Compendium of Research in the Northwest Territories 2017

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

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Fisheries and Oceans Canada Pêches et Océans Canada

Northwest Territories Environment and Natural Resources

Northwest Territories Education, Culture and Employment

Foreword

Welcome to the 2017 Compendium of Research in the Northwest Territories. I am pleased to present you with this annual publication which includes plain language summaries of all the licensed research that has taken place in the Northwest Territories. The Aurora Research Institute, the Prince of Wales Northern Heritage Centre, the Department of Environment and Natural Resources and the Department of Fisheries and Oceans have been collaborating to produce this compendium series since 1984.

In addition to the compendium summaries, please check out the ARI's NWT research database for more information about research happening in the Northwest Territories. The NWT Research Database is a publically-available, map-based online resource that can be accessed at data.nwtresearch.com. The Database is continuously updated with new records, and was designed to make information about NWT research more accessible to the people and stakeholders of our territory.

As you look through this Compendium, I encourage you to contact the researchers if there is a project that is of interest to you. The summaries in this publication are only a brief outline of the rich findings and scientific advancements that have been made over the past year.

Pippa Seccombe-Hett
Vice President, Research
Aurora Research Institute

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2017 Licenced Research Projects

Introduction

This compendium offers a summary of research licences/permits that were issued in the Northwest Territories during 2017. The information contained in this book is a product of 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 1984.

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 (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, email or telephone (see address on page viii).

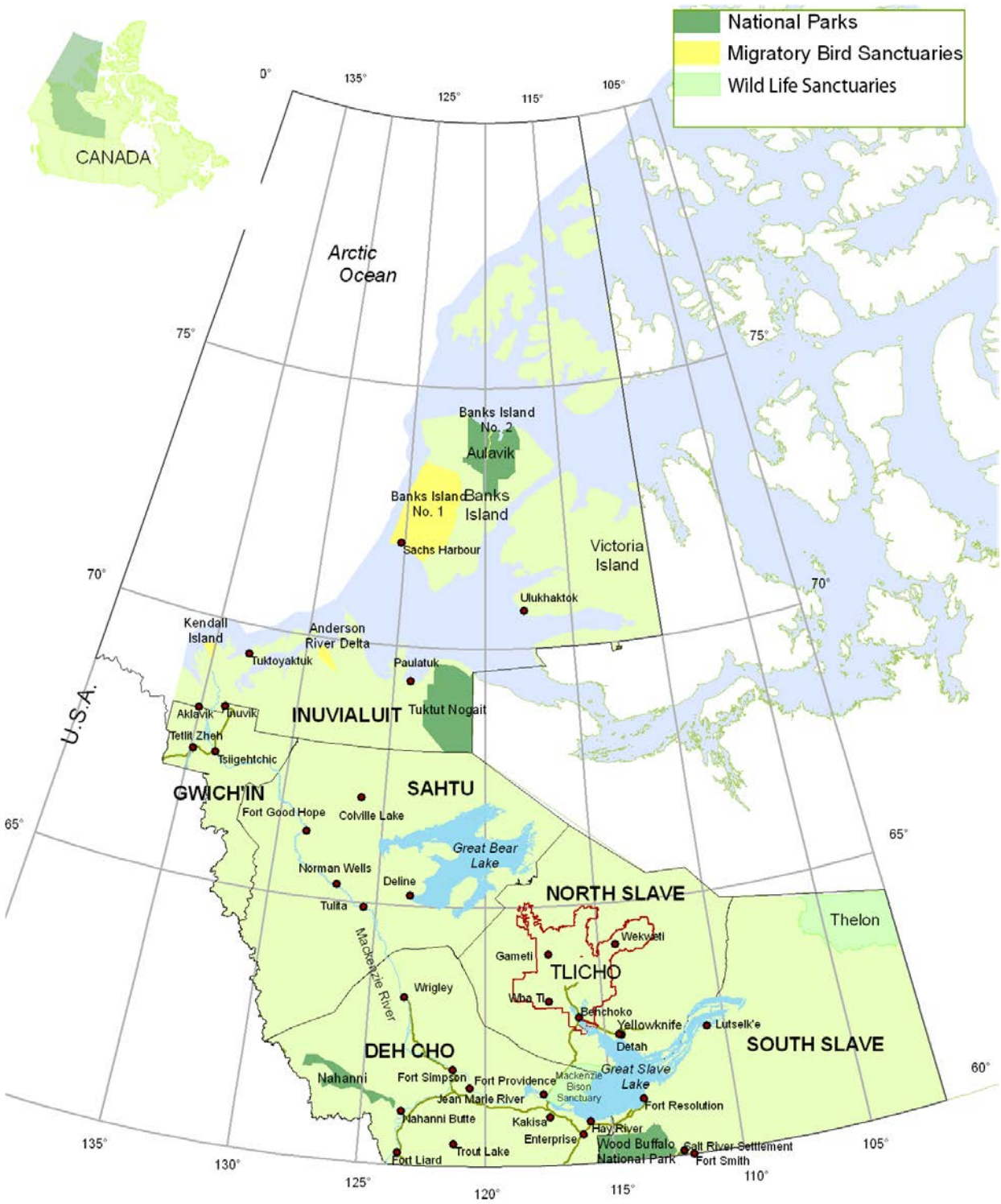

Figure 1. *Land claim regions in the Northwest Territories*

Aurora Research Institute

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

ARI is responsible for:

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

For more information, contact ARI at:

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

Department of Environment & Natural Resources

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

With respect to permitting for research and monitoring, ENR is responsible for issuing Wildlife Research Permits under the Wildlife Act (Section 84) for all studies on wildlife or wildlife habitat in the Northwest Territories. Wildlife includes all vertebrates and invertibrates, except fish and marine mammals.

For more information, contact ENR at:

Wildlife Division
Environment and Natural Resources
Government of the Northwest Territories
PO Box 1320
Yellowknife, NT, X1A 2L9
Fax: (867) 873-0293
Website: enr.gov.nt.ca

Northwest Territories Environment and Natural Resources

Department of Fisheries and Oceans

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

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

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

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

For further information about licensing, contact DFO at:

Licensing Officer
Central & Arctic Region
Government of Canada
Fisheries and Oceans Canada
PO Box 358
Iqaluit, NU, X0A 0H0
Tel: (867) 979-8005
Fax: (867) 979-8039
Email: XCNA-NT-NUpermit@dfo-mpo.gc.ca
Website: dfo-mpo.gc.ca

Fisheries and Oceans Canada | Pêches et Océans Canada

Prince of Wales Northern Heritage Centre

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

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

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

NWT Cultural Places Program
Prince of Wales Northern Heritage Centre
4750 48th Street
PO Box 1320
Yellowknife, NT, X1A 2L9
Phone: (867) 873-7688
Fax: (867) 873-0205
Email: archaeology@gov.nt.ca
Website: pwnhc.ca

Northwest Territories Education, Culture and Employment

Biology

Bihan-Poudec, Anne-Claire
Why Expeditions Association
Concarneau, Bretagne, France
anne-claire@underthepole.com

File No: 12 402 919 **Licence No:** 16148
Region: IN **Location:** Along the Northwest Passage

Under the pole - innovative underwater exploration
No summary available.

Davies, Linda L.
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London, Greater London, United Kingdom
l.davies@imperial.ac.uk

File No: 12 402 916 **Licence No:** 16123
Region: NS **Location:** Yellowknife

Global monograph of the *Hymenogastraceae* family
The main goal of this project is to identify mushrooms from the family of fungi known as *Hymenogastraceae* that have not yet been formally identified in the NWT. The researchers collected six types of mushrooms from the *Hebeloma* genus from a mixed woodland surrounding Frame Lake on August 11th, 2017. By looking at the mushrooms in the field and doing DNA analysis later, they think they found five different species. The researchers are analyzing more of the DNA from the mushrooms to determine what species of fungi they found. There is very little understanding of the diversity and distribution of the *Hymenogastraceae* family in North America because these mushrooms are very hard to tell apart. However, these fungi are essential for forest growth and ecosystems, so it is important to research them. Until the North American species are better understood, it is not possible to give all the mushrooms they collected the right name. If confirmed, three of the mushrooms they collected (*Hebeloma alpinum, Hebeloma clavulipes,* and *Hebeloma grandisporum*) would be new records for the NWT.

Fisher, Jonathan A.
Memorial University of Newfoundland
St. John's, NL
jonathan.fisher@mi.mun.ca

File No: 12 402 913 **Licence No:** 16177
Region: IN **Location:** Dolphin Strait and Union Strait (70°38'28"N, 118°4'30"W)

2017 baseline monitoring of marine productivity and oceanography spanning the Northwest Passage using ships of opportunity
Academic and industry researchers partnered to study marine ecosystems in Canada's Northwest Passage and Atlantic Arctic gateway. The first goal of this project was to identify and measure small marine plants and animals (plankton) that are food for fish and marine mammals in the offshore waters of the Inuvik region. The second goal was to show how commercial ships that travel through the Northwest Passage can be used to monitor plankton and other water properties. The researchers took four plankton samples using a towed device, and one sample using a plankton net, near Ulukhaktok. They identified and counted all the plankton species in the samples and recorded this information, along with water conditions such as temperature and the presence

of plastic debris. Results from the Inuvik region are being compared to samples collected across the Nunavut portion of the Northwest Passage, and have revealed striking differences in plankton abundances across the 2800 miles of sampled waters. Understanding plankton is key to understanding and maintaining healthy marine resources in northern Canada. These results show that having industrial vessels take water samples helps researchers understand more about plankton.

Graham, Mark S.
Canadian Museum of Nature
Ottawa, ON
mgraham@mus-nature.ca

File No: 12 402 783
Region: IN

Licence No: 16172
Location: Pearce Point (69.827N, 122.736W), Paulatuk (69.349N, 124.062W), Fiji Island (70.190N, 125.067W), Baillie Islands (70.654N, 128.220W), Tuktoyaktuk (69.443N, 133.057W)

A coastal, pan-Canadian collection of plants, microalgae, and marine invertebrates for the Canadian Museum of Nature

The main goal of the Canada C3 voyage was to study the plants on the land and tiny plants animals that live in the oceans around Canada. The research ship 'Polar Prince' travelled along the coast between Toronto and Victoria for 150 days between June 1st and October 28th, 2017. From September 5th to 9th, the ship passed along the shores of the Northwest Territories and took samples. The scientific work was integrated with the many other programs taking place during the Canada C3 Project, so the scientific staff often came to shore with other members of the voyage. Some of the work took place close to shore, either from the ship or from a small research boat. The ship stopped at more than 100 sample sites during the 150 days. The researchers are still studying the samples they collected along the way. Studying these samples will help researchers understand more about Canada and the oceans on a large scale. Other researchers outside of the C3 project are also benefitting from the samples for their projects.

Gray, Derek K.
Wilfrid Laurier University
Waterloo, ON
dgray@wlu.ca

File No: 12 402 917
Region: GW

Licence No: 16129
Location: Lakes along the Dempster Hwy between Inuvik and Tsiigehtchic

How will fish communities in Gwich'in and Inuvialuit lakes respond to climate change?

The goal of this on-going project is to understand how fish in Mackenzie Delta lakes respond to climate change. During August of 2017, the team studied 29 small lakes located along the Dempster Highway between Inuvik and Ft. McPherson. For each lake, the research team made underwater maps, collected water samples for analysis, and set up gill nets to count fish. The surface area of the lakes ranged from about a half of a hectare to about 90 hectares (one hectare is about the size of a sports field). Lakes were typically between 0.8 and 10 meters deep. Only ten of the sampled lakes had fish, while the remainder were fishless. Common fish species encountered during sampling included broad whitefish, lake whitefish, northern pike, white sucker, inconnu, and longnose sucker. Fillets collected from common species were sent to a laboratory

to measure levels of mercury and heavy metals. In coming years, the research team hopes to expand the survey to lakes along the new Inuvik to Tuktoyaktuk highway.

Insley, Stephen J.
Wildlife Conservation Society Canada
Whitehorse, YT
sinsley@wcs.org

File No: 12 402 894
Region: IN

Licence No: 15996
Location: Cape Kellett, Johnson Point, Prince of Wales Strait

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

The main goal of this study is to see how increased shipping and the loss of sea-ice will affect marine mammals in the eastern Beaufort Sea. The research team is monitoring noise at the western entrance to the Northwest Passage shipping route, particularly the Amundsen Gulf and area around Banks Island. The emphasis in 2015 was the Sachs Harbour and western Banks Island area. In 2016, the researchers continued working near Sachs Harbour and also recorded ocean sounds near Ulukhaktok. In 2017, the researchers continued recording near Sachs Harbour and Ulukhaktok, and started new recordings near Cape Parry and the Prince of Wales Strait. While they were planning for their 2017 research at Sachs Harbour in the winter and spring, the researchers spoke with the Sachs Harbour Hunters and Trappers Committee (HTC), the Ulukhaktok HTC, and the Paulatuk HTC about their research. They also gave a formal presentation of what they had found out to date. Five trips were conducted during the 2017 season. In July, the researchers found their recording equipment near Sachs Harbour and Ulukhaktok, copied the data from 2016, and replaced the equipment. In July and early August, new recorders were put in the ocean near Browns Harbour, Cape Parry, and Johnston Point and Jesse Bay on the east coast of Banks Island.

Insley, Stephen J.
Wildlife Conservation Society Canada
Whitehorse, YT
sinsley@wcs.org

File No: 12 402 894
Region: IN

Licence No: 16008
Location: Darnley Bay

Darnley Bay seal monitoring

The goal of this on-going project is to design and maintain a long-term, locally-based monitoring program focused on ringed and bearded seals in the Inuvialuit Settlement Region. The 2014 season was the first season of the project, so only a small number of seals were sampled in Darnley Bay during September of that year. The researchers have continued to sample seals each year, and the project has grown to include Darnley Bay, Sachs Harbour, and Ulukhaktok. Researchers have met with the Paulatuk Hunters and Trappers Committee (HTC), the Sachs Harbour HTC, and the Ulukhaktok HTC to discuss the project and answer questions. In November 2016, samples taken from both Sachs Harbour and Darnley Bay in 2016 were shipped to a laboratory in Winnipeg for analysis. The results were similar to those from 2015, and indicated that seals are eating mostly fish rather than invertebrates (invertebrates are small animals like insects, shrimp, mollusks, and worms). One change in 2016 is that seals ate more cod, while in 2015 they ate mostly capelin. The research team is preparing the samples from both communities

so they can be shipped to a lab for analysis. Results are expected early 2018. Fall and winter sampling took place in Ulukhaktok as well.

Kutz, Susan M.
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Calgary, AB
skutz@ucalgary.ca

File No: 12 402 665
Region: IN

Licence No: 16076
Location: Ulukhaktok

Community-based evaluation of muskox health in the Canadian north
This project has two main goals. The first is to integrate traditional ecological knowledge and western science to study the impact of diseases and climate change on muskox population numbers. The second is to see how traditional and local knowledge of Inuit communities can be formally incorporated into the policies that guide regional and territorial wildlife management bodies as they take care of muskox populations and health. After first contacting the community of Ulukhaktok, the researchers conducted 20 interviews between May and September of 2017. The age of participants ranged from 25 to 82 years old, with most between 40 and 60 years old. There were only three women among the interviewees. On average, the interviews lasted between two and two and a half hours. Participants were recruited through the local Hunters and Trappers organizations, or were recommended by people during their interviews. New participants were included until no new information or themes emerged from the interviews. Interviews had some open-ended questions to explore the participants' views and observations on muskox health and ecology. There were also mapping exercises and questions that asked the participants to identify the most important topics about muskoxen.

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File No: 12 402 920
Region: SS

Licence No: 16156
Location: Slave River, Hay River, Slave River Delta

Benthic macroinvertebrate monitoring (Slave and Hay Rivers)
Benthic macroinvertebrates are tiny animals that live at the bottom of rivers. Biologists use them to see how healthy water ecosystems are. However, it can be hard to collect samples of benthic macroinvertebrates from large, fast-flowing rivers. Two different sampling techniques were tested on both the Slave and Hay Rivers to see which one works best in large rivers. First, a total of 24 'Hester-Dendy' samplers were placed in each of the Slave and Hay Rivers in August. These are special plates stacked on top of each other that are left in the water, and to which the benthic macroinvertebrates attach themselves. They were left in the rivers for five weeks. Second, a kick-sampling method was used to collect a total of 30 samples from the Slave River and 25 samples from the Hay River in September. Kick samples are taken by kicking up the sediment on the bottom of the river, where benthic macroinvertebrates live, and taking samples of it. All samples were collected close to each other and near the NT-Alberta border. Water and sediment samples were also collected to check for pollution. All of the samples have been sent to laboratories for analysis and the results will be shared by spring 2019.

Low, George
Dehcho Aboriginal Aquatic Resource and Oceans Management
Hay River, NT
geobarbgeo@hotmail.com

File No: 12 402 857
Region: DC
Licence No: 16133
Location: Horn River (61°28'39.1"N, 118°04'55.0"W)

Horn River creel survey and stock study
The main goal of this study is to understand whether fish in the Horn River are healthy. This will help fish management organizations make good management decisions. During the first year of this three year program, two community guardians and an *Aboriginal Aquatic Resource and Oceans Management* (AAROM) supervisor monitored the Horn River during June and July of 2017. During that time the researchers also conducted interviews with all of the anglers they could reach. The researchers recorded information about the number of fish captured, the number of fish kept, and the time spent fishing. In addition to the interviews, the researchers took samples from 68 walleye to record their sex, maturity, and age to get samples of the Horn River population.

Moore, Jonathan
Simon Fraser University
Burnaby, BC
jwmoore@sfu.ca

File No: 12 402 942
Region: GW
Licence No: 16152
Location: Peel River near Ft. McPherson

Community-based long-term monitoring of the Peel River near Ft. McPherson
Whitefish are an important food fish for communities along the Peel and Mackenzie Rivers, making up over half of the fish caught near Ft. McPherson in the summer. In spite of this there is still a lot about the biology of whitefish that is unknown. In the summer of 2017, the research team worked with harvesters who fish on the Peel River near Ft. McPherson to do a community-based data collection project on broad whitefish. Four harvesters and three youth were given training on how to take measurements and samples of whitefish. The measurements included the weight and length of the fish, and the biological samples included 'otoliths', fin clips, and scales. Otoliths are tiny stones from the fish's ears that provide information about its age and species. Over 370 fish were caught and measured, and samples are now being processed in laboratories at Simon Fraser University and the University of Maine. So far, the researchers have entered information about 150 fish into their database, and the average fish weight is 2.1 kg (about 4.5 lbs) and the average fish length is 502 mm (about 20 inches). Much more information will be available in the coming year as the team studies the age and growth patterns of the fish. They will also identify which parts of the river the fish used during their lifetime.

Pellissey, Jody
Wek'eezhii Renewable Resources Board
Yellowknife, NT
jpellissey@wrrb.ca

File No: 12 402 903
Region: NS
Licence No: 16015
Location: Tłı̨chǫ region

When do caribou return? Impacts of wildfires on tǫdzi (boreal caribou)

Todzi need a lot of continuous and undisturbed land to live on. This allows them to travel, and to use as much of the different types of land as they need. Todzi need muskeg intermixed with valleys, sandy beaches, oxbow streams and rivers, and islands. They need both well-drained and water-logged ground, as well as cliffs and uplands to meet their on-going needs and to maintain a healthy population. This research project suggests that todzi need 100% of their habitat within their range to maintain a healthy population. This is especially true in view of current and possible future habitat loss, degradation, and fragmentation. Threats to their habitat include more frequent, larger forest fires, and increased industrial development and the associated infrastructure like roads and power lines. When managing these threats, it is important to consider all of the previous impacts from industrial development, climate change, and harvesting. Management decisions about todzi need to recognize that humans have relationships with the land and all the beings that live there. Todzi are a key species that indicate the health of the boreal region. Indigenous perspectives and values are essential to truly understand this elusive animal and to make wise decisions to recover, restore, and monitor todzi populations and habitat.

Scharnagl, Klara
Michigan State University
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File No: 12 402 918
Region: DC

Licence No: 16145
Location: Scotty Creek forest dynamics plot (61.3”N, 121.3”W)

Drivers of lichen diversity at different latitudes

This study investigated how many types of lichens are growing on trees in the boreal forest, and how similar or different they are from each other. The researchers went to the Scotty Creek long-term forest monitoring site, where they checked the lichen on 100 trees. At each tree, the amount and types of lichens were recorded. The 100 trees were spruce, larch, birch, and willows. The spruces were the most abundant. From these trees, a total of 26 lichen species were observed. The majority of these lichen species were ‘fruticose’ (brushy-looking, like coral from a reef) and ‘foliose’ (which have lobes and look more like leaves). The number of lichen species per tree ranged from one to ten. Many trees had a lot of different types of lichens growing on them. The diameter of the tree did not seem to affect the number of lichens growing on it. The following seventeen lichen genera were found on trees in this study: *Biatora, Bacidia, Bryoria, Buellia, Caloplaca, Candelaria, Evernia, Hypogymnia, Imshaugia, Lecanora, Melanelia, Parmelia, Parmeliopsis, Ramalina, Tuckermanopsis, Usnea,* and *Vulpicida*. This survey was part of a larger study that investigated patterns of lichen diversity at different latitudes.

Tallman, Ross
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Winnipeg, MB
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File No: 12 402 782
Region: SS

Licence No: 16179
Location: Big Buffalo Lake, Big Buffalo River, and Taltson River

Genetic assessment of inconnu (*Stenodus leucichthys*) in Great Slave Lake, Northwest Territories

The goal of this research project is to determine if there are distinct populations of inconnu (coney) within Great Slave Lake. Inconnu are an important species in the commercial, recreational, and

subsistence fisheries in Great Slave Lake. Inconnu spawn in lakes and rivers around Great Slave Lake, although in recent years some inconnu populations have declined. If inconnu always return to their own spawning grounds, then each river will have a distinct population of inconnu that can be identified from their genes. This will help decision makers take actions that will reverse the decline. This study showed that there are distinct genetic populations in the Mackenzie River, Marian Lake, and Slave River. One area of concern is the Big Buffalo River. The researchers took samples of inconnu in this river in the fall of 2017 for genetic analyses. The Big Buffalo River population shows mixed ancestry, which means they may be from different rivers. The researchers also conducted a traditional ecological knowledge survey with five people to gather more information about inconnu spawning grounds, which will help them do more research on this topic in the future. This research is important for the management of inconnu within Great Slave Lake and will determine about how many inconnu come from each spawning ground.

