho (Dease) and Tirato (Smith) Arms of Sahtú (Great Bear Lake). These data will be used for stock assessment purposes and to follow changes in the biological characteristics of lake trout stocks over time; 2) to examine the morphological, meristic and life history characteristics of archived ciscos collected from Great Bear Lake over the past 7 years to test the hypothesis that there are multiple forms/species including shortjaw; and 3) to measure ecosystem components of Great Bear Lake that influence fish productivity such as limnological parameters, quantify diversity and density of benthic and pelagic aquatic invertebrates, and nearshore terrestrial invertebrates.

Howland, Kimberly
Fisheries and Oceans Canada
kimberly.howland@dfo-mpo.gc.ca

Licence Number: S-14/15-3027-YK
Species: Dolly varden, arctic grayling **Location:** Rat River (Fish Creek)

Biological investigation of Dolly Varden and Arctic grayling from the Rat River
The objectives of this study were: 1) to conduct a harvest-based monitoring program to obtain tag returns, and collect catch-effort and biological information; 2) to obtain biological data of anadromous Dolly Varden captured at the spawning/overwintering area of the Rat River (Fish Creek) during the fall (live-sample); 3) to collect dead-samples of the resident life history of Dolly Varden to record biological information; and 4) to collect dead-samples of Arctic grayling in order to obtain biological information.

Howland, Kimberly
Fisheries and Oceans Canada
kimberly.howland@dfo-mpo.gc.ca

Licence Number: S-14/15-3030-YK
Species: Arctic char **Location:** Fish Lake

Assessment of Arctic char stock from Fish Lake
The objectives of the study were: 1) to collect catch and biological information in order to monitor stock status of Arctic char in Fish Lake; and 2) to develop a time series of information to use in a model to predict the response of the population to harvest.

Insley, Stephen
Wildlife Conservaton Society (WCS) Canada
sinsley@wcs.org

Licence Number: S-14/15-3016-YK
Species: Bearded seal, ringed seal **Location:** Amundsen Gulf

Darnley Bay seal monitoring
The objective of this study was to design and maintain a long-term, locally-based, monitoring program focused on ringed seals (Pusa hispida) and bearded seals (Erignathus barbatus) in the Darnley Bay region, ISR (Inuvialuit Settlement Region), NT. The goal of the first season (current permit application) is to conduct a pilot season from which the results will be used to determine the specific methodology moving forward. There are two main objectives involving both ringed and bearded seals: 1) to monitor local population trends and area usage; and 2) to monitor seal diet and condition.

Johnson, Jim
Fisheries and Oceans Canada
jim.johnson@dfo-mpo.gc.ca

Licence Number: S-14/15-3025-YK
Species: All fish species **Location:** Darnley Bay

Darnley Bay nearshore fish survey
The objective of this study was to conduct nearshore fish survey along the west side of Darnley Bay; the targeted sampling sites are Brown's harbour and Bennett Point, weather and ice permitting, with some additional sampling at Tipititiukak. The objective of the study was to determine what species of fish are found in the area, to collect basic biological information from a relatively small number of these fish, and to collect tissue samples from an even smaller number of deadsampled fish for follow-on laboratory analyses. A limited assessment of the environmental conditions (water temperature, salinity, substrate type, associated plant life) will also be undertaken. These data and biological samples will be utilized by a number of linked projects and initiatives. It is not the purpose of this study to collect large numbers of fish to determine detailed population parameters for the fish community inhabiting these waters.

Lea, Ellen
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Licence Number: S-14/15-1061-NU
Species: Dolly varden (searun) **Location:** Little Fish River

Big Fish River Dolly Varden harvest sampling 2014
The objective of this study was to conduct a harvest-based sampling program to obtain tag returns, and collect catch-effort and biological information of Big Fish River Dolly Varden char from a subsistence harvest licenced to the Aklavik Hunters and Trappers Committee by an Aboriginal Communal Fishing Licence.

Lea, Ellen
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Licence Number: S-14/15-1062-NU
Species: Inconnu **Location:** Marian Lake, Great Slave Lake Area

Great Slave Lake inconnu sampling

The objective of this study was to collect DNA and other biological samples from Inconnu from different areas of Great Slave Lake to learn more about the natal stocks contributing to the overall harvest.