Trimble, Annika
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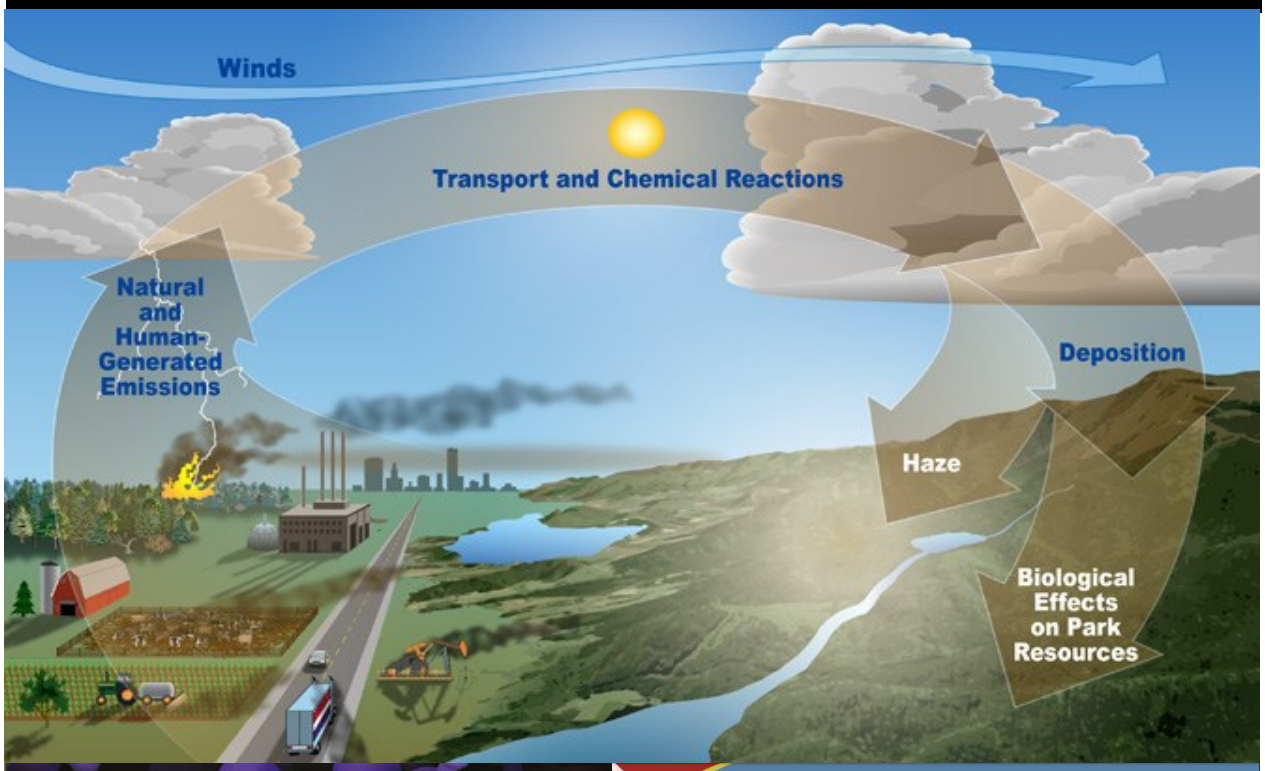
Inuvik, NT
atrimble@auroracollege.nt.ca

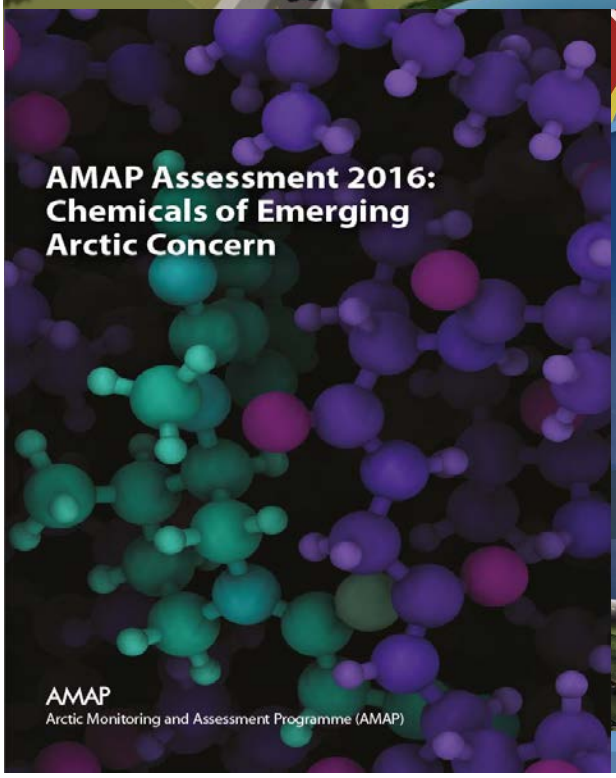
File No: 12 402 733 **Licence No:** 16006
Region: IN, GW **Location:** Inuvik

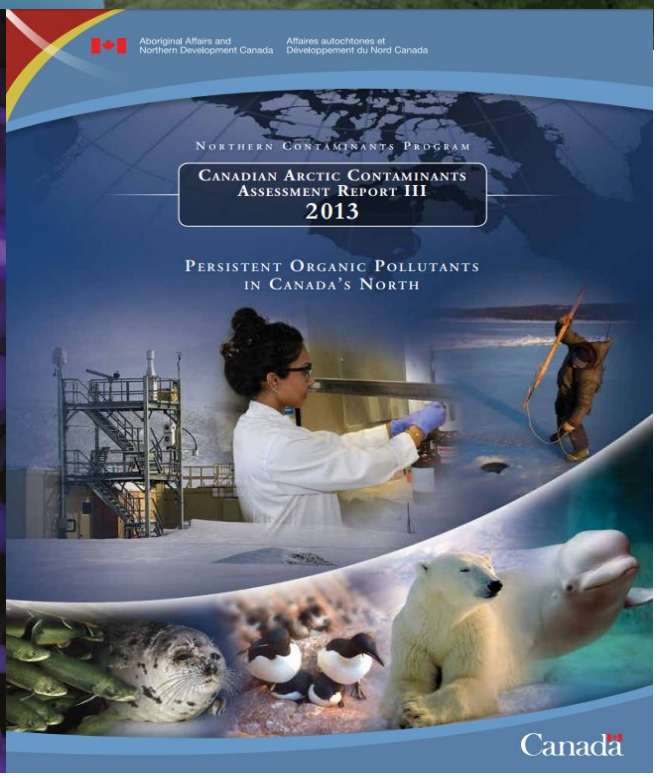
Northern native seed development field trials

The goal of this project is to study how well native plants perform when planted from seed, and to see if native plants can be used in disturbed areas after development has occurred to return the land to a more natural state. The research team seeded and transplanted native plants into field plots in 2006 and 2007. In the future, the researcher will check on the plants to see how well they are surviving the winters, and to see whether the seeds that were planted grew. They will also check overall plant health and productivity. They want to see which plant types are suitable for use in land reclamation on developed land in the NT. Vegetation monitoring did not occur at the field sites in 2017, but data analysis is on-going.

Contaminants







Amuno, Solomon
University of Saskatchewan
Saskatoon, SK
solomon.amuno@gmail.com

File No: 12 402 910 **Licence No:** 16190
Region: NS **Location:** Yellowknife area

Toxic effects of chronic arsenicosis in muskrats and squirrels from Yellowknife
No research was conducted under this licence in 2017.

Blais, Jules M.
University of Ottawa
Ottawa, ON
jules.blais@uottawa.ca

File No: 12 402 847 **Licence No:** 16043
Region: NS **Location:** Lakes and land surrounding Yellowknife

Developing new tools for assessing legacy pollutants and their ecological consequences in lakes near Northwest Territories mines
The goal of this project is to see whether pollution from old, closed-down mines is still in the environment. The researchers, in partnership with the Northwest Territories Cumulative Impact Monitoring Program, took two trips to several lakes around Yellowknife in March and August/September 2017. They checked the water quality and looked for metal pollution by taking water samples from 22 lakes. Samples from the lake water and lake beds were also checked to see how much and what kind of mercury was there. The researchers were also testing how quickly the bacteria in the sediment changed the mercury from one type to another. The researchers also took sediment cores from eight lakes, which contain lake bed sediment from many years ago through to the present. The researchers used the cores to figure out how the amount and toxicity of metals changed as roasting activities at Giant Mine changed. Finally, the researchers checked for arsenic around and in the lakes to see how it moves between plants and animals. These samples are still being processed, but early results from water and sediment samples collected in previous years were presented at the Yellowknife Geoscience Forum in November.

Blowes, David W.
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Waterloo, ON
blowes@uwaterloo.ca

File No: 12 402 843 **Licence No:** 16132
Region: NS **Location:** Giant Mine (62°29'59”N, 114°21'31”W)

TERRE-NET: Controls on the release of contaminants from gold tailings at the Giant Mine, Yellowknife, NT
The objectives of the TERRE-NET research project at the Giant Mine site are to study how arsenic and other toxic chemicals move through the Northwest Tailings Pond, and to see which potential cleanup strategies will work best and minimize environmental impacts in this tailings management area. During the 2017 field season, TERRE-NET researchers placed special instruments in the Northwest Tailings Pond. The instruments gather information about the chemical make-up of the water and how the water flows from one area to the next. Sampling and monitoring equipment were installed in a series of instrument nests. The researchers also collected samples of tailings

solids, groundwater, and the water stored in porous rocks. The samples were shipped to the University of Waterloo to be analyzed in a laboratory. The research team planned to conduct at least one additional sampling trip in 2017. The researchers will use all of the information collected during the sampling trips to better understand how low concentrations of toxic chemicals move through the site.

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File No: 12 402 475
Licence No: 16009
Region: SA
Location: Nota Creek C-17 well site

Phytoremediation study on the CDN forest et al Nota Creek C-17 wellsite
Phytoremediation means using plants to remove contaminants from the soil. As the plants grow, they take contaminants out of the soil and store them in their tissues instead. The purpose of this study is to make sure that the plants growing on an old well site are phytoremediating, or cleaning, the soil. In January and February of 2017, the last of the contaminated soil that was buried at the site was excavated and stockpiled. In mid-June, this stockpiled soil was spread over the site, seeded, and fertilized. In September, people went to collect plant and soil samples, and to harvest the plants that had grown on the site. Laboratory analysis of the soil samples confirmed that the soil had been cleaned to the applicable guidelines. This site therefore does not need any more phytoremediation, and other site closure activities such as contouring the ground and replanting permanent plants can start.

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File No: 12 402 681
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Region: DC, SS
Location: Hay River, Ft. Resolution, Łutselk'e

Spatial and long-term trends in persistent organic contaminants and metals in fish from the Northwest Territories
This study looks at trends in the concentrations of mercury, metals, and persistent organic contaminants (POCs) in lake trout and burbot in Great Slave Lake. POCs, which are no longer being manufactured, are contaminants that break down very slowly in the environment. The lake trout are harvested from the West Basin near Hay River, and from the East Arm at Łutsel K'e. The burbot are harvested from the West Basin at Ft. Resolution. The research team is also looking at trends in mercury concentrations in northern pike harvested at Ft. Resolution and burbot harvested at Łutsel K'e. Mercury concentrations change from year to year, but the research team found that concentrations are not increasing as strongly as they were several years ago. The GNWT Department of Health and Social Services is looking at mercury levels in the fish to see whether consumption advisories are needed. The research team has worked hard to present mercury findings to communities in a clearer manner than in previous communications. The research team developed a new format based on simple, plain language posters which provide a clearer message that mercury concentrations in Great Slave Lake burbot, lake trout, and northern pike are relatively low. These posters were well-received, so the research team has developed and widely shared posters about their past work in other lakes in the Dehcho, Akaitcho, and Sahtú.

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File No: 12 402 900
Region: SA, DC, SS

Licence No: 16021
Location: Colville Lake, Déline, Ft. Good Hope, Norman Wells, Tulita, Ft. Liard, Ft. Providence, Ft. Simpson, Jean Marie River, West Point First Nation, Kakisa

Contaminant biomonitoring in the Northwest Territories Mackenzie Valley: investigating the links between contaminant exposure, nutritional status, and country food use

The overall objective of this on-going project is to promote country foods in the Mackenzie Valley in a way that balances contaminant risks and nutrient benefits. To reach this objective, the research team is evaluating how people use country foods and checking on their exposure to food-borne contaminants. The researchers took blood, urine, and hair samples from people living in participating communities in the Dehcho region, Sahtú region, and around Hay River between November 2016 and March 2017. Local research coordinators helped with the project. A total of 314 individuals participated in 2017, which was the second year of the project. Each participant choose which parts of the project to take part in (questionnaires about food, and sampling of hair, urine, and/or blood). Samples were analyzed for several nutrients (like healthy fats) and many contaminants (like mercury, cadmium, and other pollutants. Confidential letters are being prepared for each participant. The letters will contain will contain information about the person's contaminant exposure levels. Community reports are also being prepared. The letters and reports will be shared with participants and communities in the fall of 2016 or early 2017. This project is emphasizing the importance of country foods and providing baseline contaminant levels in the region. Up to four additional communities will be invited to participate in 2017-2018.

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File No: 12 402 857
Region: DC

Licence No: 16138
Location: Sanguez Lake (61°15'26.1"N, 120°29'49.8"W)

Sanguez Lake fish down study

This multi-year project was initiated by Jean Marie River First Nation. The objective of this project is to assess whether intensive fishing can lower mercury levels in large, predatory fish like northern pike and walleye. Previous research has shown that large northern pike and walleye in Sanguez Lake have levels of mercury that exceed the Health Canada guidelines. In early fall of 2017, the first phase of this community-driven fish-down pilot study began in Sanguez Lake. A sampling team removed 71 kg of northern pike from the lake using gill nets. The sampling team included community members, resource monitors, Dehcho Aboriginal Aquatic Resource and Oceans Management (AAROM) staff, and university researchers. The researchers are currently processing the samples and analysing them in the laboratory. Further fish-down activities are planned for spring 2018.

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File No: 12 402 912
Region: NS
Licence No: 16183
Location: Along the Ingraham Trail to Tibbitt Lake

Understanding the potential impact of metals in aquatic systems
No research was conducted under this licence in 2017.

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File No: 12 402 409
Region: NS
Licence No: 16025
Location: Diavik Diamond Mine, East Island, Lac de Gras

Reclamation of disturbed sites research at Diavik Diamond Mine, NWT
Reclamation means returning the land to the state it was in before it was damaged or changed by development, or to change the land to a state desired by local land-users. Reclamation research in the north over the past 30 years has focused on land affected by oil and gas development and transportation corridors. No matter which industry affects the land - mining, oil and gas, transportation, or something else - the effects on the land are similar. However, different industries may have different may have different types of waste products, and this partly determines which reclamation methods are most appropriate. The purpose of this research program is to find ways to make plants grow more quickly on disturbed sites at diamond mines in the north and to study how to create soil-like surfaces in places where the soil has been stripped off the ground. This new soil will be made of materials that are available on the site, and purchased commercially, and will help native plants return more quickly to these bare areas. In 2013 and 2014, research sites were set up to see how grass and other plants would grow after making small changes in the surface of the land, adding natural materials to the soil, and preventing erosion. The research team also planted mosses and lichens. They have visited the plots every year to check on the growth of the plants. They found that adding sludge from the sewage treatment process is particularly beneficial, along with making the land surface uneven instead of smooth. Controlling erosion continues to be a challenge.

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File No: 12 402 921
Region: NS
Licence No: 16162
Location: Lower Martin Lake, Long Lake, Handle Lake, and a lake along the Ingraham Trail

A multidisciplinary investigation of recovery in Yellowknife area lakes from 50 years of arsenic pollution: what are the factors inhibiting recovery and the biological consequences?
The primary goals of this project are to check how much arsenic is present in lakes near the Giant Mine site, and to see how this has changed over time. Field work was conducted in September and October 2017. The researcher focused most of the work in and around Lower Martin Lake,

which is the last lake in the Baker Creek system before the creek passes through the Giant Mine site and flows into Yellowknife Bay of Great Slave Lake. The researcher took regular samples from Lower Martin Lake, as well from as the inflow and outflow of the lake, to gather information on the amount of arsenic that enters and leaves the lake. The research team also conducted an experiment in the field. They collected four sediment cores from the bottom of Lower Martin Lake, and used a special technique to collect water from just above the bottom of the lake. The metal(loid) concentrations in the water samples from just above the lake bottom were measured, because the worrisome types of pollution from the mine are metals like arsenic. The difference in arsenic from the start to the end of the experiment will allow the researchers to estimate the amount of arsenic that moves from contaminated areas into the lake during the fall. This experiment will be repeated under ice to see if the arsenic levels are different during different seasons. The results from this study are not yet available.

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File No: 12 402 905
Region: IN
Licence No: 16130
Location: Billy's Creek and Hornaday River

Paulatuk whitefish assessment

In the Inuvialuit Settlement Region, whitefish are ecologically and culturally important and play a large part in subsistence. When the Anguniaqvia niqiqyuam Marine Protected Area was designated, the Paulatuk Hunters and Trappers Committee felt that there was not enough information about whitefish to make decisions about their management. For this reason, they started a whitefish monitoring program in 2016 to better understand the biology of whitefish harvested by the community, with a focus on what the whitefish are eating and how healthy they are. Four monitors were hired. Two monitors harvested and sampled 75 broad whitefish from Billy's Creek during the second week of June. For each fish, they measured its size, took a muscle sample, collected its otoliths (these are tiny stones in the fish's ears that get larger as the fish get older), and took a sample of its stomach contents. The other two monitors collected an additional 75 whitefish at the upper Hornaday River. The fish had eaten sand and a bunch of different types of bivalves (these are clams and other similar animals).

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File No: 12 402 891
Region: NS
Licence No: 16040
Location: Yellowknife

Toxic legacies: community perspectives on arsenic pollution at Yellowknife's Giant Mine

Last year, the project team team held a workshop at Chief Drygeese Centre in Detah to discuss how to communicate the arsenic hazard at Giant Mine to future generations. This year, they completed a report on the workshop. This report is the third in a series, and includes ideas for stories, monuments, symbols, and text-based messages about the arsenic that came from Yellowknives Dene elders and other community members from Ndilo, Detah, and Yellowknife. The report includes great drawings by workshop participants. In other news, research team members are completing a mapping project with Yellowknives Dene First Nation land users. The

land users have mapped out areas to avoid due to arsenic contamination. The project team will share the results when they are available.

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File No: 12 402 915
Region: NS

Licence No: 16102
Location: Walsh (62.577781”N, 114.276732”W), Banting (62.634963”N, 114.290108”W), Chitty (62.697561”N, 114.120792”W)

Metals levels in large bodied fishes near impacted lakes near Yellowknife, NWT

The purpose of this study is to learn more about the levels of mercury and heavy metals in the flesh of large-bodied fish that are traditionally harvested. The researchers compared metal levels in large-bodied fish harvested near communities along the Mackenzie River to fish from contaminated lakes near Yellowknife. To do this comparison, they harvested fish and collected tissue samples to check for metals including mercury. In the Yellowknife area, they harvested fish using scientific gill nets in three locations around the city where the water is affected by industrial development, for example near historic mines or housing developments. They took samples from 30 individual fish that were either whitefish or northern pike. All fish were sent to the University of Alberta to see how old they were, and to check the levels of mercury and heavy metals. The researchers also took samples from other types of fish, but those samples were saved for later research. This year’s fieldwork is a continuation of previous work conducted in March 2016. The continuation of this field work over two years is to ensure that the researchers’ results are valid. A graduate student from the University of Alberta will report on the results in 2019.

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File No: 12 402 889
Region: DC

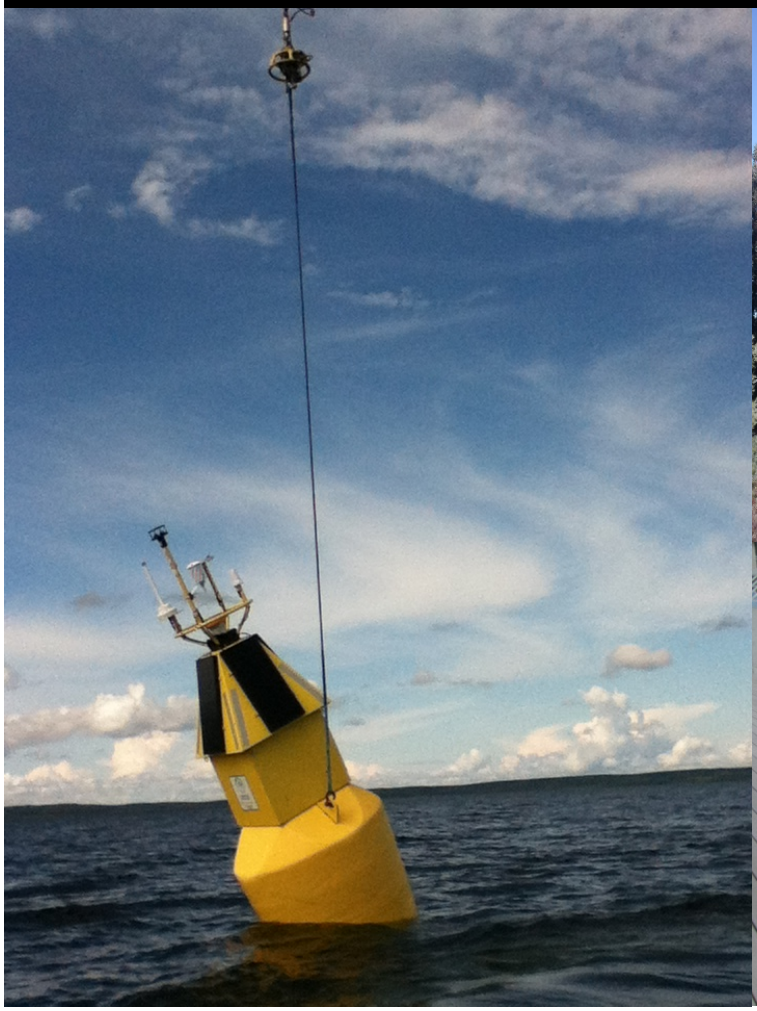
Licence No: 16046
Location: Ekali Lake (61°17'24.34"N, 120°35'26.07"W), Sanguez Lake (61°15'28.99"N, 120°29'51.78"W), Willow Lake (62°10.267”N, 119°06.693”W), Mustard Lake (61°59.488”N, 120°05.517”W)

Further examination of the bio-magnification of mercury within fish species of the Dehcho and their varying levels among lakes

This project has three main goals. First, the research team wants to determine why mercury levels in fish vary among lakes in the Dehcho region. Second, they want to identify the best predictors of mercury levels in fish. Third, they want to determine which species of fish have the lowest levels of mercury and the highest levels of nutrients. To meet these goals, sampling teams made up of both community and university researchers collected a variety of samples from three lakes (Ekali, Big Island, and Kakisa) in summer 2017. Samples were taken of the water, the lake-bed sediment, the fish living in the lake, and a variety of large and small plants and animals that also live in the lake. Community monitors and samplers from Kakisa, Ft. Providence, and Jean Marie River collaborated with researchers at the field camps. Each camp was approximately one week long, and included youth training whenever possible. For example, the researchers worked in

collaboration with a youth camp that was held on Kakisa Lake. The research team is currently preparing samples for analysis in the laboratory, but they have already found that mercury levels in northern pike are best predicted by habitat use (that is, where the pike are living) and lake clarity (that is, how clear the water is). They have also learned that mercury levels in walleye are best predicted by the amount of algae in the lake, and that cisco and lake whitefish have the best nutrient-to-mercury ratios.

Engineering



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File No: 12 406 062
Region: IN
Licence No: 16119
Location: Trail Valley Creek watershed

Hydrological remote sensing
The goal of this project is to test different ways of determining soil moisture from satellite images. It is important to be able to map soil moisture because it affects how the active layer of the permafrost thaws during the warm season. The active layer of the permafrost is the part on top that thaws and re-freezes every year. In dry soils, the organic layer that is composed of living plants and decaying plant material insulates the ground lying underneath it. This keeps the lower layers cool and reduces the amount of permafrost thaw. However, wetter soils transfer heat from above into the lower layers, and likely allow for more permafrost thaw. Scientists want to understand the big picture of how permafrost will likely thaw, so they need easy ways to understand and map out soil moisture across the north. The research team established several soil moisture stations where soil moisture and active layer depth were monitored through the summer period. The real, on-the-ground information collected from the soil moisture stations was compared to soil moisture maps that the researchers made from special instruments attached to aircraft and from current satellite images.

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File No: 12 406 063
Region: IN
Licence No: 16094
Location: Trail Valley Creek (68°44'22.26"N, 133°27'49.91"W), Parsons Lake (68°53'27.99"N, 133°32'20.01"W), Gungi Creek (69°18'34.09"N, 132°59'42.35"W)

Winter flow regime and icing dynamics of tundra streams near the Inuvik to Tuktoyaktuk Highway
The goal of this reseach project is to better understand the temperature of small tundra streams and how much they flow in winter. In February and March 2017, the lead researcher on this project collaborated with other researchers from the Northwest Territories Geological Survey and the Geological Survey of Canada on a permafrost research field program. The team observed winter conditions at several small streams along the Inuvik to Tuktoyaktuk Highway. They placed automatic cameras at several locations along the highway to photograph the streams through the winter. The team returned to the area in May and June to observe and photograph streams along the highway during peak flow, and to look at the ramaining overflow icings (aufeis) that had developed through winter In July and August they installed temperature sensors in the ground and on the beds of streams at five different locations. These devices record water and ground temperature throughout the year. Water depth sensors were also installed in two lakes upstream of the Creek 18 site, and water flow was measured in Creek 18 near the Inuvik to Tuktoyaktuk Highway bridge.

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File No: 12 406 065
Region: IN, GW

Licence No: 16194
Location: Forested site near Inuvik water tower trail (68°21'43.41"N, 133°41'22.86"W), tundra site along the Inuvik-Tuktoyaktuk Hwy (69°12'50.54"N, 132°53'45.37"W)

Comparing the snow depths and densities of different habitats in the Beaufort Delta region

The purpose of this project was to study how different landscapes affect the depth and density of the snowpack, and the shape of the snowflakes. The researchers chose two sample sites, one in a vegetated area in the town of Inuvik, and one in the open tundra alongside the newly constructed Inuvik-Tuktoyaktuk Hwy. They took samples once a month to allow time between samples for the snow to accumulate and change in shape. They collected information about snow depth and density along transect lines, and measured the temperature and density of deeper snow that was sampled from a snow pit. They measured the temperature at different depths within the snow pack as well. Snow pack temperature at the Inuvik site stopped changing in April. The researchers found differences in seasonal snow density at both sites, and found higher density snow at the highway site. Variability in snow depths and densities can partially be explained by differences in vegetation, landscape, and weather. Understanding the chemical and physical characteristics of the snow pack, and how these change seasonally, are important when predicting how water moves through the ground, travel safety, and the health of ecological habitats.

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File No: 12 406 059
Region: IN

Licence No: 16047
Location: Trail Valley Creek and Havikpak Creek

Hydrology of high latitude watersheds

This research project has two main goals. The first is to see how well computers models can predict how water flows through the lakes, rivers, and ground in this region. The second is to use this computer model to see what the water in this region will be like in the future. The climate of the Inuvik region is changing rapidly, and will continue to change in the coming decades as a result of human-released greenhouse gases. In Inuvik, winters are not as cold as they used to be, and summers are warmer. The amount of rain in the summer and snow in the winter have also been gradually decreasing. Due to the warming climate, there are more shrubs growing on the tundra north of Inuvik, the permafrost is thawing, and water levels in lakes and rivers are changing. The research team will study how snow, lakes, and rivers will change in the coming decades at a site north of Inuvik. Stream flow has been measured at this site since the 1970s, and detailed measurements of all aspects of the water systems at the site have been carried out since 1991. The research team conducted field work at this site from April to September 2017. They are also investigating the impacts of the Inuvik to Tuktoyaktuk Highway on the snow and streams in the area.

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File No: 12 406 064
Region: IN

Licence No: 16173
Location: Sachs Harbour

Predicting the future(s) of renewable energy in Canada's Arctic: MEOPAR year of polar prediction project

The goal of this research project is to study how wind power and 'solar irradiance' (energy from the sun) in the north will change in the future. At this time no work has been undertaken for this project. The tower that will measure wind and the boundary layer at Sachs Harbour has not yet been installed. The Government of the Northwest Territories is in the final stages of identifying a contractor to install the tower. It is getting late in the season for an installation in 2017, so it looks like the installation will take place in spring 2018 instead.

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File No: 12 406 061
Region: NS

Licence No: 16042
Location: Upper Baker Creek watershed (62°36.6"N, 114°24.6"W)

Investigations of the water cycle and hydrological processes of the subarctic Canadian Shield

The goals of this project are to map out baseline water flow and water quality conditions in the Baker Creek watershed. The research team also wants to see how both factors vary among smaller watersheds in the Baker Creek system that have different land cover patterns and permafrost ground conditions. To do this, the research team sampled groundwater wells and streamflow in tributaries and at lake outlets along Baker Creek in April, June, and October of 2017. Stream samples were analyzed for ions, pH, metals, nutrients, carbon, and nitrogen. Water level gauges were also upgraded so that measurements of lake levels and outflows could be collected year-round. This allowed three lakes in the Baker Creek watershed to be used as ground truthing sites for NASA's Air, Surface Water, and Ocean Topography (SWOT) missions in July and August, which are part of a large research program called the Arctic and Boreal Vulnerability Experiment. SWOT will include a satellite-based mission that will launch in 2020, which will measure water levels in streams and lakes larger than 250 m wide. Also, work began this year to create a computer model of frozen ground dynamics using the Environment and Climate Change Canada prediction systems. The researchers also conducted spring snow surveys and activated special instruments that measure water levels and the climate. Remote measurements of meteorological conditions, evaporation, soil moisture, hydrochemistry, and streamflow continued.

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File No: 12 406 058
Region: GW

Licence No: 16000
Location: 6 km northeast of the Inuvik airport (68°21'24.12"N, 133°24'25.31"W)

Wind energy monitoring at Inuvik High Point (2015-2017)

The goal of this research project is to see how much energy could be produced by windmills at the Inuvik High Point site, which is about 6 km northeast of the Inuvik airport. The project will run for two years, and data collection continued in 2017. This is part of an alternative energy study for the Inuvik area. Two full years of wind measurements will be analyzed to see whether it is windy enough at the High Point site to use windmills to produce energy for the town of Inuvik. The project will also use this information to do an economic analysis to see whether it is cost effective to produce energy using windmills at this site.

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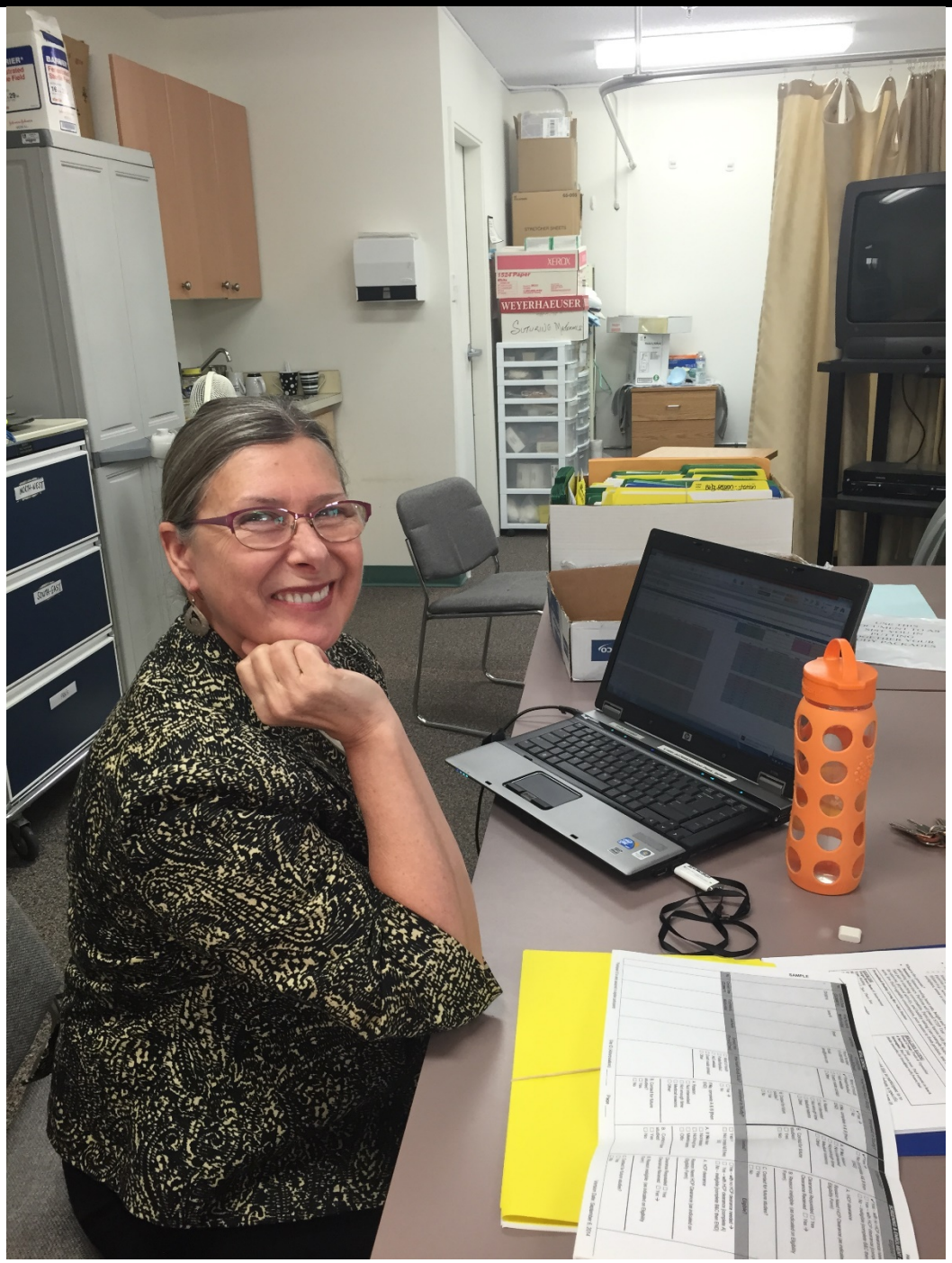
File No: 12 406 058 **Licence No:** 16001
Region: NS **Location:** CN Hill (63°24'15.5"N, 116°10'44.8"W)

Wind energy monitoring at Yellowknife (2015-2017)
The goal of this wind monitoring project is to see how much energy could be produced by windmills at two sites near Yellowknife: Berry Hill, which is about 18 km north of Yellowknife, and CN Hill, which is about 130 km from Yellowknife. The project will run for two years, and wind data collection continued at both sites through 2017. This is part of an alternative energy study for the Yellowknife area. Two full years of wind measurements will be analyzed to see whether it is windy enough at these sites to use windmills to produce energy for the town of Yellowknife. The project will also use this information to do an economic analysis to see whether it is cost effective to produce energy using windmills at these sites.

Health



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File No: 12 408 213 **Licence No:** 16075
Region: SS **Location:** Ft. Smith

A health and social service provider's perspective on the evolution of school-based care
The ultimate goal of this study was to identify ways to make it easier for young people to access school-based health and mental health services, and to improve how these services are provided. To meet this goal, the researcher worked with the staff who provided services at a youth-focused, school-based clinic called The Health Café that is located in the local high school in Ft. Smith. The researcher spoke with staff about the services offered at the Café, explored barriers to service provision and discussed how the organziations might ensure services align with the needs of the youth. Recommendations from this study, based on expertise of the staff and service providers, were provided to the Chief Operating Officer of the Northwest Territories Health and Social Services Authority in the Ft. Smith Region and suggested strategies to increase program effectiveness and improve access to and provision of school-based health and mental health for local youth.

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File No: 12 408 102 **Licence No:** 16151
Region: NS **Location:** Yellowknife, Ndilo, Detah

Health effects monitoring program
This program is one part of the Giant Mine Remediation Project. The purpose of the program is to check for contaminants from the Giant Mine, and the possible related health effects, in people from Ndilo, Detah, and Yellowknife. The program will focus on arsenic as well as other chemicals that may cause health issues, including antimony, cadmium, lead, manganese, and vanadium. All of these chemicals may be released into the environment as the mine site is remediated. The researchers will interview and take samples from about 750 people ranging in age from six to 79 starting in fall 2017. They will interview and take samples from another 750 people in the spring of 2018, for a total of approximately 1,500 participants. Residents of Yellowknife were randomly selected from the City of Yellowknife housing list. Members from the Yellowknives Dene First Nation and the North Slave Métis Alliance will participate on a voluntary basis. Each participant will answer a lifestyle questionnaire, a questionnaire about the food they eat, and provide samples of toenail clippings, urine, and saliva to test for contaminants. With additional input from their leadership, members of the Yellowknives Dene First Nation will also complete a medical history questionnaire and have a brief medical exam with a nurse. All project participants will be asked for their consent to have their medical records reviewed for the past five years. Youth participants between the ages of six and 17 will be able to participate in a follow-up study in 2022/2023. A follow-up study for all participants, including adults, is planned for 2027/2028.

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File No: 12 410 216
Region: NS
Licence No: 16180
Location: Yellowknife

Aspiration in children of Canadian Inuit and First Nations: a retrospective cohort study
Due to delays and challenges with data sharing agreements, no research was conducted under this license in 2017.

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File No: 12 410 218
Region: NS
Licence No: 16195
Location: Yellowknife

Access to health services in the Northwest Territories: project ECHO and tele-medicine expansion
No research was conducted under this licence in 2017.

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File No: 12 408 149
Region: IN, GW
Licence No: 16010
Location: Aklavik, Tuktoyaktuk, Ft. McPherson, Sachs Harbour

Addressing community concerns about health risks from *H. pylori* infection
Helicobacter pylori (*H. pylori*) organisms are bacteria that live in people's stomachs, where theycause an infection. The Canadian North *Helicobacter pylori* (CANHelp) Working Group conducts projects in communities in the Beaufort Delta and Yukon to address concerns about H. pylori . The Inuvik Inuvialuit Settlement Region *H. pylori* project, which was launched in February 2017, has 127 enrolled participants. In March 2017, the CANHelp team held a mobile endoscopy clinic in Aklavik. An endoscopy procedure uses a special instrument to see inside the body and check for abnomalities. Researchers performed 52 exams, with 38 of these being follow-ups of endoscopies that were done in 2008. In June, the researchers held an endoscopy clinic at the Inuvik Regional Hospital, where 16 new Inuvik participants and 12 from Ft. McPherson follow-up endoscopy. The researchers will return the results to the study participants in fall 2017, and will present their project results to the communities in late 2017. The researchers also completed an analysis that looked at whether mercury levels in hair samples are related to chronic stomach inflammation. They shared these results with planning committees in Aklavik and Ft. McPherson, where the hair samples were collected. Throughout the year, the team consultated with community project planning committees about their research, and conducted interviews to collect stories of how *H. pylori* affects people in their everyday lives.

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File No: 12 408 176
Licence No: 16161

Region: IN, GW, SA, DC, NS, SS **Location:** All NWT

Practices for managing *H. pylori* infection in northern Canada: a consultation with health care practitioners

Helicobacter pylori (*H. pylori*) is a bacteria that can live in people's stomachs and cause an infection. The goal of the Canadian North *Helicobater pylori* (CANHelp) Working Group is to develop cost-effective and culturally appropriate strategies to reduce health risks from *H. pylori* infection in northern Canada. The group links academic researchers with northern communities and the doctors, nurses, and decision makers who provide their health care to address concerns about health risks from *H. pylori* infection. The goal of this project is to speak with health care providers like doctors and nurses about two topics. First, how *H. pylori* infection and similar diseases are currently treated, and second, what is preventing sick people from getting the best care possible. The research team will consult health care practitioners in the Northwest Territories and Yukon using telephone and in-person interviews. The in-person interviews will happen during health care meetings. The research team have been working with health care partners to develop a questionnaire, to identify participants for the study, and to compile contact information for doctors, nurses, and other health care professionals who have worked in the Northwest Territories for at least six months.

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File No: 12 408 187 **Licence No:** 16069
Region: SS **Location:** Ft. Smith

Outcomes of primary maternity care in Fort Smith, NT

The goal of this project is to study the health of mothers living in Fort Smith and Hay River before and after birth, and the health of their newborns. To meet this goal, the researchers collected information about births from 2008 until 2017 in Fort Smith. In July 2017, the research team and a research assistant travelled to Fort Smith to gather information about births from health records. The research team also travelled to Hay River to document births that took place at the Hay River clinic. In particular, they were studying births that were attended by the midwives who have been at the clinic since 2015.

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File No: 12 408 204 **Licence No:** 15999
Region: IN **Location:** Hendrickson Island (69°30'0"N, 133°35'10"W), East Whitefish (69°22'45"N, 133°37'10"W)

Beluga health and food borne parasites in the Inuvialuit Settlement Region

This project looked at the health of belugas that were harvested in the Inuvialuit Settlement Region (ISR) in 2015 and 2016. The researchers assessed health using the beluga's body condition (thin, good, or overweight), an internal examination, and testing for parasites. Although some animals appeared thin most were in good body condition, and overall appeared to be in good health. As expected for any wild animal, parasites were found, including lungworms, flukes, and cysts of the

parasite *Sarcocystis spp*. These parasites do not pose a concern for humans. The research team did not detect *Trichinella* (a roundworm transmissible to people) in either the tongues or diaphragm muscles of harvested beluga. One of 53 beluga showed evidence in their blood of exposure to the parasite Toxoplasma (a microscopic parasite transmissible to people), and the parasite was detected in a brain sample from a second beluga. The research team will continue testing blood, muscles, and organs from belugas that were harvested in the ISR for food borne parasites. At this time, there is no reason to suspect that Toxoplasma is causing health problems in beluga that are harvested in the ISR. At the moment, the test results support the current messaging about public health risks and benefits from eating locally harvested wildlife. These results were presented at the Inuvialuit Final Agreement Research Day in Whitehorse on September 6th, 2017.

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File No: 12 408 214 **Licence No:** 16104
Region: NS **Location:** Yellowknife

Increasing the reporting of medication errors through leadership at Stanton Territorial Hospital

This research project looked at ways to increase the reporting of medication errors (like when the wrong dose or wrong drug is given to a patient) by nurses at Stanton Territorial Hospital in Yellowknife. In general, nurses and other health care providers do not report all medication errors that occur. Reporting these errors is important, however, because it can reduce the harmful effects to the person who received the wrong drug. It can also help prevent future errors from occurring. Both the researcher and the nurses/health care providers identified issues and shared knowledge to develop a solution. Based on these conversations and a review of the academic litature on the topic, four recommendations were developed to help the hospital management ensure nurses more frequently report medication errors. These are 1) the hospital should have a mandatory follow-up policy for all medication errors, 2) a monthly summary of medication errors should be posted, along with system changes, so that nurses can review them, 3) the hospital should have a safe disclosure policy for reporting medication errors, which means that nurses won't be punished for reporting errors and instead the focus will be on continuous learning, and 4) hospital staff who are in charge of nurses should receive leadership training to learn how to become engaged and trusted leaders.

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File No: 12 408 199 **Licence No:** 16024
Region: IN, GW, SA, DC, NS, SS **Location:** All NWT

Understanding syndemics and HIV/STI vulnerability among northern Indigenous youth in Northwest Territories

The purpose of this on-going research study is to see how effective the peer leadership training workshop called FOXY (Fostering Open eXpression among Youth) has been. The goal of the FOXY workshop is to reduce the vulnerability of young Indigenous men and women to HIV, and to increase their empowerment and cultural connectedness. As planned, the FOXY peer

leadership training was held in summer 2017, and was attended by young Indigenous men and women. The research team are currently analyzing the informaiton they collected at the workshop, and hope to have a report ready in the next four months.

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File No: 12 408 199 **Licence No:** 16027
Region: IN, NS, SS **Location:** Yellowknife, Hay River, Inuvik, Ft. Smith

Visual and performance art for HIV prevention with Indigenous youth in the Northwest Territories and Nunavut: a mixed-methods multiple case study

The goal of this research project is to evaluate two arts-based human immunodeficiency virus (HIV) prevention programs that are currently working to promote sexual health in northern Indigenous youth. The first program is FOXY (Fostering Open eXpression among Youth) in the Northwest Territories, and the second is the Nunavut Sexual Health Drama Program in Nunavut. There is one article that was published in the British Medical Journal of Sexually Transmitted Infections, and a second article in peer review at the Canadian Journal of Public Health (CJPH). The CJPH article presents preliminary findings on the effectiveness of FOXY. The research team found that, following intervention, participants had significantly higher sexually transmitted infection knowledge scores, resilience scores, and safer sex self-efficacy scores.

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Region: NS **Location:** Yellowknife

Canadian primary care sentinel surveillance network (CPCSSN) project

The goal of this on-going research project is to gather information about health care and treatment for people with chronic (long-term) diseases. This includes information about treatments and outcomes over a long time-span. This information will help doctors and nurses determine how best to treat chronic diseases. In 2014, research agreements and data sharing agreements were set up with the Yellowknife Health and Social Services Authority. Since then, researchers have obtained electronic medical records from almost 27,000 patients from 26 different doctors. They removed all identifying information about the patients, and formatted the remaining information in a readable way, so they could analyze it and provide feedback reports to the 26 doctors. The reports were sent in May and October 2016. In 2017, there were changes to privacy rules and the research team was not able to access information from any medical records. They will need to create new research agreements and data sharing agreements before they are able to extract information from these records. Once the new agreements are in place, the researchers will resume studying the medical records and providing reports.

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File No: 12 408 117
Region: IN, GW, SA, NS, SS

Licence No: 16171
Location: Yellowknife, Inuvik, Ft. Smith, Tulita, Hay River

Learning from mothers, grandmothers, and great grandmothers about breastfeeding in the Northwest Territories

Exclusive breastfeeding for the first six months of an infant's life, where an infant is only fed breastmilk and no other food or drink, is recommended by the World Health Organization. In many developed countries, such as Canada, this does not occur. Also, there has been little research on breastfeeding in the Northwest Territories. This study had two main goals. First, to learn from grandmothers about traditional infant feeding practices, and to learn how today's mothers feed their babies. Second, to use health records to find out how many mothers start breastfeeding, and for how long they breastfeed their babies. The researchers held five sharing circles with a total of 49 grandmothers, and interviewed a total of 24 mothers. They also reviewed almost 600 medical charts from 2016, and reviewed information from well-baby visits in five communities (Yellowknife, Inuvik, Tulita, Hay River, and Ft. Smith). The researchers recorded traditional breastfeeding stories from Gwich'in, Inuvialuit, Shúhtaot'ine/Dehogao'tine, Kátł'odeeche, and Métis grandmothers. The stories fit into five themes: feeding practices, being resourceful, surviving hardships, rekindling the past, and sharing wisdom. Mothers told the researchers about how they fed their babies, social support, and judgment they received for breastfeeding (or not breastfeeding) their babies. They also passed along messages for new moms. The research team found that, in 2016, 82% of mothers started breastfeeding, but that rates of exclusive breastfeeding for six months varied from as low as 17% to as high as 68%. The researchers made recommendations for further research, policies, education, and health promotion.