Lea, Ellen
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Licence Number: S-14/15-3017-YK
Species: Arctic char **Location:** Ulukhaktok Area

Ulukhaktok summer coastal harvest monitoring 2013
The objective of this study was to collect harvest and biological information from the summer coastal subsistence Arctic char harvest by the community of Ulukhaktok. The information that will be collected by the monitors is an integral part of the community fishing management plans that are established between the Olokhaktomiut Hunters and Trappers Committee, Fisheries Joint Management Committee, and the Department of Fisheries and Oceans Canada.

Loseto, Lisa
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Licence Number: S-14/15-3020-YK
Species: Beluga whale **Location:** Darnley Bay, Shingle Point, Kugmallit Bay, Kendall Island

Assessment of health in beluga whales through harvest-based monitoring
In partnership with FJMC and Oceans support the development and maintenance of long term monitoring and sampling of beluga in the Tarium Niryutait Marine Protected Area (TN MPA); 2) Use Hendrickson Island as the main sampling site and support growth at other community beluga hunt locations (e.g. East whitefish, Kendall Island, Shingle Point); 3) Support beluga sampling efforts in the proposed MPA in Darnley Bay in partnership with the Paulatuk HTC and FJMC; 4) Use the information to provide a baseline of the natural variability. This is needed to be able to assess potential impacts at the regional scale (e.g. climate change) and localized scale (e.g. oil and gas activities); and 5) Build capacity for science and long term monitoring for beluga health in the Inuvialuit Settlement Region.

Low, George
Dehcho AAROM
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Licence Number: S-14/15-1032-NU
Species: All fish species **Location:** Dehcho Region Lakes

The bio-magnification of mercury within fish species of the Dehcho and their varying levels among lakes
The objectives of this study were: 1) to determine why fish mercury levels vary among lakes in the Dehcho region; 2) to identify best predictors of fish mercury levels; and 3) to determine which fish have the lowest levels of mercury and highest levels of micro-nutrients and fatty acids.

Low, George
Dehcho AAROM

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Licence Number: S-14/15-3002-YK
Species: Walleye, northern pike, lake trout, lake whitefish, longnose sucker, burbot
Location: Trout Lake, Kakisa Lake Tathlina Lake Fish Lake, Greasy Lake, Little Doctor Lake, Cli Lake

Updating data on mercury levels in food fish in lakes used by Dehcho communities
The objective of this study was to update data on mercury levels of certain fish in Dehcho lakes that have shown elevated levels in previous studies. This project will also determine if any other traditional fishing lakes are affected. The data from this project will also be used by scientists to help determine which factors are leading to increases of mercury in fish. It is also an objective of this study to provide traditional knowledge data on which lakes and fish species are being used for subsistence by the first nations.

Low, George
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Licence Number: S-14/15-3003-YK
Species: Arctic grayling
Location: Providence Creek

Enhancement and monitoring of arctic grayling spawning habitat at Providence Creek
The objectives of this study were: 1) to enhance Providence Creek to increase arctic grayling (Thymallus arcticus) spawning habitat. This will be done by removing beaver dams which have been shown to decrease usable spawning habitat, and to create new spawning habitat with gravel and boulders; and 2) to monitor the arctic grayling population to determine if the enhancement has increased usable spawning habitat; this will be done by putting a fish box in to count and sample fish going upstream. Visual observations of where the fish are spawning will also be done.