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File No: 12 408 215
Region: IN, GW, SA, DC, NS, SS

Licence No: 16116
Location: All NWT

Physical activity monitor (PAM)

The purpose of this research project is to understand what may help or prevent people from participating in physical activity. To understand this, the researchers contacted people living in the north by phone and then used a questionnaire to gather information from them. The questionnaire is called the 'Physical Activity Monitor' (PAM), and versions of the PAM have been in use since 1995. The results show how different factors, such as individual, environmental, and social factors, affect physical activity. The PAM asked participants what types of sports they were doing and how often, about the types of spaces/places (like parks and gyms) where they were active, how satisfied they are, and how often they use these spaces/places. The PAM also asks participants about the things that prevent them from being active. These are examples of the types of research that the federal, provincial, and territorial governments are interested in. Repeating the questionnaire over time allows the researchers to measure changes in both physical activity levels, and the factors that affect physical activity levels. The researchers are still reviewing the information they gathered. Reports on the results of this research will be freely available at www.cflri.ca.

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File No: 12 408 186 **Licence No:** 16164
Region: NS **Location:** Yellowknife

Digital knowledge translation tools for parents, on common pediatric conditions in emergency department visits

The purpose of this study was to work with parents to review an educational website on needle pokes. There are many reasons why a child may be required to get a needle, such as vaccinations, IVs (when medication is given), and when blood is taken. Researchers created an educational website as a way to provide information about needle pokes after interviewing parents in the emergency department. Parents at hospitals in the Northwest Territories and Alberta were asked to view the website and provide their feedback. Overall, parents found the website to be useful and simple to use. They also agreed that it provided information that was relevant to the parent, was an appropriate length, and was nice to look at. When the researchers asked the parents if they would use it in the future or if it would help them make decisions, the parents' responses were mixed. Further analysis indicated that new parents were more likely to use the website in the future compared to those who considered themselves to be experienced parents. When asked if they would recommend the website to their friends, a majority of the parents said yes. Using this feedback, the researchers revised and improved the website.

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File No: 12 408 141 **Licence No:** 16182
Region: GW, SA **Location:** Ft. Good Hope, Inuvik

Improving the utilization of cancer screening services in northern Indigenous communities

Three screening programs have been established in Canada for the early detection of breast, colorectal, and cervical cancers. Cancer screening involves a variety of tests that are designed to detect these cancers at an early stage. It can increase the likelihood of a successful treatment and decrease the burden on patients. Screening can also increase survival rates and prevent early deaths due to cancer. Three screening programs have been established in Canada for the early detection of breast, colorectal, and cervical cancers. The goal of this research project is to work with community and health leaders in Inuvik and Ft. Good Hope to develop educational videos about cancer screening that meet the priorities of the communities. The research team has traveled to the NWT several times to meet with community members and health professionals and discuss the best ways to make and distribute the educational videos. They are working extensively with the Dept. of Health and Social Services, Government of the NWT and other organizations and have made community presentations in Yellowknife and Inuvik to receive feedback from the public. During the past few months, the team has developed 'story boards' (the first step in planning a video) and scripts based on the information provided by health professionals and the participating communities. In January 2018, the team will travel to Yellowknife to meet with key participants again and to start filming the videos.

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File No: 12 408 217 **Licence No:** 16192
Region: IN, GW, SA, DC, NS, SS **Location:** All NWT

Aging, disability, and technology (ADT): understanding and advancing Canadian policies to enhance access to assistive technologies
No research was conducted under this licence in 2017.

Physical Sciences

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File No: 12 404 815
Region: IN

Licence No: 15984
Location: Bar Harbour (74°258”N, 123°901”W), Johnson Point (70°767”N, 133°497”W), Nelson Head (71°39”N, 122°959W)

Teleseismic investigations of the crust and mantle structure beneath Banks Island, NWT
The goal of this project is to understand what is deep under Banks Island. There are two theories – one is that Banks Island was made from very old volcanoes under the ocean. If this is true, there may be oil and gas deposits. The other theory is that Banks Island is part of the Canadian Shield like all of mainland Nunavut and the eastern half of the NWT. If this is true, there may be diamonds that could be mined. To figure this out, the researchers used special and very sensitive machines that record distant earthquakes. The sensors were buried in the ground near a small transmission station, and are powered by either solar power or a battery. Earthquakes move through different types of ground in different ways. When the researchers detect a distant earthquake, they can examine how the earthquake moves through the ground under Banks Island to get a better idea of what is deep under it. The researchers visited the seismic stations at Bar Harbour and Johnson Point in 2017. While they were there, the researchers collected data from the storage disks and carried out site maintenance. A new station was also installed at Ulukhaktok. The researchers analyzed the data they collected, and preliminary results were presented at both the Northwest Territories Geoscience Forum in Yellowknife in November 2017 and the American Geophysical Union Fall Meeting in New Orleans in December 2017. The research team will return to the area next year to collect more data from the stations.

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File No: 12 404 815
Region: SA, DC

Licence No: 15985
Location: Ft. Liard, Wrigley, Tungsten, Nahanni Butte

Yukon-northwest seismic network: characterizing earthquakes and earth structures
Seven new seismograph stations were installed in northwestern Canada in the summer of 2013. Each station has a very sensitive machine, a seismograph, that measures and records earthquakes occurring locally, nationally, and around the world. The information collected by the seismograph stations is used to produce maps of the Earth’s interior deep under the ground surface, and to help the researchers understand where earthquakes might occur in the future. Information about any earthquakes detected by the seismograph stations is sent to the research team by satellite. The researchers have found that the boundary between the mountain chain and the flat sedimentary basin at depths of 50-100 km below the Earth’s surface is more variable than they had thought. They are learning more about how the mountains were made by the movement of the Earth’s crust over many millions of years. The rocks in the crust float over the weaker, hot rocks below, and this movement is what causes earthquakes. The researchers are developing a way to assess the risk of earthquakes in any particular area. In 2017, the research team fixed problems at three of the seven stations. The Yukon stations at Watson Lake, Hyland airport, and

Twin Creeks airport were serviced. The research team is writing a lot of academic papers and publications from the information they have gathered.

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File No: 12 404 855
Region: IN

Licence No: 16017
Location: Trail Valley Creek (68°44.734”N, 133°30.003”W)

Drivers and consequences of shrub distribution on the tundra landscape

The goal of this multi-year research project is to understand how shrubby areas and areas with trees are changing in the forested area near Inuvik at Havikpak Creek, and at a spot between Inuvik and Tuktoyaktuk called Trail Valley Creek. Alder shrubs are becoming more common on the tundra, including around Trail Valley Creek, and researchers do not know what effects the shrubs may have in the future. During the spring and summer of 2017 the research team finished three tasks. First, one researcher visited plots that were set up in 2015, and made careful observations and measurements of the alder shrubs. The researcher measured the depths of the snow and active layer (the top part of the permafrost that thaws each summer), because differences in the timing of spring melt may cause changes in tundra and shrub patches. Second, the research team carefully measured the water use and nutrient status of the alder shrubs. This information will allow the team to better understand what prevents shrubs from growing in some areas of the tundra, which will make it easier to predict what will happen in the future. The measurements of shrub water use also help to explain groundwater movements in this region. Third, the researchers took tree cores from both black and white spruce in Havikpak Creek and Trail Valley Creek. The cores show that the trees are growing much more quickly than they used to, and that this is due to the rapid warming in this region. This is in contrast to more southerly forests, where warming slows down tree growth.

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File No: 12 404 855
Region: DC, NS

Licence No: 16018
Location: The coordinates for the four corners of the study region are 60.714°N, 117.027°W; 63.206°N, 123.702°W; 64.175°N, 113.974°W; 62.322°N, 112.459°W

Impacts of wildfire extent and severity on caribou habitat

The goal of this project is to understand how taiga forests in the southern NWT grow back after severe wildfires. To study this, the researchers went to almost 50 locations called ‘plots’ that were in a variety of areas. Some plots were in an area that was burned during a particularly severe fire in 2014, while others were in areas that burned 35 to 45 years ago, and others were in areas that had never been burned. They were particularly interested in forests that burned 35 to 45 years ago because they suspected they would find rapid changes in the amount of lichen, which is an important food for caribou. At each plot, the researchers took careful measurements of what is growing there, what seeds are present, and how the permafrost and soil were affected by the fire. They also counted the number of seeds and determined how well they germinated, or started to

grow into trees. The researchers re-visit each of the plots year after year to see how the plants, lichen, shrubs, and trees re-grow over time. During 2017, the research team completed all of their sampling and testing, and are now analyzing these samples. The research team also engaged in a range of outreach activities.

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File No: 12 404 899
Region: SA

Licence No: 16032
Location: The central Mackenzie Valley, from 64:45N to 65:25N, and from 126:40W to 127:30W

Environmental studies for EL470 - 5yr
No research was conducted under this licence in 2017.

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File No: 12 404 838
Region: IN, GW, SA, DC, NS, SS

Licence No: 16055
Location: Aklavik, Inuvik, Ft. McPherson, Tsiigehtchic, Ft. Good Hope, Norman Wells, Tulita, Ft. Providence, Ft. Simpson, Trout Lake, Behchokǫ̀Yellowknife, Ft. Resolution, Ft. Smith, Łutsel K'e, Hay River, Kakisa

Community-based water quality monitoring in the Northwest Territories
This research project studies water quality in order to answer community concerns and questions about the health of NWT waters, contribute to decision making, and enhance our understanding of 'cumulative impacts'. Cumulative impacts are all of the changes to the environment that result from all types of development taken together. The project team worked with 20 northern communities and other partners. They placed special monitoring equipment at over 40 sites across the NWT with the help of trained community members. The equipment included water quality loggers that sit in the water and automatically take measurements every two hours, and a 'polyethylene membrane device' that sits in the water for up to 30 days and measures chemicals from oil and gas. The researchers also used a device called a 'diffusion gradient in thin film' that sits in the water for between two and five days and measures dissolved toxic metals. The information that was collected needs to be carefully studied for trends across the environment and over time, before it is compared to water quality guidelines and long term data. A comparison among sites from across the NWT will provide information on the overall health of the Mackenzie River Basin. This program addresses questions about water quality and the health of water systems that came from the communities. It also builds community capacity. Results will be presented to communities using various communications materials.

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File No: 12 404 937
Region: NS

Licence No: 16122
Location: Within a 20 km radius of 65°16”N, 115°56”W

Prospecting for Earth’s oldest rocks using geochemical signatures of Pleistocene glacial sediments

The goal of this project is to find outcrops of ancient ‘continental crust’ in the Acasta Gneiss Complex. The continental crust is the outside layer of the earth, and the Acasta Gneiss is one of the oldest areas of exposed continental crust on earth, at about four billion years old. The researcher will create a map of the area showing both the age range of the rocks and the composition of the bedrock. Bedrock mapping is not the same as drawing a regular map. Instead, these maps show what kind of rocks make up the bedrock, even if the bedrock is covered by soil, vegetation, or lakes. This map will help determine how the continental crust first formed in the earliest days of the earth. The researcher took samples of sand from eskers that dated to the last ice age. Eskers are long, sinuous ridges made up of rocks from nearby bedrock that were left behind by melting glacial ice. The eskers run across different types of rocks from the Acasta Gneiss Complex. The sand will be checked for zircons, which can be used to figure out the age of the bedrock using a special test. By sampling and dating the zircons from the eskers, the research team hopes to find undiscovered pockets of ancient crust.

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File No: 12 404 885
Region: DC, NS, SS

Licence No: 16005
Location: Great Slave Lake area

Planning and collection of data on boreal wildfire effects: studies of broad-scale 2014 wildfires in NWT, Canada

The goal of this project is to study the impacts and consequences of the 2014, 2015, and 2016 wildfires in the Northwest Territories using both satellite images and field observations. In August 2017, the project team visited six fire sites and took measurements and observations at a total of 167 locations. At the burned sites, the researchers collected observations about burn severity, the condition of the ground, small plants, shrubs, and forest canopy, how well the plants are growing back after the fire, and the age of the trees in the stand. The researchers are also making burn severity maps using satellite imagery. Field data from 2015 through 2017 is being used to create maps showing what the peat and vegetation were like before the wildfires. Using these maps, the team will be able to understand how severe a wildfire is based on the ground conditions beforehand, such as the type of peat and ground cover that are present. At both burned and unburned sites the research team took soil samples and measurements of soil temperature, the depth to frozen ground, the depth of peat, and tree heights, along with other measurements. They have collected field observations from many different types of forests and burns in order to understand how recent changes in climate (like earlier springs, longer summers, and changes in moisture patterns across the landscape) are affecting wildfires in this region.

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File No: 12 404 707

Licence No: 16013

Region: IN **Location:** The Melville South Ice Cap

Glacier mass balance of the Melville South Ice Cap
The goal of this research project is to estimate the amount of water lost (or gained) by the Melville South Ice Cap each year. Changes in the amount of water stored in the ice cap can come from rain, snow, and melting, as well as other sources. The research team measured snow accumulation and ice melt at 21 locations on the Melville South Ice Cap in 2017. Based on these measurements, the research team has determined that the Melville South Ice Cap thinned by the equivalent of 78 cm of water between September 2015 and September 2016. This is almost three time higher than the average of 28 cm per year between 1960 and 2015. Measurements recorded by an automatic weather station show that the 2016 melt season lasted from June 5th to August 31st. The average daily temperature during the melt season was -1.29°C, and a summer maximum temperature of +18°C was reached on July 11th. The researchers measured the snow depth across the ice cap using a pole, and found a maximum depth of 1.29 m for the 2016/2017 winter snowpack. The 2016/2017 period had the second highest snowfall on record, which was about two times greater than the 50 year average. In response to the summer warming, the ice cap surface at the automatic weather station site lowered by about 150 cm. These measurements indicate that the ice cap lost 0.04 km^3 of ice in 2015-2016. This amount of loss is about three times greater than the 50 year average of 0.014 km^3 per year. This research is essential to help scientists understand sea-level rise and climate change across this region.

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File No: 12 404 235 **Licence No:** 16074
Region: IN **Location:** Garry Island (69°29.94"N, 135°46.67"W), Illisarvik (69°28.78"N, 134°35.59"W), Inuvik at Dempster Hwy km 256, Paulatuk (69°19.84"N,124°06.05"W)

Permafrost and climate change, western Arctic Canada
The goal of this research project is to understand how climate change is affecting permafrost in the western Arctic, particularly in the outer Mackenzie Delta. In 2017, the research team spent time in the western Arctic at Illisarvik, on Richards Island, and on Garry Island. At Illisarvik the team studied a drained lake basin to see how plants colonise the newly-exposed ground. They also made a detailed snow survey in April, to see how snow depth affects vegetation in the drained lake basin. In August the research team made regular measurements of the permafrost in the drained lake basin and on the nearby tundra at Illisarvik. They also examined the development of ice wedges at Garry Island. The researchers now have 20 years of information about how the active layer (that is, the top part of the permafrost that thaws every summer) develops, and also about how the ground is slowly sinking above two ice wedges located in hills at Illisarvik. Based on the two decades of measurements, the researchers can tell that the the ground level started to sink in 2006, when the summer thaw depth reached the top of the ice wedges. The ground temperature in the permafrost shows that the ground is getting warmer due to on-going climate change at the western Arctic coast.

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File No: 12 404 837
Region: IN, GW

Licence No: 16035
Location: (71.992197°N, 125.261721°W), (69.34763°N, 124.07056°W), (69.51494°N, 132.82442°W), (68.4945°N, 135.84372°W), (68.31°N, 133.53°W), (67.61056°N, 135.78655°W), (67.44096°N, 133.74193°W)

EarthScope transportable array
The goal of the EarthScope project is to study earthquakes and volcanoes in North America in order to understand how the continent was created over millions of years and how it continues to change. The researchers are also studying the material deep under the surface of the earth, how the large 'tectonic' plates on the surface of the earth move around, and how human activities may cause more earthquakes. To do this, researchers have installed special earthquake sensors across North America, and continue to install more sensors as needed. So far, the project team has installed 290 ground motion sensors throughout Alaska and western Canada. Of these, 44 are in the Yukon Territory and nine are in the NWT. Each station senses ground movements caused by distant earthquakes and sends this data by satellite or radio modem to a central receiving point in San Diego, California. Sometimes the research team visits the stations to do maintenance on the sensors, and sometimes the researchers add new stations. There are several NWT stations where you can watch the earth's movements in real-time: Sachs Harbour station: http://anf.ucsd.edu/stations/TA/A36M;
Paulatuk station: http://anf.ucsd.edu/stations/TA/C36M;
Inuvik station: http://anf.ucsd.edu/stations/CN/INK; and
Tsiigehtchic station: http://anf.ucsd.edu/stations/TA/F31M.

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File No: 12 404 551
Region: SS

Licence No: 16136
Location: East Arm of Great Slave Lake

Metallogenic investigation of the East Arm
Recently, scientists have started to ask questions about the geological history of the East Arm of Great Slave Lake. This is the history over a very long time span, going back many years into the past. Now, the area needs to be re-evaluated by scientists to answer questions like, what are the rocks like under the soil and deep into the ground, and how did they get to be the way they are? Scientists also need to explain the metals that can be found in the ground in this area. The goal of this study is to answer questions about the geological history of the area and its metals, and to determine if there is a potential for mining in the area. The research team spent three weeks in the field mapping the bedrock and investigating the mineral deposits that may be mined in the future. They recorded the type of rock that they found in four large depressions, and the ways that forces like pressure and heat may have changed these rocks over many millions of years. They also examined mineral deposits and took samples that included rocks that contained gold, copper, nickel, uranium, and thorium. They found some attractive red chert, and took a sample to see if it might be used to make jewellery. Finally, they took samples of another rock to see if could be used in construction (to make stone buildings, for example).

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File No: 12 404 859
Region: NS
Licence No: 16039
Location: 10 km north of Yellowknife

City of Yellowknife gold project
The goal of this project is to find out how metals like arsenic and lead might get into lake water. These metals can come from either natural sources or pollution. To figure out how they might get into lake water, the researchers needed to study ground and water conditions. The researchers collected ground temperatures from three drill holes that went deep into the earth, and they found that the ground is not permanently frozen even at a depth of three metres (10 feet). They installed eight meters that measured water level and barometric pressure in eight different lakes. The information collected from these instruments shows that the water levels have dropped 20 to 40 cm (8-16 inches) due to the very dry conditions from 2014 to 2017. The researchers checked a map of recorded archaeological sites in the southern and eastern parts of their study area, and saw that there are several areas that may have undiscovered archaeological sites that should be investigated with field work. They conducted an archaeological survey of the western part of their study area and found no new archaeological sites. Finally, the researchers took water samples from eight lakes and found that the levels of arsenic and fluoride are higher than drinking water standards. The arsenic and flouride come from naturally-occurring sources in the bedrock.

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File No: 12 404 897
Region: DC
Licence No: 16139
Location: Tungsten mine site (Cantung Mine) at 61°57'58.2”N, 128°13'9.0”W

NATCL Cantung 2017 EEM program
Before closing down, the Cantung Mine had to monitor the effects of mine waste water on fish, fish habitat, and whether fish were safe to eat. The researchers have completed field work and written a summary report about this every three years since 2006. The study area for their monitoring programs is upstream of the Nahanni National Park. In 2017 the researchers visited the same study sites that they visited in 2006, 2009, 2012, and 2015. During each trip the researchers compare the health of water and fish in the Flat River downstream of the Cantung Mine to areas upstream of the mine, to determine if the mine is affecting the aquatic environment. The research team measured things like fish population numbers, fish size, fish health, fish food, water quality, and sediment quality. A summary report of results was completed in February 2018. The researchers found that, in 2017, mine wastewater from all sources did not appear to be negatively affecting fish, fisheries resources (food), or fish habitat in the Flat River.

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File No: 12 404 827
Region: SA
Licence No: 16064
Location: Within the Husky, ConocoPhilips, or MGM land parcels, between Norman Wells and Tulita

Establishing a watershed framework for assessing cumulative impacts of development
The goal of this project is to see how 'cumulative impacts' may affect the water within a whole watershed. Cumulative impacts are all of the changes to an area, including changes to the animals and human use of that area, that result from development, such as climate change, logging, and mining, when taken together. In 2017, the researcher collected sediment cores from six lakes in the study region to find out the concentration of hydrocarbons (including fuels like oil and gas) that were in the lake in the past. This will help the researcher understand the meaning of hydrocarbon concentrations in recent times. The researcher also took samples from stream sediments, and samples of the small animals that live in the water. Tests on these samples showed that there are varying amounts of metals and metalloids dissolved in the stream water, which means that there is a broad range of natural variability in the region. Finally, the researcher will use air or satellite photos to catalogue and measure the amount of human disturbance (like mining and roads) on the landscape.

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File No: 12 404 930
Region: IN

Licence No: 16092
Location: The Tarsuit Caissons (69°34'13"N, 138°58'19"W)

2017 Tarsuit Caissons removal program
No research was carried out under this licence in 2017.

Coyle, Maurice
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File No: 12 404 927
Region: GW, SA, DC

Licence No: 16058
Location: Mackenzie Mountains area (65°00.00N, 132°21.00W), (64°50.00N, 132°29.00W), (64°22.00N, 130°56.00W), (63°58.00N, 30°42.00W), (63°49.00N, 130°17.00W), (63°30.00N, 129°49.00W), (62°57.00N, 129°46.00W), (62°55.00N, 129°11.00W), (62°40.00N, 128°54.00W), (62°44.00N, 128°26.00W)

Mackenzie Mountains aeromagnetic survey
The goal of this project was to map out the earth's magnetic field in the Mackenzie Mountains using special instruments towed by twin-engine planes. Magnetic mapping like this can show the general location of certain minerals in the earth's surface, like iron-bearing minerals. It can also show us the composition of the bedrock, even if it's hidden under soil and lakes. These maps are also useful for locating oil and gas deposits and minerals to mine. The researchers surveyed about 77,000 km with two planes. The two planes flew at a constant height above the mountains. This means that they generally followed the peaks and valleys of the mountains, to ensure that the ground surface was close enough to the planes to take measurements while still being safe. The average flying height for the entire survey was around 2,000 feet above the ground. The magnetic field was successfully recorded throughout the study area by April 2018. Although the

survey was started in July 2017, due to very bad weather conditions in the area the survey flying was completed six months later than planned. As a result of this delay, the researchers are still processing the measurements and they are not yet ready for for publication.

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File No: 12 404 943
Region: IN

Licence No: 16166
Location: 68.53759°N, 133.65755°W

Effects of climate change and landscape perturbation on arctic tundra lake water quality

The goal of this research project is to study the large slumps that have recently appeared along the shorelines of many lakes in the Mackenzie Upland Region. These slumps, called 'retrogressive permafrost thaw shoreline slumps', happen when the permafrost is exposed by a slump. The permafrost thaws and then this causes more slumping. In particular, this project is looking at how the sediments from the slumps are getting washed into the lakes. This information is important because it will help scientists understand how the slumps may affect lake water quality as the climate warms. In September 2017, the researchers collected samples from slumps along the shore of a small tundra lake that drains into Noell Lake. There is a lot of scientific information already available for this lake from past research projects. The sample has been shipped to the Hydraulics Lab at the Canadian Centre for Inland Waters in Burlington, Ontario, which is run by Environment and Climate Change Canada. Over the winter of 2017/18, the researchers will conduct experiments on the sediment sample using a rainfall simulator and a special machine that simulates currents within the lake. The goal of this experiment is to see how quickly the sediments drop out of the water and settle on the lake bottom. There will be no results to report until after these experiments are completed.