Machtans, Hilary
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Licence Number: S-14/15-3000-YK
Species: All fish species
Location: Snap Lake

De Beers Snap Lake Mine AEMP
The objective of this study was to conduct a fish sampling program required as part of DeBeers Snap Lake Mine's Aquatic Effects Monitoring Program (AEMP) under its Water Licence. A Special Study was initiated after the 2011 downstream reconnaissance work to determine the extent of downstream movement of the treated effluent plume into three lakes immediately downstream of Snap Lake. For the purposes of this special study the three lakes that are successively more downstream of each other, are referred to as DSL1, DSL2 and Lac Capot Blanc. Although treated effluent measured as elevated conductivity has been detected throughout DSL1 and DSL2, it is restricted to the far western end of Lac Capot Blanc near the inlet. Studies of water quality, sediment quality and plankton were completed in 2011, 2012 and 2013 for the Downstream Lakes Special Study and these studies will be repeated in 2014. In addition a fisheries assessment and benthic invertebrate program are proposed for 2014. The objective of these programs is to determine the nature of the aquatic community in each of the three lakes and their current conditions and to provide a basis for assessing future changes within each of the lakes. The specific objectives for 2014 are as follows: 1) compare the community composition and fish

metrics (e.g., growth, age of maturity) of fish species resident in each of the three downstream lakes (i.e., DSL1, DSL2, and Lac Capot Blanc) using a broad scale community monitoring (BsM) sampling protocol; 2) evaluate the fish tissue chemistry (e.g., trace metals) status of Lake Trout and Round Whitefish from each of the three downstream lakes relative to existing human consumption guidelines; 3) conduct monitoring of the lower food chain including phytoplankton, zooplankton, benthic invertebrates, and periphyton on each of the three downstream lakes as well as Snap Lake, Northeast Lake, and Lake 13; 4) conduct spring fish surveys of inlet and outlet streams of Snap Lake, and the three downstream lakes; and 5) conduct fish presence/absence study and fish habitat survey of IL2, IL8, and Stream 28 during the open-water season.

MacLatchy, Deborah
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Licence Number: S-14/15-3029-YK
Species: Emerald shiner, spottail shiner **Location:** Fort Smith area, Salt River

Development of small bodied fish species as a biomonitoring tool to detect environmental change
The objective of this study was to determine the feasibility of using small-bodied fish species in the Slave River for biomonitoring of cumulative impacts and local environmental contamination.

Maier, Kris
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Licence Number: S-14/15-1039-NU
Species: Dolly varden **Location:** Fish Creek (67 44'N 67 54'W)

Examination of distribution and density of juvenile Dolly Varden in Fish Creek
The objective of this study was to utilize electrofishing in order to improve the understanding of juvenile Dolly Varden habitat use, distribution, and recruitment. The information collected will be useful to quantify the preferred habitats for this life stage which are poorly known and utilize the results from density estimates as a proxy for recruitment and a possible future indicator for relative abundance. This information is critical to improving management decisions made by the RRWG for the Rat River char stock.

Mason, Kristine
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Licence Number: S-14/15-3012-YK
Species: All fish species **Location:** Lac du Sauvage

Dominion Diamond Ekati Corporation baseline study in Lac du Sauvage Area
Golder Associates Ltd. will be continuing the fish and fish habitat baseline studies in Lac du Sauvage and surrounding waterbodies on behalf of Dominion Diamond Corporation. The overall objective is to complete follow-up investigations that reliably describe baseline conditions for fish, benthic invertebrate, and plankton communities in the Study Area.

Supplemental catch data with gill netting near the proposed footprint location of Lac du Sauvage; the primary objective is to reliably describe community composition and species relative

abundance using a statistically robust number of short-duration gill net sets for a large lake (n = up to 60-80 sets); a secondary objective is to use the catch data to assist with descriptions of life history statistics, and for 2014, we expect catch up to 200 individuals of target species such as Lake Trout and Lake Whitefish for these statistics.

Fish sampling in the Ac sub-basin lakes and streams using a variety of methods (e.g., short-duration gill netting, angling, backpack electrofishing, minnow trapping); the primary objective is to confirm species presence/absence, followed by the objective of describing life history statistics using the catch data.

McGeer, Jim
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Licence Number: S-14/15-3028-YK
Species: Water fleas, amphipods

Location: Pontoon Lake, Cameron River, Tibbitt Lake, Thor Lake, Stagg River, Frame Lake, Baker Creek

Understanding the potential impact of rare earth elements to aquatic invertebrates in the NWT

The objectives of this study were to evaluate the relative sensitivity of northern aquatic invertebrates and northern ecosystems in comparison to southern species and environments. The focus of comparisons is in relation to the toxicity of rare earth elements. All of the research activity is lab based (at WLU). The permit request is to collect a few local strains of Hyalella azteca and Daphnia so that they can be brought back to the lab and cultured.