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File No: 12 404 606
Region: SA, DC

Licence No: 16118
Location: Between 64°30'0"N, 122°30'0"W and 60°45'0"N, 127°30'0"W

Glacial limits of western Northwest Territories

The goal of this project is to understand when and how two different types of glaciers interacted during the last ice age. The research team knew from previous work that the large continental Laurentide Ice Sheet, which was approaching from the east-northeast, reached the foothills of the Mackenzie Mountains before the smaller glaciers moved out of the mountains from the west. To answer this research question, the researchers are studying 'erratics'. Erratics are large rocks that are broken off and picked up by a glacier as it moves across the land. Later on, when the glacier melts, these rocks are left behind on the land, often very far from where they originated. The researchers took samples from six erratics, which will be tested to get an estimate of when the glaciers advanced and retreated. The test the researchers are using measures changes in the surface of the erratics that are caused by cosmic rays hitting the new, broken surface after the glacier picked them up. Of the six erratics sampled, four were from continental glaciers and two were from smaller mountain glaciers. The researchers will soon publish an activity report that

describes their fieldwork and sampling in more detail. The mapping of the movement of the glaciers, and measurements that will tell the researchers when this happened, are in progress.

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File No: 12 404 931
Region: IN, GW

Licence No: 16093
Location: Ft. McPherson to the NWT/Yukon border (67°16.586”N, 135°3.812”W), (67°14.511”N, 135°16.858”W), (67°13.149”N, 135°30.478”W), (67°10.760”N, 135°42.330”W), and the Inuvik to Tuktoyaktuk Hwy (68°30.010”N, 133°47.576”W), (68°31.885”N, 133°51.044”W), (68°33.156”N, 133°52.608”W), (68°34.838”N; 135°42.330”W)

Forest ecotone experiment
The area where the forest changes into tundra is one of the largest vegetation transition zones in the world. Changes in this transition zone (for example, the treeline moving further north) due to changes in the environment might have far reaching consequences for humans and animals alike. The goal of this research project is to study the forest-tundra transition zone near Inuvik over the next few years to get a better understanding of how this important transition zone might respond to environmental change. During the 2017 field season the research team installed a range of different equipment along the new Inuvik-Tuktoyaktuk Highway. This equipment allows the team to monitor both the stress level of trees, and how this stress level responds to variability in weather conditions. The researchers hope to have some preliminary results from this study to share in 2018 that will show how the forest-tundra transition zone might respond to environmental change.

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File No: 12 404 881
Region: NS, SS

Licence No: 16114
Location: 75M, 75N, 76D, 76C

Slave Province surficial geology and permafrost study
The goal of this project is to study the permafrost and map the bedrock in the Slave Province. The research team installed a network of permafrost monitoring devices, and they expect the first measurements to be taken in the fall. They also took soil samples from the area to see if they could detect buried kimberlite, a crystalline rock that can indicate that diamonds are also present. Finally, the researchers used seismometers, which measure tiny movements in the earth, to determine the depth of the various layers of the earth’s surface. The researchers and their university partners are working on the information they collected. New geological maps were made and are being printed by the Northwest Territories Geological Survey. When complete, the results of this research will be published by the Northwest Territories Geological Survey (www.nwtgeoscience.ca/), and summaries will be presented at the 2018 Yellowknife Geoscience forum in November.

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File No: 12 404 744
Region: SA, DC

Licence No: 16165
Location: Liard (61.7°N, 121.3°W), Willowlake (62.7°N, 123.0°W), Wrigley (63.2°N, 123.6°W), Blackwater (63.9°N, 124.1°W), Redstone (64.2°N, 124.6°W), Keele (64.4°N, 124.8°W), Little Bear (64.9°N, 125.9°W), and Great Bear (65.0°N, 124.7°W) rivers

Glacial lakes McConnell and Mackenzie reconstructed from Pleistocene deltas of the Mackenzie River tributaries

This research project has two main activities. First, the researchers are studying the deltas that were formed by tributaries of the Mackenzie River during the Pleistocene epoch (a time period that lasted from 2.5 million years ago to about ten thousand years ago). Second, the researchers are looking for evidence of flooding in the area, and are collecting samples from these ancient floods to see when they happened. The fieldwork for this project was carried out from September 2nd to 9th, 2017, in the Ft. Simpson area. The researchers looked at the layers of exposed rock and sediments along the Mackenzie and Liard rivers, and took samples from ice age deposits. The samples included wood and other materials that could be dated using radiocarbon analysis. The researchers sent the samples to the University of Alberta to be processed, and then to the University of California at Irvine for radiocarbon dating.The researchers think that the water system, including the ancient glacial lakes McConnell and Mackenzie, was more complex than previously thought. More research is need to understand the history of the water system before and during the last ice age.

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File No: 12 404 944
Region: GW

Licence No: 16174
Location: Along the Dempster Hwy (68°03”N, 133°30”W)

Reconstructing history of hummocky soil formation in drunken forest

A ‘drunken forest’ is an area of forest where the trees lean in odd directions. This happens in places where there is a shallow permafrost layer and many small hills or mounds. As ice wedges in the ground thaw and re-freeze the ground moves up and down, which causes the trees to tilt. Black spruce forests typically grow on the shoulder of these mounds. The history of the ground moving up and down and displacing the trees can actually be ‘read’ in the growth rings of these trees. The researcher will use tree rings to reconstruct how the soil on the mounds formed over time. The research team have collected tree and soil samples from black spruce forests. The soil depth to the permafrost layer varied from 10 to 30 cm, depending on where on the mound the soil was sampled. The team found that trees standing straight up on the top of a mound have regular circular tree rings, while most trees growing on the mound edges have wider tree rings on the downhill side of the mound compared to the uphill side. They also found that the trees were leaning more on bigger mounds. In the next few years, the research team would like to use the tree ring data from this study to reconstruct hummock formation on permafrost.

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File No: 12 404 812
Region: IN

Licence No: 16135 **Location:**
Prince Patrick Island

Pliocene landscape and paleoclimate change on Prince Patrick Island

The purpose of this research project was to learn about earthquake risk, and the effects of climate change over the past five million years, on Prince Patrick Island in the western Canadian Arctic. The project's three main activities were 1) to look for earthquake faults, 2) to collect plant materials that were preserved in three-million-year old stream sands to learn about past climate, and 3) to collect quartz sand to study the age and nature of stream sands that once covered most of the western Arctic. The research team did not find any evidence of active earthquake faults, even though they surveyed regions where earthquakes have likely occurred in the past twenty years. The lack of evidence of active earthquake faults does not necessarily mean that there were no earthquakes in the region, but may instead mean that permafrost activity has disturbed the evidence and made it hard to find. The plant material that was collected from multiple locations west of Mould Bay will be studied over the next two years. The researchers will test the sand samples to get a precise date for when the stream sands were deposited. The ancient stream beds show that, around three million years ago, Prince Patrick Island had peat bogs, birch and larch forests, small ponds, and very large streams, similar to parts of Siberia today. The researchers do not think that the M'Clure Strait existed at the time of global warming three million years ago.

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File No: 12 404 938
Region: GW

Licence No: 16126
Location: 50 small lakes along the Dempster Hwy between Ft. McPherson (67.43°N, 134.88°W) and Inuvik (68.36°N, 133.72°W)

Predicting climate-driven changes in water quality and biological communities in Gwich'in lakes

This research project has two main goals. First, to study how thawing permafrost may affect water quality and the tiny animals that live in the water, known as 'zooplankton', in Gwich'in lakes. The second goal is to see if differences in the soil might change how the zooplankton react to thawing permafrost. During August 2017, the research team visited 29 small lakes located along the Dempster Highway between Inuvik and Ft. McPherson. At each lake, the team made underwater maps, collected water quality information, and collected zooplankton samples. The surface area of the sampled lakes ranged from about half of a hectare up to about 90 hectares (one hectare is about the size of a sports field). The lakes were usually between one and 10 meters deep. The water quality of the lakes was really variable. The researchers are currently studying the zooplankton samples in the lab, and it seems that there are large differences in the zooplankton species that are present in each lake. The researchers are trying to figure out if the species of zooplankton found in each lake relates to its water quality, which will help us understand the future impacts of climate change.

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File No: 12 404 687
Region: NS

Licence No: 16041
Location: Daring Lake

Biogeochemical controls on the structure and functioning of low arctic ecosystems

The goal of this research project is to study how Canadian arctic tundra ecosystems work in order to predict how they might be affected by climate change, and developments such as mining and pipeline construction, and other big changes. The researchers continued their field work on the terrestrial (land) ecosystems at Daring Lake in the Barrenlands tundra this summer. They looked at how well the plants were growing, and whether the plants were able to get the nutrients they needed from the soil. Studies like this help researchers understand and predict how the shrubs, sedges, msses and lichens in these areas will respond to climate warming. The research team had the opportunity to participate in the Daring Lake Science Camp along with about 20 northern high school students and several elders. They also presented a summary of their research at the Science Camp. In addition, two field assistants from the Tłı̨chǫ Summer Student Research Assistant Program, who were hired by the GNWT, worked with the research team on this project.

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File No: 12 404 878
Region: NS

Licence No: 15995
Location: Yellowknife, Lac de Gras, Ingraham Trail, and the Tibbitt to Contwoyto Winter Road

Quantifying permafrost thaw

The goal of this research project is to more clearly understand how permafrost differs from place to place, both in terms of its temperature and its chemical and physical characteristics. In 2017, team members worked around Yellowknife and near Lac de Gras, as well as in the area where the taiga turns into tundra south of Lac de Gras. They collaborated with the Northwest Territories Geological Survey in Yellowknife, with the Ekati Dominion Diamond Corporation near Lac de Gras, and with Kennady Diamonds at the KDI camp. In the Lac de Gras area, team members visited 43 sites where small instruments that measure ground and permafrost temperatures were installed in 2015. The team members took the temperature measurements wirelessly, so the soil was not disturbed. Soil samples that were taken in 2015 were analyzed at the Taiga Environmental Laboratory in Yellowknife. Results show that the permafrost and soil contain a lower concentration of dissolved minerals than other previously investigated areas, such as the Mackenzie Delta. These differences may affect how the ecosystems react to permafrost thaw. Around Yellowknife, the researchers measured the elevation of roads and other surfaces. These surfaces change as the permafrost below them thaws, so their elevation can be used by researchers to figure out how much ice has been lost from the soil as the permafrost thaws. They also measured soil water content and ice-loss in three areas around Yellowknife. The research team have retrieved the first year of ground temperature data and are now studying how ground temperatures differ between sites.

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File No: 12 404 939
Region: SA

Licence No: 16131
Location: The Ts'ude niline Tu'eyeta Candidate Protected Area at 66°10'21.22"N, 129°52'33.50"W and 66°14'07.62"N, 129°25'30.45"W

Understanding changes in aquatic ecosystem health and water quality in the Ft. Good Hope – ramparts area

The goals of this research project are to build community partnerships, identify field sites, and develop a sampling system for a long-term community-based program that will monitor wetlands near Fort Good Hope. The research team created these goals with input from community partners and Environment and Climate Change Canada while they were in Fort Good Hope this summer. The researchers visited classes from grades six to ten, joining teachers and community leaders to talk about environmental change and why it's important to study and monitor wetlands. The students took a field trip to a local wetland. Outside the classroom, the research team worked closely with two local monitors, learned about the cultural importance of T'sude Niline Tu'eyeta, and used local knowledge to plan access to the field sites. The research team, including the local monitors, traveled to wetland sites in the Fossil Creek area. The monitors taught the team about the importance of water to the Dene people, and the team taught the monitors how to collect scientific data (physical measurements) and samples of water and the small animals living in the water. These measurements and samples will be useful in the future because they are a snapshot of the conditions at this time, and they will help scientists study the potential impacts of environmental change.

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File No: 12 404 946
Region: IN

Licence No: 16187
Location: East branch of the Mackenzie River at (68°30'6.67"N, 133°50'27.20"W) and (68°29'49.08"N, 133°50'32.22"W)

Correlation of water quality parameters of a disturbed slump and an undisturbed river bank on the east branch of the Mackenzie River

The purpose of this project was to compare water quality parameters from two specific locations on the east branch of the Mackenzie River, one that is disturbed and one that is not. The disturbed site was selected because of a relatively large shoreline slump affecting the water. The undisturbed site was about a five-minute walk upriver from the disturbed site. The researchers wanted to test the idea that shoreline slumping, weather, and water temperature can change certain characteristics of the water, such as its acidity or alkalinity, dissolved or floating matter, temperature, and water clarity. What the researchers found in the field is that ice cover plays a more important role in seasonal changes in water quality than do slumps along the shoreline. Both disturbed and undisturbed sites became more acidic after they were covered by winter ice. Winter ice cover also caused the water to become more clear and to contain less dissolved and floating matter at both the disturbed and undisturbed sites.

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File No: 12 404 839 **Licence No:** 16036
Region: NS **Location:** Ekati claim block

EKATI engineering and environmental monitoring programs
This is an on-going monitoring program at the Ekati mine. The research team had two goals in 2017. First, to see if the Ekati Diamond Mine is having an effect on the surrounding aquatic (water) environment and air quality, and second, to provide information about undisturbed areas where mine development may occur in the future. The research team continued to gather data for their on-going monitoring program, which was designed to detect changes resulting from the mine's activities. To do this, they collected information about the water, air, vegetation, wildlife, wildlife habitat, soil, water quality, lake or riverbed sediment quality, and the tiny plants and animals living in the water. The Ekati and Diavik mines worked together to study grizzly bear DNA as well. The researchers also studied conditions in Lac du Sauvage, in lakes and streams near the Sable development, and at the outlet of Lac de Gras. In these locations, they looked at the water system and how it interacts with the weather and air. They did this by taking observations of the weather, water quality, and river and lakebed sediment quality. They also observed the plants, fish, and other animals that live in the water, and the behaviour of nearby wildlife. Results from this research program have been, or will be, made publically available through Dominion Diamond Ekati Corporation.

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File No: 12 404 710 **Licence No:** 16070
Region: IN **Location:** Inuvik

Polar airborne measurements and arctic regional climate model simulation project (PAMARCMIP)
The goals of this research project are to improve our understanding of the Arctic atmosphere, and to improve our ability to predict regional and global climates in the Arctic. The 2017 field work took place from March 13th to April 16th, 2017. The researchers took various measurements and observations of the air, in particular measuring differences between the air close to the earth and the air higher up in the atmosphere. These measurements were taken from airplanes. The flights started in Greenland, went west to Inuvik, and continued west to Barrow, Alaska, before returning along the same path. The research team also completed two science missions to the sea ice northeast and northwest of Inuvik. Here, they took additional measurements of the air and atmosphere. The sea ice in the area was rather thin, with a below-average first-year thickness. The researchers found that the atmosphere closest to the surface of the earth had a normal layered structure throughout the Canadian Arctic. The researchers found evidence that there are polluted air masses above the Arctic Ocean. They do not yet know where these polluted air masses may have come from. In general, they found lower levels of 'trace gases' (that is, all gases except nitrogen and oxygen) in the more southern regions of the Canadian Arctic compared to Eureka and Alert, which are much further north.

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File No: 12 404 906
Region: DC

Licence No: 15987
Location: Cantung, Flat Lakes, and Mac Creek areas

Geological mapping of the march fault
There were two goals for the 2017 field season. The first was to understand how the rocks in and around the Cantung mine were deformed by pressures in the Earth's crust approximately 100 million years ago, and the second was to understand how this may have influenced the formation of the tungsten ore that makes up the mine. The researchers made geological maps of the areas west of Cantung, west of the Little Nahanni River, south of the Pass section of the Nahanni, to about 12 km south of the Cantung mine. They also took samples from these areas. The microscopic features of the samples were analyzed in a lab at the University of British Columbia. These microscopic features tell the researchers what depth and temperature the rocks were at when they were deformed. The rocks in the area are layered sedimentary rocks that are 580 to 480 million years old. Approximately 100 million years ago, these rock layers were almost 12 km down in the Earth's crust, at temperatures of about 400° to 450°C, when they were squeezed together and bent into a series of large folds by plate tectonic forces. After these folds formed, approximately 98 million years ago, a large body of magma pushed up into the folded rock layers. This pushed some of the large folds upwards and flattened them like a pancake. The rising magma also caused the folded layers to break along numerous large, but very narrow, cracks. As the magma cooled into solid rock it released hot water rich in tungsten into these cracks. This tungsten-rich fluid underwent chemical reactions with the flattened folded layers on either side of the cracks, producing the tungsten ore that makes up the Cantung mine.

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File No: 12 404 717
Region: GW

Licence No: 16106
Location: Peel River at Ft. McPherson, Arctic Red River at Tsiigehtchic, Mackenzie River at Tsiigehtchic

Erosion of old organic carbon in the Mackenzie River basin
In early June 2017 the research team revisited the Mackenzie River Basin, the fifth year sampling river sediments and river waters since 2009. The advice and equipment support from the Aurora Research Institute was essential, as was support from local communities.

In 2017 the research team wanted to sample the rivers as close to ice-break up (freshet) as possible, because a lot of sediment and carbon are carried at this time of year. The team got to the Middle Channel of the Mackenzie Delta a few days after the East Channel had cleared of ice (on 3rd June 2017). River water and sediment samples were collected from 'depth profiles' within the river our depth sampler. The research team also collected samples from the Arctic Red and Peel rivers. In collaboration with the Aurora Research Institute, the team also started collecting samples through July to December on the Arctic Red River.

The research team are still analysing the samples and data. The first results show that the team have collected very sediment rich samples, which is what was hoped for. Two of the field trip

members are completing their PhDs, and the measurements form a main part of their new research.

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File No: 12 404 713
Region: GW

Licence No: 16022
Location: Mackenzie River near Tsiigehtchic (67°27'21"N, 33°45'11"W)

The Arctic great rivers observatory III

This project studies the six largest rivers that flow into the Arctic Ocean. The rivers in North America are the Mackenzie and Yukon, and the rivers in Russia are the Ob', Yenisey, Lena, and Kolyma. The research team is measuring the concentrations of naturally-occurring chemicals, such as carbon, nitrogen, and phosphorus, in all six of these rivers. Their goal is to obtain baseline information about the flow of these chemicals to the ocean to better understand how climate change is affecting Arctic rivers. This project has been running since 2003. The research team takes samples from each river every second month. The samples are being analyzed in the laboratory, and the results are being posted on a website as they become available (www.arcticgreatrivers.org). The results can be downloaded from this website for free. In the NWT, samples from the Mackenzie River are being taken by staff at the Aurora Research Institute. During the summer, they use a motorized boat to take samples from the mid-point of the river just upstream of the Tsiigehtchic ferry crossing. During the winter, they use an ice auger to take a water sample from the same location. Eight litres of water are taken during each sampling trip, which is brought back to the ARI lab in Inuvik.

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File No: 12 404 808
Region: NS

Licence No: 16014
Location: Snap Lake Mine

De Beers Canada Snap Lake Mine environmental monitoring

The goals of this project are to fulfill the requirements of the Snap Lake Mine's Land Use Permit, Water License, Environmental Agreement, and Fisheries Authorization. Another goal is to meet De Beers' corporate commitments on the environment. Snap Lake Mine is currently in the 'care and maintenance' stage, which means that the mine is no longer active and all work at the site is directed towards closing the mine after the conditions of the various licenses and permits are met. For this reason, all of the monitoring activities in 2017 were related to the mine closure. This included monitoring the water systems, the plants and animals that live in the water, the plants and trees around the mine, the nearby wildlife, and so on.

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File No: 12 404 861

Licence No: 16158

Region: IN **Location:** Southern Beaufort Sea

Canada-Korea-USA Beaufort Sea geoscience research program: 2017 activities
The goal of this multidisciplinary field program was to study what happens when the permafrost under the ocean starts to melt and degrade, and how this affects the 'gas hydrates' in the permafrost. Gas hydrates are ice crystals with methane frozen inside of them, which are important for two reasons. First, if they melt or are disturbed, they release methane (a greenhouse gas) in huge quantities. And second, they may be a good source of natural gas to extract using drills and rigs. The research team was studying many different things. They were mapping the layers of the ground, mapping the location of permafrost under the ocean, studying the micro-organisms found in the permafrost, searching for hazards in the ocean that might affect development, and studying the possibility of earthquakes. Earthquakes can cause the gas hydrates to melt and explode. The expedition focused on two main areas in the Canadian Beaufort Sea: the Mackenzie Trough and western shelf off the Yukon coast, and the eastern shelf and slope areas offshore of Tuktoyaktuk. The researchers will analyze and interpret the information they collected in the coming months. Copies of their publications, including the full report from their 2017 research cruise, will be given to the Aurora Research Institute.

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File No: 12 404 925 **Licence No:** 16026
Region: IN **Location:** Trail Valley Creek (68°44.734"N, 133°30.003"W)

Radar remote sensing of snow
The goals of this research project are to understand and explain the role of snow microstructure (the structure of snow that is visible under a microscope). Research was conducted at a camp near Trail Valley Creek from April 7th to May 1st, 2017. The researchers used a special instrument known as the 'University of Waterloo scatterometer' to take measurements of the snow. This instrument aims a radar at the snow, and then uses the radio waves that bounce back to it to study the snow. They also took measurements and observations of the snowpack and snow microstructure, which helps to ensure that the scatterometer was working properly. They visited 11 sites, conducted 303 radar scans, and dug 35 snowpits to study the snow at different depths. The researchers are analysing the information they collected to see if shrubs on the ground affect how the snow changes over time. The researchers also did a series of special experiments to test out the scatterometer. They compared the snow on shrub-covered ground with the snow on shrub-free ground using radar calibration targets that had been buried in the snow. They also looked at how the snow melted and refroze overnight, and removed thin layers of snow, to see how the scatterometer measurements were affected. All of these measurements and tests will help the researchers be certain that the scatterometer is working well.

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File No: 12 404 116 **Licence No:** 16117

Region: SA

Location: Between Dale Valley (63°15'58.18"N, 130°5'6.37"W) and Caribou Pass (63°34'21.70"N, 129°12'4.19"W)

A mass-energy analysis of permafrost and vegetation change across a Mackenzie Mountain treeline ecotone: 1944 to 2017

The goals of this research project are to study how and why ice-rich permafrost landforms and the plant 'community' change across the treeline. A plant community is all of the plants, shrubs, and trees that are found together in an area. In July, the research team surveyed ice-rich permafrost along the North Canol Trail in the Mackenzie Mountains. Previously, other researchers had used satellite images and aerial photography to study the area. The current project confirmed the presence and extent of soil characteristics that could not be seen from the air or from space. In August, the research team helped with the annual Earthwatch program, hosted by Dechen La Lodge. During Earthwatch, there was an international team of volunteer field assistants that did research on permafrost thaw and the tree line. In September, the research team chose an area where they would do their water systems and weather research. They dug a series of water level observation wells and installed a weather station in the area. The weather station is currently logging temperature and moisture levels in the soil, and atmospheric conditions above ground.

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File No: 12 404 918

Licence No: 16002

Region: NS

Location: Beaulieu River (112°23'10.462"W, 62°54'15.494"N), (112°21'5.256"W, 62°50'19.035"N)

Beaulieu River belt collaborative VMS project

The goal of this field work was to study the 'geological history' of ancient volcanic rocks along part of the Beaulieu River near Sunset Lake. The geological history is the history of the volcanic rocks over many millions of years as they are changed by factors such as heat and pressure. The researchers recorded information about the type of rocks, the temperatures and pressures they were likely exposed to, the types of changes that happened to the rocks, and where the pressure came from. The researchers also checked for metals such as copper, zinc, and gold. Rock samples were collected so they could be studied in more detail later. Another objective of this research project was to study the glacial history of the Sunset Lake area. The researchers mapped out indicators, or signs, that told them in what direction the ice moved, and the shape and orientation of rock outcrops that were affected by ice movement. They took samples of rocks that were left behind by the glaciers so they could be analyzed in a laboratory. These samples will provide information about possible local and regional mineral deposits. The information that was collected will be presented at the Yellowknife Geoscience Forum (November 14th to 16th, 2017), and will be published as a preliminary bedrock map by the Northwest Territories Geological Survey.

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File No: 12 404 545

Licence No: 16056

Region: IN, GW

Location: Ft. McPherson area (67°27.293”N, 134°48.081”W), (67°15.142”N, 135°13.847”W), (67°10.850”N, 135°43.421”W), (67°16.300”N, 135°3.526”W), drained lake (67°31.265”N, 135°18.543”W), Inuvik area (68°23.019”N, 133°45.355”W), (68°31.732”N, 133 44.665”W)

Permafrost in the western Arctic

In this project, the researchers used both field-based studies and air or satellite photos to study permafrost conditions and map changes in the landscape of the northwestern NWT. They used an unmanned aerial vehicle (a drone) to take air photographs and thermal images. Thermal images are like photos, but instead of showing a picture in full colour they instead show how hot or cold the things in the image are. They used these images to monitor some large changes to permafrost. For example, they looked at retrogressive thaw slumps, which are areas where the earth is sinking due to permafrost thaw, and man-made disturbances such as roads and borrow pits. The researchers also used satellite images to map out permafrost thaw features to see how quickly they are changing and to see which streams, lakes, and coastal areas are being impacted by permafrost thaw. They mapped the Dempster to Tuktoyaktuk road corridor, the Peel Plateau, and Banks Island. In winter 2017, the research team also partnered with the Department of Infrastructure to drill several boreholes between Inuvik and Tuktoyaktuk. They used the boreholes to study the permafrost, ground stability, and soil chemistry. Samples from the boreholes are being studied at the University of Alberta. Special thermometers that will record ground temperatures over time were placed in the boreholes. Studies of landscape change and permafrost monitoring will continue into 2018-2019, with an increasing focus on communities and the surrounding environments.

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File No: 12 404 929
Region: IN

Licence No: 16090
Location: Between Inuvik and the Beaufort Sea coast (68°32'14.25"N, 133°34'25.23"W), (68°57'42.42"N, 133°38'9.09"W), and (69°17'14.57"N, 134°30'1.26"W)

Long-term perspectives on aquatic ecosystem change with thawing permafrost

The goal of this research project is to study how increased permafrost thaw slumping has impacted lakes along the Inuvik-Tuktoyaktuk Highway since 2005. A total of 65 lakes were re-surveyed to follow up on an initial survey that was done in 2005/06. A water sample was taken from each lake. In about half of the lakes (28 lakes in total), the researchers also used special nets to collect plankton, which are the tiny plants and animals that live in the water. The plankton were collected to study how thaw slumps might change the living systems in the water. The plankton are currently being analyzed by a student, who will report the results in their thesis project. The water chemistry of the water samples was analyzed by Taiga Environmental Labs in Yellowknife. The data are still being analyzed, but when the analysis is complete all of the information collected about both water chemistry and plankton will be open to the public. Copies of all scientific manuscripts that the researchers write will be sent to the Aurora Research Institute.

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File No: 12 404 852
Region: NS

Licence No: 16037
Location: Kirk Lake watershed and Kennady Lake watershed

De Beers - Gahcho Kué 2014 environmental monitoring program

The goal of this project is to study the environment around the Gahcho Kué mine to see whether the mine is affecting the surrounding area. To do this, the research team monitor a lot of things. This includes the nearby lakes and rivers, and the plants and animals that live within them. They also monitor water quality, and the quality of lake bed sediments, both within the mine area and in downstream lakes and channels. They check the soil, vegetation, and wildlife, and monitor fish health, air quality, and chemical changes in the soil. The researchers also observe the weather and take measurements of the snow pack every year. They record the rate that water flows in channels downstream from the mine, and record lake elevations. Snow berms along the winter road are measured, and wildlife surveys are conducted every week. The researchers also check for dust in the air and on the ground. The researchers are working with the University of Waterloo to monitor Arctic grayling . An annual fish-tasting is conducted with six aboriginal groups, and aboriginal employees and contractors are hired to help with the survey work where possible. Also, Ni Hadi Xa is conducting traditional knowledge monitoring in the family culture region that surrounds the mine.

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File No: 12 404 803
Region: IN

Licence No: 16103
Location: Panarctic satellite F-68 well site at Satellite Bay, Prince Patrick Island (77º17’27”N, 116º55’10”W)

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

This project has two main goals. The first is to remove and dispose of historic waste such as barrels, batteries, debris, and wood that were left at the site. The second is to construct a special containment structure on top of the existing buried waste area that will be used to store soil and waste. The site is an abandoned well site near Satellite Bay at the northern end of Prince Patrick Island. The well was drilled in 1971 by BP Exploration Canada Limited, and was abandoned shortly after that with only limited clean-up. There were a variety of waste materials left at the site, including soil containing fuel and metals, used drums and scrap metal. The field work for this project took place between June 28th and September 10th, 2017, but there were several weeks of weather-related delays during June and July. This shortened the 2017 field season, so the team only completed the following tasks: 1) established two temporary camps, 2) completed environmental sampling, 3) gathered, tested, and removed barrels, 4) removed debris and waste, 5) dismantled and removed a metal building, 6) dug out areas of impacted soil and took samples, and 7) partially completed the containment structure and installed some ground thermometers. The remaining clean-up and building of the containment structrue will happen in 2018.

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File No: 12 404 621
Region: NS

Licence No: 15983
Location: Daring Lake Tundra Ecosystem Research Station

Toward predicting future tundra carbon balance
The goal of this project is to study how the plants and soil in the tundra interact with the atmosphere (the air). This will help scientists predict how changing tundra vegetation will affect the climate in the future. In 2017, the research team made its first trip to the Daring Lake Tundra Ecosystem Research Station. The researchers set up three of the four research sites, and measured late-winter snow at all sites. A bear had destroyed one of the sites in the fall of 2016. The researchers set this site back up, and visited their other stations to do some maintenance. Two student researchers maintained other special instruments, and did surveys of the plants and soil thaw. They also took measurments of methane, an important greenhouse gas, at a wetland site. Finally, the research team worked with various science teams from the NASA ABoVE (Arctic Boreal Vulnerability Experiment) project. The NASA project included flights over the research site throughout the summer. The aircraft that made these flights were outfitted with many different scientific instruments that collected information about the plants, shrubs, soil, and permafrost at the site, and measured how carbon moves between the earth and air. Carbon is present in the water, land, and in every living thing, but it is also an important greenhouse gas when it is in the form of a gas in the atmosphere (in the air).

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File No: 12 404 758
Region: IN, GW

Licence No: 16077
Location: Core sites (N68.82816, W133.20030), (N69.12682, W132.93147), (N69.07905, W132.96325), (N68.315157, W133.428259), (N68.648, W133.626), (N68.59476, W133.72319), (N67.234565, W135.38760), (N71.98704, W125.25402), (N71.98245, W125.54319), (N72.01232, W125.20729), (N72.02425; W125.27744), (N72.02494, W125.27372), (N72.01212, W125.21447), (N69.05891, W134.13219), (N68.76454, W133.54950), (N69.36256, W133.03657), (N69.366, W133.035), and new sites in 2017 (N72.417, W124.586), (N72.437, W124.071), (N69.189202, W132.995430), (N69.103069, W133.084753), (N68.862708, W133.548601), (N72.061, W125.348), (N72.296, W125.42), (N72.635, W124.69), (N72.953, W124.339)

Drivers and constraints of ecological change in the western Arctic
The goal of the Arctic Landscape Ecology Lab at the University of Victoria is to understand why northern vegetation and permafrost are changing, how quickly they are changing, and to assess

the impact of these changes. To accomplish this, the research team use air photos, field studies, and computer programs to look for changes at a small scale, and also for changes that occur across the region or the continent. In 2017, their work focused on western Banks Island and the coast around Tuktoyaktuk. On western Banks Island, the team looked at why plants haven't been growing well and why the ground is much dryer in low-lying areas. They walked transects and measured vegetation, soil moisture, and permafrost thaw depth at 19 sites. The team also observed how geese are using their habitat, to see if there are any changes in habitat use due to the population growth of lesser snow geese. All sites were also photographed from the air using an unmanned aerial vehicle (a drone). The researchers found that the plants aren't growing as well due to the combined effects of decreased surface water and soil moisture, and increased snow goose foraging. In the Tuktoyaktuk coastlands the team are studying changes in vegetation, soils, permafrost, and snow. In 2017, they set up 14 monitoring sites near the Inuvik-Tuktoyaktuk Highway. These sites were also surveyed using drones.

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File No: 12 404 917 **Licence No:** 16191
Region: NS **Location:** Hwy #3 past the Yellowknife Airport (62°27'36.29"N, 114°31'12.17"W)

Boreal forest carbon balance studies
No research was conducted under this licence in 2017.

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File No: 12 404 932 **Licence No:** 16099
Region: NS **Location:** Acasta River (65°11'18"N, 155°37'20"W), (65°09'30"N; 155°31'30"W)

Geochemical and isotopic studies of Acasta Gneiss Complex, the oldest terrestrial rock on earth
No Summary available.

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File No: 12 404 485 **Licence No:** 16067
Region: IN, GW **Location:** Mackenzie Delta

Biogeochemistry of lakes in the Mackenzie Delta
This goal of this long-term project is to study the lakes in the Mackenzie Delta as a whole 'ecosystem' to better understand how climate change might impact the Mackenzie Delta and other arctic deltas. In May, the research team took samples of bottom sediments from 34 lakes near Inuvik while the lakes were still covered by ice. The samples were analyzed to determine the quality of their 'organic content'. Organic content is the decaying plant and animal matter in the

sediment, and higher quality sediment is a better food source for bacteria living in the sediment. From June to August, the team visited six lakes near Inuvik and took sediment samples every three weeks. The samples were used to measure what was happening with the methane in the sediment (methane is an important greenhouse gas that can move from lakes into the atmosphere). To do this, they also studied how quickly the methane was consumed by bacteria in sediments taken from the lake bottom. The researchers divided the lake bottom sediment into layers that were from different depths, and took water samples from the different layers. The sediment water samples were sent to Simon Fraser University and the University of Maryland to check for methane content, among other measurements. The research team have found that the quality and quantity of decayed plants and animals in the lake bottom sediment differs a lot among the lakes, but they can't yet tell what effect this has on methane escape from the lake sediments.

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File No: 12 404 905
Region: DC, NS, SS

Licence No: 15982
Location: (60°56'45"N, 117°21'37"W), (60°56'11"N, 117°22'06"W), (61°36'53"N, 117°09'36"W), (61°41'28"N, 116°57'10"W), (61°44'14"N, 116°50'03"W), (61°47'46"N, 116°44'31"W), (61°42'49"N, 116°49'07"W), (62°29'20"N, 116°31'44"W), (62°27'02"N, 116°29'44"W), (62°20'44"N, 116°28'46"W)

Impacts of forest fire on discontinuous permafrost in the south-western Northwest Territories

Understanding how permafrost will change as a result of a warming climate is essential for residents and governments of northern regions, as well as land managers and those who work with buildings and roads. The scientists who predict how permafrost will change due to climate warming usually don't include forest fires, even though severe fires can speed up permafrost thaw. Also, fires are getting more frequent and severe as the climate warms. The goal of this project is to look at how permafrost changes after a forest fire passes through an area, in order to improve our ability to predict how permafrost will change in the future. From 2015 to 2017, the research team set up 18 sites between Kakisa and 80 km northeast of Yellowknife. Instruments at the sites measure air temperature, ground temperature, and snow depth. In addition, the researchers are taking measurements and mapping both frozen and thawed zones. Sites that were investigated in 1962, when they had permafrost, were re-examined to see what impacts fire and climate change have had over the past fifty years. At some sites, a thicker frost table has developed and there has been a possible loss of permafrost. The sites with the greatest changes generally had sand and gravel with a thin organic layer on top (the organic layer is made up of decomposing plants), whereas peatland sites had changed less.

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File No: 12 404 945
Region: GW

Licence No: 16178
Location: Dolomite (Airport) Lake (69°17'39.34"N, 133°32'8.3"W)

Temperature and oxygen concentrations in Dolomite (Airport) Lake
No research was conducted under this licence in 2017.

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File No: 12 404 529
Region: GW, SA
Licence No: 16087
Location: Bonnetplume Lake

Mackenzie Mountains bedrock mapping and stratigraphic studies
The goal of this research project is to improve the understanding of bedrock geology in two regions of the Mackenzie Mountains. This includes how the layers were folded, the locations of fault lines, how the different layers relate to one another across large distances, the history of movement of tectonic plates, and the presence of mineral showings. The research team did fieldwork in the western Mackenzie Mountains for four weeks in July and August 2017. They worked at Goober Lake and Poacher Lake for two weeks each. Small teams stayed at some sites for short periods of time in low-impact tent camps. The researchers either used helicopters to fly, or else hiked, to 450 bedrock exposures located on mountain ridges or stream banks. Ten sites were studied in detail. Researchers recorded the locations and rock descriptions, took photographs, and measured rock thicknesses and orientations. They also collected about 200 rock samples, varying from walnut-sized to slightly larger than a loaf of bread. Samples were shipped to the Geological Survey of Canada in Calgary, where their composition, fossils, age, and chemistry will be studied. The researchers will produce new geological reports and maps of the bedrock geology for the western Mackenzie Mountains, which will be made publicly available.

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File No: 12 404 868
Region: SA
Licence No: 16019
Location: Canol Heritage Trail (63.246164°N, 130.029783°W to 63.475206°N, 129.361818°W)

Long-term ecological and geomorphological investigations in the alpine tundra of the Mackenzie Mountains, NWT
The goals of this project were, first, to study recent permafrost thaw, and second, to track any movement of the treeline due to climate change, in the western Mackenzie Mountains. It appears that warmer temperatures have indeed thawed the permafrost. Thawing is deepest at high elevations, though some permafrost mounds at the lowest-elevation site had collapsed catastrophically at some time in the last two years. As permafrost thaws, Arctic landscapes will change, sometimes abruptly, and plants and animals living in the area may find themselves unable to adapt. The treeline was the other major focus of this research project. Warmer temperatures could mean that trees might be able to grow further north, or further upslope in mountainous areas. The researchers have been planting tree seeds in the area to see how they grow, and they checked on these during 2017. The researchers found that south-facing alpine slopes may be ideal environments for new tree growth. However, there appear to be two limits on treeline expansion. First, trees along the Canol Trail do not currently produce enough good seeds. Second, seeds that fall in shrubby areas are quickly eaten by small mammals. In 2016, small cages were placed on half of the seeded areas to prevent animals from eating the seeds. These

cages kept out small mammals, and are showing that seed-eating is limiting the advance of the treeline.

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File No: 12 404 935 **Licence No:** 16112
Region: GW **Location:** Inuvik (68°24'52"N, 133°46'11"W)

Inuvik SuperDARN radar facility

Just as high and low pressure systems drive weather in the earth's atmosphere, high and low voltages drive weather in space. The Inuvik SuperDARN radar network is designed to measure voltage patterns several hundred kilometers above the ground. The voltage patterns near the earth project out into space along the earth's magnetic field lines. The SuperDARN radar in Inuvik is part of a worldwide network of more than 35 radars that monitor the space weather conditions in the upper atmosphere. The radar takes a scan every minute, 24 hours a day, 365 days a year. The only exceptions to continuous scanning in 2017 were a few intermittent power outages at the beginning of the year. The scans from the Inuvik radar were shared with researchers worldwide. SuperDARN engineers from Saskatoon visited Inuvik from August 9th to 16th, 2017, to perform maintenance at the site. The engineers tested the radar electronics to make sure they were working properly and calibrated them when required. Several water leaks in the radar control building were fixed as well. The guy ropes and anchors that hold up the antenna towers were inspected and fixed where required. The engineers also cleared the brush around the antenna towers. There have been no significant changes to the project, and the SuperDARN radar will continue to operate in 2018.

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File No: 12 404 248 **Licence No:** 16052
Region: IN **Location:** Beaufort Sea

Beaufort marine hazards / Integrated Beaufort Observatory

The purpose of this project is to monitor the Canadian Beaufort Sea over a long period of time. Northerners, northern governments, and offshore industry need long-term observations of the Beaufort Sea in order to make strategic plans. The expedition began at Cambridge Bay on September 15th using the resarch ship Sir Wilfrid Laurier. The lead team from DFO worked with its project partners in ArcticNet to map the seabed. The Integrated Beaufort Observatory is a long-term monitoring project, and its activities change little from year to year. The researchers find, maintain, and replace special instruments that are attached to the ocean floor. These instruments are recorders that take and store measurements of ice thickness and ridging, storm waves, sea level, ocean currents, water temperature and salinity, the sounds made by ocean mammals like whales, and plankton. The researchers stop at points along the ship's track through the Beaufort Sea to measure various properties of seawater between the ocean surface and a depth of 500 meters. All activities that the researchers intended to do were completed, with an almost perfect recovery of the information that was stored on the recorders since October 2016. Since returning

to the Institute of Ocean Sciences in mid-October, the research team have processed and interpreted the data that they collected.

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File No: 12 404 664
Region: DC

Licence No: 16033
Location: Glacier Lake (62°04”N, 127°32”W), Brintneii-Bologna leefield (62°05”N, 127°50”W)

Holocene glacier fluctuations in Nahanni National Park Reserve, Northwest Territories, Canada
No research was conducted under this license in 2017.

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File No: 12 404 822
Region: IN

Licence No: 16189
Location: Mackenzie Shelf and Amundsen Gulf

Integrated regional impact study of the coastal western Canadian Arctic
The goal of the ArcticNet research program is to study the changes happening in the Canadian Arctic coastal marine ecosystem due to climate warming. The program is focused on the continental shelf and slope portions of the seabed. The researchers working on this project record information over a longer time-period and a larger area than previous studies. This research program will contribute important information that is needed by governments to make decisions about industrial development, regulations, and management in the offshore Beaufort Sea. The research team took samples in the Inuvialuit Settlement Region while onboard the Canadian research icebreaker CCGS Sir Wilfrid Laurier. They worked with their project partners, the Integrated Beaufort Observatory. Seawater was sampled using a special instrument that was lowered into the water, and measurements were taken of salinity, temperature, depth, and the concentration of particles. The researchers also mapped the seabed during transit, and collected measurements of the sea surface temperature and conductivity. They also collected information about the air using a special instrument that was mounted near the water intake of the ship. The researchers are using the information they collected during the 2017 CCGS Sir Wilfrid Laurier expedition to better understand the impacts of climate change on the physical, biological, and geochemical processes in the Canadian High Arctic.

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File No: 12 404 923
Region: SS

Licence No: 16051
Location: Taltson Hydroelectric Facility

Taltson hydroelectric facility aquatic monitoring

The goal of this on-going monitoring project is to check how the annual shutdown of the Taltson Hydroelectric Facility affects the area of the Talston River immediately downstream from the facility. The annual shutdown does affect this area, and the monitoring project team hopes to figure out which way of running the shutdown has the smallest impact on the area. Every year in mid-August, the Twin Gorges dam shuts down so the power-generating station can be serviced and maintained. During the shutdown, the flow of the Taltson River is reduced downstream of the powerhouse to Elsie Lake (this is referred to as the tailrace). When the river flow decreases fish are stranded and die. The researchers want to provide information to the Northwest Territories Power Company about where the fish are coming from in the tailrace and Elsie Lake, based on their fieldwork and other research. It appears that the fish in the tailrace and Elsie Lake are from a resident self-sustaining population, and that the fish community persists despite the deaths that happen during the yearly shutdowns. This monitoring is contributing towards obtaining a Fisheries Act Authrorization from the fisheries and Oceans for the annual shutdown.

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File No: 12 404 928 **Licence No:** 16089
Region: IN, GW, SA, DC, NS, SS **Location:** All NWT

NASA ABoVE airborne campaign

The 2017 ABoVE Airborne Campaign was one of the largest airborne experiments ever conducted by NASA's Earth Science Division. It involved nine aircraft and more than 100 flights between April and October. The aircraft sampled over four million square kilometers (about three times the size of the NWT) in Alaska and northwestern Canada. Often, field crews on the ground visited the same areas that were flown over, on the same day, to make more measurements and observations. This links field-based studies (on the ground) with airplane and satellite measurements (taken from the air). The planes had very specific scientific instruments on them. One instrument took images that can be used to make 3-D models of the ground and see what covers the earth. Another took images that show the plants and trees covering the ground. Another takes detailed maps of the topography, while another measures the concentrations of carbon dioxide and methane in the air near the ground. The planes flew over field sites that were operated by the ABoVE science team. They also flew over research sites that were operated by the Canadian Cold Regions Hydrology project in the tundra near Trail Valley Creek, Havipak Creek, Smith Creek, Scotty Creek, and Daring Lake. They flew over the Slave River and Slave Delta watershed, the Peace-Athabasca Delta, and numerous forest and fire disturbance plots throughout the Northwest Territories that are maintained by the Canadian Forestry Service and Government of the NWT, among others.

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File No: 12 404 940 **Licence No:** 16134
Region: SA **Location:** Redstone River area

Quaternary stratigraphy in the Redstone River area

The goal of this research project is to study exposed riverbanks along the Redstone River and some of its minor tributaries. The researchers want to figure out where the sediments in the

riverbanks came from and what's in them. The research team conducted this sediment study in part of the Redstone River in the summer of 2017, in partnership with local claim holders. In this area, two streams (Harriet Stream and Moose Nest Creek) merge with the Redstone River. The Harriet Stream valley runs west to east and contains large terraces of coarse river sediments. The Moose Nest Creek valley runs north to south and briefly connects with the Harriet Stream before it reaches the Redstone River. The Moose Nest Creek meanders through a large floodplain rich in organic (decaying plant) matter and flanked by gently sloping walls. These valley walls are covered with clay sediments that formed at the bottom of a glacial lake, shortly after the last glaciation. The study reveals that these clay sediments in the study area are susceptible to slumping. The researchers found old soils below deposits from the last glaciation, suggesting that an ancient river existed in this location even before the last glaciation. This is a common setting for placer gold deposits in the Klondike. The researchers took sediment samples during the summer of 2017 and found a low but unexpected gold content.