McPherson, Morag
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Licence Number: S-14/15-3022-YK
Species: Arctic grayling

Location: Mac Creek, Placer Creek, Steel Creek, South Lened Creek, Zenchuk Creek, Little Nahanni River

Arctic Grayling ecology in the Little Nahanni River watershed

The objective of this study was to improve our understanding of species-habitat relationships for stream salmonids in the Northwest Territories. This project aims to identify the distribution of Arctic grayling and the critical habitat that they require throughout the Little Nahanni watershed, specifically documenting habitat use and seasonal movements of early life-stage Arctic grayling.

Specific objectives were: 1) document spawning and rearing habitat; 2) document baseline habitat reference conditions which can be used to monitor change over time; 3) document seasonal movements by early-life stage Arctic grayling in the Little Nahanni River tributaries and watershed; 4) test the applicability of a distributional monitoring approach to document occupancy of salmonids in northern stream; and 5) identifying a sampling protocol to maximize detection efficiency of Arctic grayling.

Mochnacz, Neil
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Licence Number: S-14/15-3024-YK
Species: Bull trout **Location:** Prairie Creek

Bull Trout ecology in the South Nahanni Watershed
The objective of this study was to improve our understanding of species-habitat relationships for stream salmonids in the Northwest Territories. Bull Trout will be the primary species of interest during this phase of the project; however, other species will also be documented. Specific objectives are: 1) determine the suitability of a distributional monitoring approach to accurately document the occupancy of salmonids in northern streams; 2) test the broad-scale applicability of this approach in the NWT; and 3) develop statistical models to predictively map the distribution of critical salmonid habitat over broad areas and assess impacts to these areas from cumulative stressors.

Morinville, Genevieve
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Licence Number: S-14/15-3005-YK-A1
Species: All fish species **Location:** Pigeon Stream Diversion Channel

Pigeon Stream Diversion Monitoring Program
The objective of this study was to conduct a 10-year post-construction monitoring program developed through DFO Fisheries Authorization #SC99037 in relation to the newly constructed Pigeon Stream Diversion (PSD) channel. There are two main biological components to the studies that will be conducted in 2014: 1) Primary and Secondary Production (i.e., epilithon/periphyton and benthic invertebrates): Characterize Year 1 of post-construction conditions in the PSD channel relative to Pigeon Stream; and 2) Fish: 1) Monitor the use of stream habitat by fish in the Pigeon Stream Diversion Channel (PSD) and in Pigeon Stream, particularly for Arctic grayling; 2) determine migration patterns of Arctic grayling and other fish species occurring between downstream and upstream lake habitats (i.e., Fay Bay and Upper Pigeon Pond A) and Pigeon, in addition to movement occurring between the PSD channel and Pigeon Stream; and 3) compare the biological characteristics of fish utilizing the PSD relative to those in Pigeon Stream.

Panayi, Damian
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Licence Number: S-14/15-3018-YK
Species: All fish species **Location:** Bluefish Lake, Quyta Lake, Prosperous Lake

NTPC Bluefish Hydro Facility mercury and fisheries monitoring
The objectives of this study were: 1) to monitor fish habitat compensation as required by Fisheries Authorization 09-HCAA-CA-00079. This includes verifying the use of the habitat compensation shoal by spawning Lake trout and use by other species (gillnets, electrofishing and minnow traps) and collecting eggs from shoal substrate (egg nets); 2) to monitor fish activity relative to river flows, as per Fisheries Authorization 09-HCAA-CA-00079; 3) to determine the effects of methyl mercury release as a result of flooding the area between the old dam and the new dam as per water licence MV2009L4-0004. Slimy sculpin will be lethally sampled to monitor for potential changes to mercury levels; 4) to study distribution of recently discovered Pygmy Whitefish (a species unknown to the area) and different morphs of Cisco; and 5) to determine the presence of

resident and migrating fish\in the Yellowknife River between Prosperous Lake and Bluefish Lake, as required by the Flow Monitoring Plan, pursuant to Water Licence MV2009L4-0004.

Reist, Jim
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Licence Number: S-14/15-1026-NU
Species: All species (excludes marine mammals) **Location:** Beaufort Sea (Offshore)

BREA-Fishes, habitats and ecosystem linkages to oil and gas development in the Canadian Beaufort Sea
The objective of this study was to address gaps regarding offshore marine fishes and supporting ecosystem components, thereby; 1) increasing knowledge of the Beaufort Sea marine ecosystem, the fishes therein, and the structural and functional relationships to key biota harvested by Inuvialuit; 2) establishing pre-development baselines within which developmental stressors may be assessed; and 3) providing a benchmark within which anticipated future effects of climate change may be assessed in the context of developmental impacts.

Reist, Jim
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Licence Number: S-14/15-3004-YK-A1
Species: Lake trout **Location:** Grassy Lake, Unnamed Lake (L-35 Arctic Gas Report), Unnamed Lake (L-34 Arctic Gas Report), Sitidgi Lake, Wolf Lake, Eskimo (Husky) Lake

Assessment of lake trout genetic diversity and critical habitat within Husky Lakes and the Mackenzi
The objectives of this study were: 1) to assess the current status of lake trout in lakes within the Mackenzie Delta and Husky Lakes drainage, including lakes within the 1km corridor of the Inuvik-Tuktoyaktuk Highway; and 2) to assess the lake trout population connectivity and genetic diversity within this region and assess the importance of freshwater source lakes to the Husky Lakes lake trout population.

Rithaler, John
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Licence Number: S-14/15-3013-YK-A1
Species: All fish species **Location:** Mac Creek, March Creek, Steel Creek, Fork Creek

Fish and fish habitat inventory along the Selwyn Chihong Mine's Access Route
The proponent is proposing to upgrade an existing 80km road to the Chihong mine. This road passes through Sahtú and Dehcho regions, as well as the Nahanni National Park. Our objectives are to conduct fish and fish habitat inventories in areas potentially affected by this road upgrade; typically watercourse crossings and watercourses that run parallel and close to the right-of-way of the road. The objective of the study is to gain an understanding of the fisheries profile through

the study area and identify habitat quality and quantity, identify sensitive habitat types for the species present as well as look for limiting habitat types.

Sarchuk, Jennifer
AECOM
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Licence Number: S-14/15-3011-YK
Species: Slimy sculpin, burbot, arctic grayling, longnose stickleback, lake trout, northern pike, ninespine stickleback
Location: Sandy Lake

Fish spawning survey and baseline construction monitoring program
The objective of this study was to monitor the potential effects associated with the discharge of treated effluent on fish spawning, rearing and feeding activity in downstream habitats and to provide evidence of spawning, rearing and feeding activity in the watercourses downstream of the effluent. Monitoring of potential effects associated with treatment and discharge of mine water effluent will be achieved through observation, larval fish surveys and identification and documentation of habitat use in the downstream system.

Shadwick, Robert
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Licence Number: S-14/15-3019-YK
Species: Beluga whale
Location: Hendrickson Island

Beluga lung and ear health - Hendrickson Island
The objectives of this study were: 1) to study indicators of beluga health, which will lead to increased knowledge about normal function and how disease and human activities may impact belugas in the Western Arctic; and 2) to characterize the normal ear ultrastructural anatomy of beluga and document any structural alterations of the cochlear cells (inner ear trauma), particularly related to man-made noise.

Simba, Melaine
Ka'a'gee Tu First Nation
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Licence Number: S-14/15-1037-NU-A1
Species: Walleye, lake whitefish
Location: Tathlina Lake

Investigating the cumulative impacts of environmental change and human activity in the Tathlina wate
The objective of this study was to assess health, reproductive, and energetic endpoints in walleye at Tathlina Lake, NT to determine potential impacts of environmental change and human impacts on the fish.