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File No: 12 404 892
Region: DC

Licence No: 16059
Location: Scotty Creek research camp area sites (61°17”N, 121°17”W), (60°23”N, 122°24”W), (62°36”N, 122°36”W), (61°11”N, 120°5”W), (62°26”N, 121°16”W), (61°24”N, 121°27”W), (61°9”N, 119°55”W)

Effects of fire on peatland permafrost stability and carbon cycling
The goal of this research project was to see how wildfire affects permafrost in peatlands, and how both wildfire and permafrost thaw affect stream water. During the 2017 field season, the researchers visited sites along the highway between Wrigley and the Alberta border. They measured the soil temperature and seasonal thaw depth at several peat plateau sites. They found that wildfires do increase seasonal thaw depths on peat plateaus for 30 years after a fire, until the trees and other plants have almost fully recovered. The research team also found that, for several decades following a wildfire, the fire accelerates the expansion of the irregular bogs that form when permafrost thaws. This information is important for understanding the impacts of wildfire and climate change on woodland caribou habitat, for example, and also for traditional land-use activities such as hunting. The researchers took water samples at Scotty Creek (where there was a fire in 2013) and Notawohka Creek (where there were no fires in 50 years), near Jean Marie River. They found that the 2013 fire had a minor impact on the water chemistry of the creek, but that the it caused the creek to flow more deeply through the peat plateau. Finally, the research team sampled water chemistry and methane emissions in five ponds near Wrigley in the Smith Creek catchment. Their goal was to understand the impacts of permafrost thaw on methane emissions from ponds, and also on downstream water quality.

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File No: 12 404 893
Region: IN

Licence No: 16066
Location: Three lakes near Inuvik (Lake 520, 68°18'42.102"N, 133°43'35.94"W; Lake 129,

68°18'18.3774"N, 133°50'34.4754"W; Lake 56, 68°19'22.7706"N, 133°50'45.6"W), two lakes in the lower Mackenzie Delta (Swiss Cheese Lake, 69°13'31.6158"N, 135°14'32.2434"W; Manta Lake 69°13'6.1854"N, 135°12'11.3394"W), two lakes on North Richards Island (site 1, 69°22'15.2502"N, 134°26'46.068"W; site 2, 69°40'46.9806"N, 134°25'55.38"W)

Studies of methane release from lakes in the Mackenzie Delta and on Richards Island
The researchers measured methane concentrations in ice-covered lakes over the winter using remote sampling devices. Their goal was to assess how much methane is released from Arctic lakes. Methane is a potent greenhouse gas that may increase global warming, and as the climate warms more methane may be released from Arctic lakes. This research built on prior studies started in the summers of 2015 and 2016. During those studies sampling devices were placed in nine different lakes in the Mackenzie River Delta and on North Richards Island. In August 2017, the researchers visited Inuvik and traveled to the field to recover the sampling devices from the lakes. When they looked at the information that was logged over 2016, they found variable build up and release of methane from the ice-covered lakes. One important thing that they found is that some, but not all, lakes have less methane during the spring ice out period. This depends on the connection of the lakes to the river, and the height of the spring flood. The results from 2017 show that the amount of methane released from a lake seems to be consistent from year to year, but further study will be needed to confirm this.

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File No: 12 404 876 **Licence No:** 16176
Region: SS **Location:** Hwy #5 west of Ft. Smith

Structure, carbon dynamics, and silvichronology of boreal forests
The goal of this on-going project is to study how carbon moves between trees, animals, the air, and the earth. The team of six members visited Ft. Smith and Wood Buffalo National Park for about two weeks in mid-September to conduct field research. They collected tree ring samples to study how trees grow in relation to climate change. They took samples of the air coming out of the forest floor and tree stems to check for gases that are indicators of climate warming. Finally, they made a special three-dimensional (3D) image of the forest, including all of the trees and other plants. This was made using a ground-based 3D laser. The laser mapped out the structure of the forest in a way that allowed the researchers to assess changes in the forest structure that resulted from natural disturbances. The field work was mostly successful, although some of the planned activities (for example, studies of carbon dynamics of forest ecosystems) could not be done. The research team were unable to collect forest litter from litter traps, or to download temperature and soil moisture information from 2016-2017 from the data loggers. They plan to return to Ft. Smith to finish their field work.

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File No: 12 404 779
Region: SS

Licence No: 16082
Location: 5 km NE of the Gahcho Kue Mine

Kennady North Diamond Project
The goal of this research project is to document existing environmental conditions around the Kennady North Diamond Project mine site. The researchers monitored fish migrations in the Yellowknife River at the Bluefish Hydroelectric Plant. This monitoring project was completed in 2017, and was required by the mine's Fisheries Act Authorization. The research team observed lake whitefish, lake trout, lake cisco, and northern pike. All of these fish species migrated up the Yellowknife River to the Bluefish Plant for fall spawning and feeding. The research team constructed a small spawning bed as a pilot study to see if improvements to the natural spawning area would lead to increased egg survival. It does appear that the artificial spawning bed increases egg survival, but further studies and discussions with Fisheries and Oceans Canada are needed to see whether the spawning bed should be expanded.

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File No: 12 404 779
Region: NS

Licence No: 16084
Location: Yellowknife River between Prosperous Lake and Bluefish Lake

NTPC Bluefish Hydro repairs
The Northwest Territories Power Corporation started to construct a new dam at the Bluefish Hydroelectric Facility on the Yellowknife River in 2011. This construction project includes a research study that was designed to make sure that the dam is meeting all of the requirements set by the project permits and licenses. The researchers checked on a spawning area that was created to replace lost natural spawning areas in Bluefish Lake. They checked on the water flow in the Yellowknife River between Bluefish Lake and Prosperous Lake, and surveyed fish use of the Yellowknife River. They also checked the mercury levels in large-bodied fish in Bluefish Lake because changes in mercury were seen in small fish living in the recently flooded area of Bluefish Lake in both 2014 and 2015. The researchers found that lake trout do not seem to be using the artificial shoal in Bluefish Lake. Flows in the Yellowknife River below the Bluefish dam (Reach 1) remained above the minimum required levels throughout 2016, and did not decrease during the winter months like they had in past years. Fish that spawn in the fall (such as lake trout, lake whitefish, and cisco) did use Reach 1 and the tailrace area downstream of the generators to spawn. Samples from lake trout and northern pike showed that mercury concentrations in lake trout have significantly decreased since 2012. Concentrations of mercury in northern pike show no significant change over time.

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File No: 12 404 934
Region: DC, NS, SS

Licence No: 16110
Location: Between 60°0'0"N, 114°0'0"W and 62°00'0"N, 122°00'0"W

Southern Mackenzie surficial mapping

The goal of this study is to make a map of the surface sediments in the southern Mackenzie basin. The map will help researchers understand what is on the surface of the earth, how thick the materials are, how these materials were deposited by glaciers, and where the bedrock breaks through the surface materials. This type of mapping is called 'surficial geology' mapping. This area was selected for mapping because there are currently no existing high-resolution surficial geology maps for this region. In other words, the existing maps do not show enough detail to answer questions that are being asked by scientists, or to determine whether developments can happen in the area. However, the area is surrounded by regions that have been mapped using surficial geology methods. The research team collected 40 till (glacial sediment) samples from the area covered by NTS mapsheet 85B, 63 till samples from the area covered by NTS mapsheets 85C and 85F, and 17 till samples from two sample 'transects' west of Kakisa Lake. East of the Hay River, samples were collected in three-gallon (15 kg) pails. West of Hay River, where there are more clay-rich sediments, samples were collected in five-gallon (25 kg) pails. The researchers dug holes and collected samples by hand, and then refilled each sample site so it was returned to how it was before they took samples. They did this to make as small an impact on the land as possible.

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Region: DC, NS, SS **Location:** Yellowknife and Ft. Providence areas

Using the past to inform the future: a paleoecological perspective of the impacts of drought and fire on lakes, permafrost, and forests

The goal of this research project is to examine the frequency and severity of past wildfire and drought-like conditions in the southern Northwest Territories. At four small unnamed lakes, the team collected sediment cores that should capture conditions back to the last glaciation in the Yellowknife area. These sediments are currently being analyzed for charcoal (a measure of past fire events), diatoms and chlorophyll a (measures of lake productivity), and isotopes (measures of changes in past hydrology). Samples from the sediment cores will be sent for radiocarbon dating and lead-210 dating in the fall of 2017. Water samples were collected, and were sent for testing in a lab. The results will tell the researchers about the present-day hydrology of the lakes. The same set of four lakes were resampled in late August. Water samples were collected again, and the isotopes in the water are being analyzed. The sample from the summer will be compared to the August sample, which will indicate the amount of evaporation that occurred from the different lakes over the summer. In July, the team took samples for tree ring studies. In 2016 samples were collected from jack pine trees in this region, and in 2017 sampling was focused on collecting tree cores from white spruce trees. Samples were collected from several sites in the Snare River basin and to the east near Gordon Lake. In 2017, the team also installed dendrometers on jack pine trees at a study site along Ingraham Trail. The dendrometers were installed in early May, and were removed for the winter in September. The data from the dendrometers has not been fully analyzed, but results will be available in the spring or summer of 2018.

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File No: 12 404 640
Region: IN, GW

Licence No: 15991
Location: Husky Lake, burn area south of Inuvik, Noell Lake area, Campbell Dolomite upland, Dempster Hwy/Peel Plateau

Examining the impacts of climate and environmental change on aquatic and terrestrial ecosystems of the Mackenzie region, NWT
No research was conducted under this licence in 2017.

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File No: 12 404 865
Region: IN

Licence No: 16146
Location: Anderson Plain (68°34'37”N, 133°47'27”W), (68°36'37”N, 133°35'14”W), (68°32'22”N, 133°22'12”W), (68°49'20”N, 134°11'56”W), Tuktoyaktuk coastlands (68°59'2”N, 133°33'41”W), (69°7'50”N, 132°55'3”W), Outer Delta and coast (69°10'52"N, 134°44'49"W), (69°21'27"N, 134°39'30"W), (69°40'5"N, 134°23'46"W), (69°29'55"N, 135°45'59"W), Inuvik to Tuktoyaktuk (68°51'18"N, 134°29'26"W), 69°2'54"N, 134°35'33"W), (69°17'19"N, 133°53'59"W)

Long-term reconstructions of cold-season climate and atmospheric Hg deposition from ice wedges in the Mackenzie Delta region
This goal of this research is to better understand long-term changes in winter temperatures and atmospheric mercury (Hg) in the Mackenzie Delta area over the last 11,700 years, a period known as the Holocene. Field research on ice wedges began in July 2017. The project team took samples from four exposed ice wedges in the coastal Mackenzie Delta near Pelly Island, Hooper Island, North Point, and Tuktoyaktuk. They also sampled one exposed ice wedge on the East Channel of the delta near Inuvik. The ice samples were sent to the University of Alberta wherethe chemical make-up of the ice will be studied. This will provide information about past cold-season climate change. To date, the research team have analyzed the ice chemistry of the Pelly Island ice wedge, which shows changes in winter temperatures. However, the age of the ice is unknown. The researchers think the ice is hundreds or even thousands of years old, based on a preliminary analysis. The researchers will use radiocarbon dating to figure out the age of some fossil plant remains in the wedge ice, so that the climate changes seen in the ice chemistry can be better understood. The research team will then analyze the remaining ice wedges, and combine all of the information about climate change that was found in the ice wedges from the region.

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File No: 12 404 309
Region: IN

Licence No: 16065
Location: Noell Lake (68°31'37”N, 133°30'48”W)

A program to evaluate changing northern lake ice regimes

The main goals of this on-going research project are to measure the thickness and chemical composition of the ice that forms on Noell Lake each winter. The researchers will use this information to make sure their lake ice and under-ice ecology models are correct, to see how climate change is affecting the chemical composition of ice cover, and to see how climate change is affecting conditions under the ice. In May 2017, research staff travelled by snowmobile from Inuvik to Noell Lake. At Noell Lake a handheld GPS (Global Positioning System) was used to find the right locations to take measurements. The researchers visited and took measurements at 30 locations on the Noell Lake ice cover, following both a north-south and an east-west transect. At each location, a tape measure was used to measure the depth of the snow on the ice. The researchers used an ice auger to drill a hole into the ice cover and see if any white ice was present. The ice auger was then used to drill all the way through the ice and a measurement of total ice thickness was recorded. After the water flowed up into the newly drilled hole, the water level was also recorded. The researchers took pictures of the research staff working and the ice and snow cover.

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File No: 12 404 823
Region: IN, GW

Licence No: 16149
Location: East Channel lakes area (68°20'8.34”N, 133°42'7.44”W), Chain Lake coordinates (68°27'7.92”N, 133°48'51.30”W), Noell Lake north (68°33'14.69”N, 133°40'16.33”W), Noell Lake south (68°30'6.45”N, 133°39'57.29”W)

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

The lives of the tiny insects and other small animals that live in the lakes in the Mackenzie Delta are highly dependent on spring flooding. The insects and animals that are being studied in this project are known as benthic invertebrates (‘benthos’), and they live in the bottom of lakes and rivers. They are useful to scientists because they can indicate changes in the water. Spring flooding in Mackenzie Delta lakes is driven by ice jamming in the main delta channels, and so is highly influenced by climate change. Delta lakes differ in terms of how long they are directly connected to the river during spring flood conditions, and the purpose of this study is to see how this affects the benthos. In 2017 the researchers finished a five-year study on the benthos and water chemistry in a series of delta lakes near Inuvik. The lakes are flooded for different amounts of time each spring. As they were taking samples of benthos, they also took water samples, which were analyzed by the National Laboratory for Environmental Testing. The research team found that they can tell different benthos communities apart, even without using complicated testing. In other words, benthos communities from connected lakes look different than those from isolated lakes. They found that isolated lakes have more ‘aerial dispersers’ (insects that fly from lake to lake) and predatory invertebrates during the summer. The researchers are still identifying the species from the water samples.

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File No: 12 404 570
Region: DC

Licence No: 16053
Location: Scotty Creek drainage area

Impacts of permafrost thaw on hydrology and water resources
The goals of this research are to improve scientists' understanding of how permafrost thaws, and to improve their ability to predict the rates and patterns of permafrost thaw. The warming climate is causing permafrost thaw throughout much of the Dehcho region. This is causing forested peat plateaus to get smaller, and treeless permafrost-free wetlands to get larger. The land in this region is also extremely sensitive to other disturbances such as fire and seismic exploration. There are usually many more seismic lines than natural drainage channels, and as a result, water will run off of the land through seismic lines instead of natural drainage routes. The research team took ground-based measurements at Scotty Creek, and also used air photos. They found that there are more and more 'taliks' in the area. A talik is an area of ground sitting on top of permafrost that remains unfrozen throughout the year. A lot of water drains through the taliks year-round, including during the winter. The growth of taliks is changing the balance between water runoff and storage so that basins produce more runoff. The researchers are using both field measurements and specialized math to see why the run-off is increasing, and ultimately to predict the rates and patterns of permafrost thaw and talik development. The focus of this project has also expanded from Scotty Creek to the larger Dehcho region.

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File No: 12 404 680
Region: SA

Licence No: 16120
Location: Between (67°0'0"N, 118°0'0"W) and (67°15'0"N, 119°00'0"W)

Coppermine River transect
The goals of this research program are to study the rocks and bedrock layers in the study area, and to update the specialized maps that geologists make. These maps show bedrock deep into the ground, including what kind of rocks are found in the bedrock and how old the rocks are. Geological field work was conducted by scientists from the Geological Survey of Canada, McGill University, and Laurentian University who were based at a camp located at 67°6'25.6"N, 118°28'1.63"W, between July 12th and 16th, 2017. The research team studied rocks in the field and took rock samples for analysis in a laboratory. Two teams of three people measured sedimentary rock layers and collected rock samples for geochemical analysis. The samples were analyzed for carbon and oxygen isotopes at McGill University in March 2018. The results will allow the researchers to categorize the rocks and answer questions about what life, water, and the environment were like long ago. The researchers have not made conclusions yet from these analyses because they are waiting for results from a similar study on rocks of a similar age from Nunavut.

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File No: 12 404 941
Region: NS, SS

Licence No: 16142
Location: Across the North Slave and South Slave regions

Akaitcho - DUC wetland mapping project

The Akaitcho Territory wetland mapping project was led by Ducks Unlimited Canada, in collaboration with Ducks Unlimited Incorporated and a committee of interested participants that included local first nations and Métis communities. The researchers began fieldwork in the summer of 2017. They started a wetland inventory of an area that is 31 million hectares in size. This wetland inventory will be stored in a computerized mapping program and will be used in on-going land use planning processes in the region. During a two-week period in July the researchers conducted fieldwork across the Akaitcho Traditional Territory by boat, helicopter, and fixed-wing planes. They collected detailed land cover information, including information about plants and water. The fieldwork was conducted by two teams of Ducks Unlimited mapping analysts and biologists. The information they collected has since been used to identify wetland types in high-resolution satellite imagery of the whole Akaitcho. Community meetings were held in Łutsel K'e on July 18th, and in Ft. Resolution on July 20th, to engage community members on the project. Community meetings allowed Ducks Unlimited staff to receive project feedback, address concerns, and discuss the incorporation of traditional ecological knowledge into the project.

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File No: 12 404 900
Region: NS

Licence No: 16068
Location: Burke Lake, Reference Lake, Marian River

Environmental baseline surveys for the Fortune Minerals Limited NICO project

In 2017, researchers with Fortune Minerals Limited collected information about the water, sediment, aquatic insects, fish, stream flow, and lake water levels in Marian River, Burke Lake, and Reference Lake. They made a total of five field visits for the NICO Project. They were studying variability in water flow and water quality between seasons, from the winter through to the following fall. For the fish studies, they took samples and measurements from juvenile and adult lake whitefish and ninespine stickleback. Fish from other species were counted, evaluated, and released. Water levels in Peanut Lake were recorded from summer to early fall. Two Tłı̨chǫ citizens from Whatì were important members of the field crew that did this work. The information collected during fieldwork tells the researchers about the existing conditions at the study sites, as well as changes over the seasons. The researchers compared the samples they took to all relevant guidelines, for example, the guidelines for water quality. They also compared the information they collected in 2017 to similar information that was collected in the past to see how things have changed. The Aquatic Baseline Summary Report containing this information will support the development of the Aquatics Effects Monitoring Program for the mine. The results show what the water is like before construction of the mine, so this information will also be used in the future to see how and if the water changes during the construction and operation of the mine.

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File No: 12 404 896
Region: SA

Licence No: 16020
Location: Transect between Haines Alaska and Great Bear Lake

The Mackenzie Mountains earthscope project

The goal of this project is to study earthquakes and earth structure in the broader northwestern Canadian and Alaskan regions. The researchers collected information about earthquakes that happened over the last 12 months using special instruments that measure earthquakes, called 'seismometers'. The seismometers were installed in a rough line that extends from Great Bear Lake through Macmillan Pass to southwest Yukon. The researchers also tested the instruments to make sure the equipment was still performing well. Most sites were fully functional, although about four of the sites in the Mackenzie Mountains had been destroyed by bears but still recorded some data. The research team repaired three of these, but decided to remove the equipment at Cache Lake. Analysis of the data that was collected has just started. Next year, the research team plans to remove all equipment in the summer, as the field portion of the project will be over. The team hopes to find enough funding to keep a few stations in the ground to collect earthquake hazard information, and also to search for potential geothermal sites for communities. As always, the team is happy to discuss the science and project with any interested communities or individuals.

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File No: 12 404 911
Region: IN

Licence No: 16111
Location: Fish Island (69°22'11.7"N, 134°52'42.7"W), Richards Island (69°12'59.9"N, 134°58'58.0"W)

Greenhouse gas exchange in the outer Mackenzie Delta

The Mackenzie Delta is very sensitive to climate change, which is caused by greenhouse gases that trap heat near the ground. The way that the delta responds to a warming climate might result in a feedback that would make climate change worse. It is natural for greenhouse gases to be emitted by the land, but usually their release is canceled out by greenhouse gas uptake by plants. However, warming can disturb this balance and result in more greenhouse gases in the air. More greenhouse gases will then make climate change happen even faster. Sensors were installed at Fish Island in the outer Mackenzie Delta to measure the greenhouse gases carbon dioxide and methane. The uptake and emission of these gases were observed near the wetlands on the island over the summer and early fall of 2017. The researchers found that the plants on Fish Island do not take up much carbon dioxide. They also found that the site is a much stronger source of methane than expected. The methane emissions canceled out the carbon dioxide uptake, meaning that this part of the delta is probably a source of greenhouse gases to the air. As climate change continues and permafrost begins to thaw, this area could become an even stronger source of greenhouse gases.

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File No: 12 404 657
Region: IN, GW, SA, DC

Licence No: 16034
Location: Jean Marie River, Ft. Simpson, Wrigley, Tulita, Norman Wells, Ft. Good Hope, Tsiigehtchic, Inuvlk, Tuktoyaktuk

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

The researchers visited permafrost monitoring sites throughout the Mackenzie corridor in August and September 2017. They collected ground temperature and 'active layer' data (the active layer is the top part of the permafrost that thaws in the summer). Guiding services and boat transportation in the Inuvialuit and Gwich'in regions were provided by Inuvik residents. The temperature and active layer data were added to existing records, some of which go back more than 20 years, which is helping the researchers see how permafrost conditions are changing over time. Records over many decades and from across the region will also support land management decisions. This research project is showing that the permafrost is generally warming, with greater increases in ground temperature (up to 0.1°C per year) in recent years in the northern part of the study region. Active layer thickness has generally increased over the last decade as well. The data collected in 2017 has been compiled and a report including data summaries has been completed and published and copies will be sent to relevant organizations in the region. The researchers plan to continue data collection so they can better assess the impact of climate change on permafrost.

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File No: 12 404 936
Region: NS, SS

Licence No: 16121
Location: Lakes on the Ingraham Trail (62.5619, -114.0202), (62.5490 -113.9595), (62.525, -113.8361), (62.5262, -113.3787), lakes monitored by Environment and Climate Change Canada (62.6005, -114.4314), (62.6723, -114.4516), (62.5641, -114.4077), Slave River Delta (61.4240, -112.9848), (61.3849, -113.0588), (61.4231, -113.1758), (61.4318, -113.2090), (61.4219, -113.2279), (61.4688, -113.1822), (61.4691, -113.1231), (61.4222, -113.3561), (61.3145, -113.3265), (61.3086, -113.3673), (61.2977, -113.3913), (61.2875, -113.5517), (61.1926, -113.6767), (61.4029, -113.4421), (61.3847, -113.4271), Canadian Shield towards Daring Lake (63.8586, -113.2192), (63.8026, -113.3520), (63.8276, -113.3288), (64.0111, -112.9219), (64.1501, -112.7973), (64.2016, -112.7118), (64.2464, -112.5907), (64.2597, -112.5759), (64.4320, -112.2322), (64.8401, -111.6455), (63.4838, -113.8501)

Remote sensing of Arctic-boreal surface water

The goal of this project is to measure changes in lake height across northern Canada and Alaska to understand how the presence of permafrost may affect surface water levels as the climate changes. As part of the 2017 field work for the NASA Arctic Boreal Vulnerability Experiment, an airborne radar sensor known as AirSWOT was flown over parts of the Northwest Territories. The sensor measured the water surface height for thousands of lakes. To validate the measurements of water surface height made from the plane, a research team also surveyed the water surface

height on the ground during a week-long field campaign in July. The team surveyed 18 lakes in the Northwest Territories, including eight lakes along the Ingraham Trail east of Yellowknife and 10 lakes that were accessed by float plane along a transect between Yellowknife and Daring Lake Tundra Ecosystem Field Station. The survey team was working with researchers from Environment and Climate Change Canada and the Government of the Northwest Territories. Lake level recorders were also installed in these lakes, which provided season-long records of variations in lake level. Both the fieldwork and radar measurements were successful, and the researchers plan to use maps showing the differences in lake water level to identify where permafrost exists.