Simba, Melaine
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Licence Number: S-14/15-3035-YK

Species: Lake whitefish, walleye **Location:** Tathlina Lake

Investigating the cumulative impacts of environmental change and human activity in the Tathlina wate
The objective of this study was to assess health, reproductive, and energetic endpoints in walleye at Tathlina Lake, NT to determine potential impacts of environmental change and human impacts on the fish.

Tonn, William
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Licence Number: S-14/15-3006-YK
Species: All fish species **Location:** Lac de Gras Area Lakes

Improving habitat connectivity to enhance productive capacity of arctic freshwater ecosystems
Diavik Diamond Mines, Inc. (DDMI) undertook a stream habitat compensation project on Lac de Gras' West Island. The channel of West Island Stream (WIS), a small lake-outlet stream flowing into Lac de Gras, was altered to improve its suitability for fish passage and use as spawning and rearing habitat. Our study is to evaluate the effectiveness of the in-stream habitat manipulations by examining the biotic and abiotic responses to the habitat treatment compared to pre-treatment conditions in WIS and to conditions in reference streams (R6S1, R6S2, and R2S).

Toyne, Melanie
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Licence Number: S-14/15-3001-YK
Species: Inconnu **Location:** Great Slave Lake (Area-I East), Buffalo River Closed Area

Buffalo River inconnu spring sampling
The objective of this study was to conduct long-term monitoring of Inconnu at the mouth of the Buffalo River. Buffalo River Inconnu have been the subject of concern for many years. Data for stock assessment purposes has been collected in periodic years for decades. The last sampling program took place in 2011. In 2013, we once again plan to set gillnets and lethally sample up to 250 Inconnu for biological and CPUE information, to be used to update stock status. (Note: occurrences of by-catch are expected to be minimal to none. The species listed are done so to be cautious) Fish carcasses will be filleted and brought back to the Hay River community for distribution.

Wania, Frank
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Licence Number: S-14/15-3021-YK
Species: Beluga whale **Location:** Tuktoyaktuk

Measuring changes to nutrient and persistent organic pollutant bioavailability from preparing marine

The objectives of this study were: 1) to investigate the impact of common preparation methods on the concentrations of omega-3 fatty acids (FAs) and persistent organic pollutants (POPs) in beluga blubber (muktuk); 2) to discern whether observed phase separation in beluga muktuk results in respective oil and solid phases having significantly different omega-3 FA and POP levels; and 3) to suggest possible beluga muktuk consumption advice for aboriginal Arctic populations, to maximize nutrient intake while minimizing POP exposure.

Zhu, Xinhua
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Licence Number: S-14/15-3015-YK
Species: All fish species **Location:** Great Slave Lake

Monitor and assess cummulative impacts on important fish population productivity and community integrity in the Great Slave Lake

This objectives of this study were: 1) to develop a standard monitoring framework addressing cumulative impacts on major fish population productivity and community integrity. To approach this goal, the team will create methodologies, in accordance with the Cumulative Impacts Monitoring Program Pathways Approach to Protocol Development, to quantify changes in the aquatic environment, fish population index, growth and productivity, species richness and community diversity, and association between abiotic factors and fish populations; set up a framework to integrate information on hydroclimatic dynamics, population biological characteristics, fishing effort, harvest, and social economy; and establish collaborative partnerships between researchers, resource users, Aboriginal community, and decision makers to ensure the effectiveness and representative of Great Slave Lake fisheries and ecosystem; and 2) to construct an operational assessment network for Great Slave Lake fisheries and ecosystem changes to ensure the sustainable exploitation of fisheries production. To accomplish this goal, the team will compare the mesh-specific gear selectivity between single- and multi-mesh gillnet to standardize species-specific population indices, model sustainable population productivity and management tactics for Lake Whitefish under the scenarios of changing exploitation and virgin population biomass, estimate quantities for Lake Whitefish fisheries management, such as total allocable catch (TACs), maximum surplus production (MSP), and precautionary biological reference points (PBRPs); 3) to conduct management strategy evaluation (MSE) for effective utilization while minimizing by-catch effects on Inconnu and Lake Trout; and 4) analyze the association of multi-species interactions (fish community diversity) and environmental parameters.

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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