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File No: 12 404 806 **Licence No:** 15994
Region: DC **Location:** Smith Creek (63°09'28"N, 123°14'59"N)

The frontline of permafrost thaw: a transect of eddy covariance towers across the southern Taiga Plains to better understand changing regional carbon and water budgets
The goal of this research project is to record how carbon gas moves from the earth to the atmosphere, and back to earth again. No changes were made to the instruments that were used to record the carbon gas movements. The researchers made sure that the instruments were properly calibrated and functioning, so they could be certain that the required information would be collected during the different flights over the region for the NASA Arctic Boreal Vulnerability Experiment (ABoVE) program. Preliminary results from 2017 were presented at the NASA ABoVE Science Team meeting in Seattle in January 2018.

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File No: 12 404 806 **Licence No:** 16029
Region: DC **Location:** Scotty Creek (61°18”N, 121°18”W)

Influence of changing active-layer thickness on permafrost peatland trace gas exchanges and carbon balance
The goal of this project is to understand how thawing permafrost influences carbon, water, and the temperatre of both the land and the atmosphere. This is an on-going project that began in 2013. No changes were made to the instruments that were used to record the thawing permafrost. The researchers made sure that the instruments were properly calibrated and functioning, so they could be certain that the required information would be collected during the different flights over the region for the NASA Arctic Boreal Vulnerability Experiment (ABoVE) program.

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File No: 12 404 806 **Licence No:** 16038

Region: IN, GW

Location: Trail Valley Creek (68°44'13"N, 133°29'15"W), Havikpak Creek (68°19'13"N, 133°30'48"W)

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

There is general agreement that permafrost landscapes are vulnerable to climate change, but scientists don't understand what sort of overall effect changing permafrost conditions will have on boreal forest and tundra ecosystems. No changes were made to the instruments that were used to record information for this study. The researchers made sure that the instruments were properly calibrated and functioning, so they could be certain that the required information would be collected during the different flights over the region for the NASA Arctic Boreal Vulnerability Experiment (ABoVE) program.

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File No: 12 404 785
Licence No: 15997
Region: GW
Location: Peel Plateau, and streams from Inuvik to the NWT/Yukon border

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

The goal of this on-going project is to study the effects of permafrost thaw slumps on water quality in the streams of the Peel Plateau, and to see how changes in water quality affect the plants and animals that live downstream of slumps. In 2017, the research team measured water quality and chemistry with a focus on 'particulate organic carbon' and 'dissolved inorganic carbon'. Both of these are are tiny particles of carbon that come from the soils and surrounding streams. The goal of this study is to measure how these carbon particles get into the streams, how they change once they're in the streams, and how this change aggects carbon dioxide levels in streams. This helps the researchers understand how thawing permafrost affects streams and lakes. Between June and August of 2017, the research team measured water quality upstream, downstream, and from the outflow of active permafrost slumps beside streams on the Peel Plateau. The team also measured stream water from the pristine headwaters of Stony Creek to its outflow at the Peel River. The research team hiked in to many sites with local wildlife monitors who were hired through the Tetlit Gwich'in Renewable Resources Council. The research team presented their work to the community. So far, the results show that the soil carbon that was previously frozen in permafrost slumps can be transformed and decomposed to carbon dioxide, which means that slumping contributes to climate change.

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File No: 12 404 785
Licence No: 16097
Region: DC, NS
Location: 50 stream sites in the Dehcho and North Slave regions

The effects of wildfire on diverse aquatic ecosystems of the NWT

The goal of this research project is to determine the effect of fire on water quality within the southern NWT landscape. During May and June of 2017, a series of 50 stream sites were surveyed. These sites had been identified and previously sampled during the summer of 2016. Sites were accessed from the road between Yellowknife and Ft. Simpson, and by boat using lake access from the communities of Whatì, Gamètì, and Wekweètì. At each site the research team used a hand-held meter to measure stream flow (discharge). The research team also collected approximately two litres of water at each location. The water samples were filtered each evening. The research team continues to work on these samples, but overall have found that the chemical differences between streams are due more to variations in watershed composition than the presence of wildfire. Now that the final sampling is complete, the team are preparing a report for the various communities with whom they were fortunate to work on this research. The team are also writing papers that will be published in the scientific literature.

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File No: 12 404 926
Region: SS

Licence No: 16049
Location: Wholdaia Lake region (60°37'8.88"N, 104°17'2.03"W)

Paleoproterozoic tectonometamorphic architecture of the south Rae craton
No research was conducted under this licence in 2017.

Turner, Elizabeth C.
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File No: 12 404 813
Region: SA

Licence No: 15993
Location: (65°17”N, 126°16”W), (64°56”N, 127°16”W), (64°43”N, 127°16”W), (64°39”N, 130°45”W)

Early paleozoic earth-surface environments in NWT
This study is part of a long-term project aimed at understanding the distribution of marine environments in northwestern and northern Canada between 540 and 450 million years ago. The research team measured, described, and took samples from rock layers that are roughly the same age (about 540 to 450 million years old) but found in different locations. The researchers used the rock samples to see how ancient Earth-surface environments differed among geographic locations. The research team completed eight days of field work at three locations. They continue to study the chemistry of the material that they collected. Some of the results are complete, and the full results from the field and chemical analysis will eventually be published in a scientific journal, probably in 2018 or 2019.

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File No: 12 404 813

Licence No: 16159

Region: SA

Location: Gayna River, Mackenzie Mountains (64°57”N, 130°42”W)

Neoproterozoic stratigraphy, Mackenzie Mountains
No research was conducted under this licence in 2017.

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File No: 12 404 933
Region: IN, NS

Licence No: 16101
Location: Inuvik and Yellowknife

Radar satellite observations of lake ice breakup and freeze-up
This goal of this project is to see whether a soon-to-be-launched satellite, Canada’s RADARSAT Constellation Mission, will be useful for monitoring the breakup and freeze-up of lake ice. The satellite is scheduled for launch in May 2019. Two out of three study areas are located in the Northwest Territories; these are lakes near Inuvik and Yellowknife. The researcher converted copies of RADARSAT-2 satellite images to a different type of computer file, and then developed a way to tell where ice and water are in the images. Then, the researcher used the satellite images to see when ice left the lakes, and validated the results using aerial photographs that were taken from a fixed wing aircraft. The researcher hired local organizations to take the air photos. Thirteen aerial surveys occurred from May 9th to November 10th for the Yellowknife study site, and nine aerial surveys took place from May 24th to October 18th for the Inuvik study site. The aerial surveys were timed so that they occurred at the same time that the RADARSAT-2 satellite passed over the study area. The results are not yet published because the project is on-going. This project will have a practical application that can support decision making by Canadians, such as decisions regarding the use of the ice cover on lakes for travel to fishing or hunting grounds.

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File No: 12 404 797
Region: SA

Licence No: 16163
Location: 65.3°N, 126.9°W (northwest corner)
64.6°N, 125.6°W (southeast corner)

EL494 surface water monitoring program 2016-2018
The surface and groundwater monitoring program for Exploration Licence (EL) 494 took place in August 2017. The goal of this study was to collect surface water samples from locations near exploration activities. There were fewer sampling locations this year. The water samples will be used to evaluate the water quality of the lakes, streams, and rivers that flow onto and off of EL 494. A total of 27 locations were sampled in 16 watercourses (rivers/streams/creeks) and 11 waterbodies (lakes/ponds/sloughs). All points were sampled this year because there was more rain than previous years, so there was standing water or flowing water at each sampling point. The researchers also collected the information stored in eight thermistors (data-logging thermometers) that monitor the permafrost. Groundwater wells were not sampled because the well bores were frozen. The research team are currently finishing their report. When complete,

the report will be submitted to both the Sahtú Land and Water Board and the Aurora Research Institute, so it can be made available on their public registries.

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File No: 12 404 809 **Licence No:** 16031
Region: NS **Location:** Lac de Gras (64°30”N, 110.30”W)

Diavik aquatics effects monitoring program
In 2017, Diavik Diamond Mines continued its on-going aquatic effects monitoring program to check whether the mine has had an effect on the water, sediment, and aquatic life in Lac de Gras. The monitoring team measured dust deposition at 12 stations throughout the year, and added two new stations in the fall. They collected snow samples at 27 stations in late winter. The samples will be analyzed for dustfall and snow water chemistry. They also collected lake water samples from 21 stations in Lac de Gras and its outflow, and inflow at Lac du Sauvage, both in late winter (April) and late summer (August). The lake water samples were used for water chemistry analysis. While in the field, the monitoring team took measurements of water temperature, acidity, salinity, and oxygen levels at different depths in the lakes. Finally, they took plankton samples during late summer from all lake stations. The researchers are currently analyzing the samples and the data they collected.

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File No: 12 404 809 **Licence No:** 16095
Region: NS **Location:** Lac de Gras

A21 de-fishing program
The goal of this project is to remove most of the fish from the A21 dike and transfer some of them into Lac de Gras. This will allow the dike to be drained for construction. Phases 1 and 2 of the A21 de-fishing program were completed over a period of approximately five weeks between July 6th and August 5th. The project team removed 309 fish from the dike, which in total weighed more than 45 kg (around 100 lbs). The team used gill netting, set lining, fyke netting, and minnow trapping to catch the fish. Of the 309 fish, about half (148 fish) were released into Lac de Gras. The remaining fish were sacrificed and frozen for distribution to local communities. Unfortunately, less than 3 kg of the 16.7 kg of frozen fish was deemed suitable for human consumption. The project team kept in touch with Fisheries and Oceans Canada every day. They reported the number of fish they had caught, and provided updates on how the project was progressing towards its original project goals. The primary objectives of Phases 1 and 2 were successfully met. The project team engaged and actively involved local communities in the fishing and processing effort, and the fish were successfully transferred to Lac de Gras or were processed and distributed to local communities.

Whalen, Dustin J.R.
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File No: 12 404 798
Region: IN

Licence No: 16073
Location: Shingle Point (69.99779°N, 137.45915°W), Garry Island (69.49297°N, 135.82506°W), Pelly Island (69.62631°N, 135.51952°W), Hooper Island (69.6977°N, 134.9319°W), Kendall Island (69.4733°N, 135.2875°W), East Whitefish (69.388394°N, 133.577732°W), Tuktoyaktuk (69.447°N, 133.03848°W), Toker Point (69.64665°N, 132.79718°W), McKinley Bay south (69.9317°N, 131.07607°W), Cape Dalhousie (70.2725°N, 129.7063°W), Cape Bathurst (70.642328°N, 128.268°W)

Beaufort Sea coastal and nearshore geoscience research 2017

The 'Low Impact Shipping Corridors' will be a policy that will guide how the federal government invests in marine navigation safety in the north. This policy will include improved ocean maps and information (charting and hydrography), which will be made in partnership with northerners. The Low Impact Shipping Corridors team will work with Inuit and northerners to find out 1) the potential impact of marine vessels on community members and marine areas that are used for cultural and livelihood activities, and 2) potential management strategies for the corridors. Workshops were held in Sachs Harbour, Paulatuk, Tuktoyaktuk, and Inuvik to document these impacts and strategies. The workshops included elders, active harvesters, and youth. Workshop participants were asked to describe local marine use areas, including significant cultural, archaeological, and ecological areas, as well as local travel routes. This information will be included in the Low Impact Shipping Corridors. They were also asked about the potential impacts of marine vessels on community members and important marine use areas. Finally, the workshop participants were asked to suggest ways to manage the Low Impact Shipping Corridors and Arctic marine vessels.

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File No: 12 404 919
Region: IN

Licence No: 16007
Location: Beaufort Sea

Marine Arctic ecosystem study (MARES)

The goal of this project is to collect information about the marine environment in the eastern Beaufort Sea. This includes information about the ice, waves, and water movements, the life in the water, and the water chemistry. To collect this information, the researchers are using instruments on moored and moving platforms. The fieldwork was conducted from the Canadian Coast Guard Ship Sir Wilfrid Laurier during its Arctic expedition in the fall of 2017. The research team joined the ship on September 19th at Kugluktuk, Nunavut. While the ship was travelling from Kugluktuk to the Amundsen Gulf, the researchers prepared four new moorings. On September 27th and 28th, the researchers recovered the moorings that were originally installed in 2016, and deployed the same equipment at the same locations on October 2nd and 3rd. At each mooring site, the researchers took water samples and measured the properties of the water at varying depths using a special instrument onboard the vessel. Samples were collected at two of the sites for the measurement of nitrate and to ensure that the measurements taken by the moorings are correct.

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File No: 12 404 915
Region: SS

Licence No: 16127
Location: Snowbird Lake (60.541003°N, 103.091536°W), Kasba Lake (60.461773°N, 102.271238°W)

Geology of the Snowbird Zone, Saskatchewan and NWT

Researchers from the University of Massachusetts and St. Lawrence University visited Snowbird Lake for about one week during August 2017. This field research was part of a larger geological project that investigates the 'Snowbird Tectonic Zone' of Saskatchewan, NWT, and Nunavut. The Snowbird Tectonic Zone is the proposed boundary between two geological 'provinces' called the Rae and Hearne provinces. The geology of the two provinces is different in many ways, which suggests that the boundary may be an ancient fault, perhaps where two continents drifted together to form a larger continent. This possible fault is a very ancient one. It was active many millions of years ago (in fact, more than 2000 million years ago), during the original formation of the North American continent. It is not an active fault today, but it is of interest for investigating the geologic history of North America. To study the zone, the researchers collected small rock samples from either side of the Snowbird Zone, including samples collected at Snowbird Lake in August. The goal is to see how old the rocks are and what they are made of, in order to interpret the geologic history on either side of the ancient boundary. So far, it looks like the Snowbird Zone may not be the boundary between two different continents after all. Instead, it may be the boundary between two parts of a single large continent. Additional results will be provided when the project is complete.

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File No: 12 404 549
Region: NS

Licence No: 15986
Location: Ingraham Trail to Contwoyto Winter Road

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

The goal of this project is to study where discontinuous permafrost exists at research sites in the northern Great Slave Lake region. This will allow planners and scientists to predict where it will occur in other areas, so that communities and industry can make better decisions about new buildings and roads. In September 2017, the researchers conducted field work in the Great Slave region along Highways 3 and 4, the Tibbitt to Contwoyto Winter Road as far as the north end of Gordon Lake, and at Whitebeach Point. They also monitored icings (winter overland flow) at one portage site, and recorded the temperature at a few sites. This included active-layer temperatures from forest peatland and bare sand sites, and ground temperatures from winter road and burn sites. They visited and collected data from monitoring sites that were installed in 2016 within recently burned areas at Lucky Lake, east of the Discovery Mine site, Boundary Creek (20 km north of Highway 3), and along the Ingraham Trail near Tibbitt Lake. The researchers are using this information to understand changes in ground temperature and the effects of fire on permafrost

conditions. Monitoring continued at a recent permafrost thaw slump along the Yellowknife River as well.

Social Sciences

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File No: 12 410 1074
Region: IN
Licence No: 16080
Location: Aklavik, Ulukhaktok, Inuvik, Sachs Harbour, Tuktoyaktuk, Paulatuk

Inuvialuktun energy terminology development
The goal of this project was to answer the question: What Inuvialuktun words can be re-discovered or created to modernize the traditional Inuvialuit language in order to include terms related to climate change, energy conservation and efficiency, and renewable energy? To answer this question, the researcher used collaborative storytelling and conversation, Indigenous research methodology, and 'grounded theory'. Grounded theory means the information provided by project participants is used as the starting point of the research, and themes and information come from their words and ideas. This research approach was through the lens of decolonization and reconciliation. The researcher held an Inuvialuktun language development workshop in Inuvik. During the workshop ten Inuvialuit elders developed 370 modern Inuvialuktun terms to describe energy conservation, efficiency, and renewable energy. Inuvialuktun is an ancient language rich with words that have a strong connection to the environment. This study demonstrated the value and utility of recording and developing modernized terms in the western Canadian Arctic. This study also offers recommendations for future workshops to help improve environmental education and communication about energy conservation, efficiency, and renewable energy in the Inuvialuit Settlement Region.

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File No: 12 410 1063
Region: NS
Licence No: 16081
Location: Behchokǫ̀

Conditionals and temporal expressions in Tłı̨chǫ Yatii
The goal of this project is to study 'conditional clauses' and 'counterfactuals' in the Tłı̨chǫ language. Conditional clauses and counterfactuals are types of phrases that people say when they are expressing complex ideas where there are two parts to the phrase that relate to each other in a particular way. Examples are phrases that have the words 'if' and 'then'. Participants were asked to translate sentences from English to Tłı̨chǫ, and to give their opinions on Tłı̨chǫ sentences that the researcher made based on the sentences they had originally translated. One participant also offered similar sentences in contexts that reflect Tłı̨chǫ culture and world view. The preliminary results are that the word ni?de` is often used to express events that have not yet happened, or events in the past that have happened over and over again, without talking about any specific time in particular. The researcher also found that the word can be used to repeat information that is already known, often using a question. This work is still in progress and presentations have not yet been made on the topic. Participants were reminded before their interviews that they could withdraw from the research at any time.

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File No: 12 410 1090
Region: IN, GW

Licence No: 16107
Location: Tuktoyaktuk, Aklavik, Inuvik, Ft. McPherson, Tsiigehtchic

Arctic Borderlands Ecological Knowledge Society: community based ecological monitoring

The Arctic Borderlands Ecological Knowledge Society (ABEKS) uses both local and scientific knowledge to monitor and assess changes in an area that covers the range of the Porcupine caribou herd and nearby coastal and marine areas. Interviews with local experts are conducted annually by community researchers. During the interviews, the researchers ask about fish, berries, caribou, unusual animal sightings, weather conditions, and other aspects of the environment. ABEKS had another successful monitoring season. Seven senior and six youth monitors were hired in the NWT. Senior monitors mentored youth monitors throughout the process. The monitoring teams each conducted 20 interviews with local experts who were identified by the local renewable resources council or hunters and trappers committee. The interview information was uploaded by the monitoring teams to the ABEKS online database. Finally, ABEKS held public meetings in each community to present and discuss the local and scientific knowledge they have accumulated since 1996.

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File No: 12 410 1089
Region: SA

Licence No: 16105
Location: Colville Lake, Tulita, Ft. Good Hope, Dél̨ne

Has the provision of annual basic veterinary services improved the health and welfare of dogs and improved community concerns around dogs in the Sahtú Settlement Area of the Northwest Territories?

Veterinary clinics in the Sahtú region have been offered through the University of Calgary once a year for the last ten years. For this study, the research team completed a program evaluation to understand how and if the program is serving the people and dogs of the Sahtú. As part of this evaluation, the research team visited the communities of Tulita, Ft. Good Hope, Colville Lake, and Dél̨ne in summer 2017 to complete a dog census (a count of all the dogs) and household questionnaire. In Tulita and Dél̨ne, a local student helped with the completion of questionnaires. The dog census in each community gave an idea of the reach of the veterinary program, while the questionnaire helps the research team understand how dogs are housed and fed, and what people's concerns are about the dogs in their community. In the four communities, 110 people agreed to complete the questionnaire, both from households with and without dogs. The researchers will return to each community in February 2018, when the next Sahtú veterinary clinics are held. They will hold a community gathering to discuss the findings from the summer, and to gain feedback and insight about their findings from community members.

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File No: 12 410 1092
Region: IN, GW, SA, DC, NS, SS

Licence No: 16109
Location: Yellowknife, Ft. Smith, Horton River, Peel River

Sustainable water governance and Indigenous law project

The goal of this project is to help Indigenous communities govern water resources effectively and equally with their community partners. In July 2017, one team member travelled to Yellowknife to conduct interviews and get feedback on a new type of water monitoring device. The researcher got feedback about the device from a couple of experts in the area. From October 12th to 15th, 2017, other members of the team travelled to Blachford Lake Lodge to discuss further research opportunities, do further testing on the water monitoring device, and to get feedback on the device design. All of the research to date is preliminary, and there have been no publications or public presentations. The researchers will apply for another research licence in order to continue their research.

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File No: 12 410 1100
Region: IN

Licence No: 16154
Location: Inuvik, Ulukhaktok, Tuktoyaktuk, Paulatuk

Collaborative research: food sovereignty and self-governance – Inuit role in managing arctic marine resources

The goal of this research project is to understand whether, and how, Inuit self-governance systems support 'food sovereignty'. Food sovereignty means that people have the right to make their own food choices, and to have healthy, culturally appropriate food that is local and produced or harvested using environmentally sound practices. This project began on August 1st, 2017, and takes place in both Alaska and Canada. The researcher attended existing workshops to meet with partnering organizations. For example, she met with the Inuvialuit Game Council and Fisheries Joint Management Committee during the Inuvialuit – Inupiat Polar Bear Management Meeting that was held in Alaska. The researcher also set up an advisory committee with representation from both Alaska and the Inuvialuit Settlement Region (ISR). The advisory committee met once by teleconference. During this meeting, the advisory committee heard more about the project and provided direction to the project team. Another advisory committee teleconference will occur in November. A two-page project summary was created and circulated throughout Alaska. The research team will circulate the same document within the ISR in November 2017. Projected field activities within the ISR are tentatively scheduled to occur in June 2018. Final dates will be determined with the input of the Inuvialuit Game Council and hunter and trapper organizations in ISR communities.

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File No: 12 410 1049
Region: IN, NS

Licence No: 15992
Location: Inuvik, Tuktoyaktuk, Yellowknife

Geometries of an Arctic highway: transforming the last frontier into a global resource frontier
No research was conducted under this licence in 2017.

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File No: 12 410 871 **Licence No:** 16184
Region: SA **Location:** Dél̨ı̨ę

Hybrid knowledge in practice: engaging aboriginal youth in environmental governance in northern Canada
The goal of this research project is to determine how Dél̨ı̨ę Got'ı̨ę youth understand, express, and apply knowledge they have gained from both Dene traditional knowledge and school-based science studies. The researcher did not conduct research in 2017. Instead, the researcher met with leaders in Dél̨ı̨ę twice in 2017 to discuss the research project, provide an update, and discuss next steps. The researcher participated in the Dene Tsili youth camp at Bennet Field on the Bear River, between Dél̨ı̨ę and Tulita, in September 2017.

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File No: 12 410 944 **Licence No:** 16028
Region: SA **Location:** Ft. Good Hope

Aboriginal youth stories of culture, identity, community & place: a rural/urban educational youth exchange through performing arts & technology
The goal of this study is to start a creative exchange among youth in three Aboriginal communities (Ft. Good Hope, NWT; Kainai Reserve, southern Alberta; Ben Calf Robe School, Edmonton, Alberta) using the arts, storytelling, and technology. The project team looked at promising educational (teaching) practices to help youth. These included experiential, imaginative, culturally responsive education, and new teaching strategies using the arts, technology, and youth exchange, that may work better for Aboriginal learners. The project design came from consultation with the communities and collaboration between Aboriginal and non-Aboriginal experts. This research project with Chief T'Selehye School in Ft. Good Hope and the partner school in Edmonton was on-going throughout 2017. The research team traveled to Ft. Good Hope to work with teachers and students in the grade 7/8 class. The project also hosted 15 students, plus chaperones, for a one-week trip to Edmonton for a final event. Ft. Good Hope students met with students from the Edmonton school for activities. The research with the school has now come to a close. The research team had meaningful relationships with teachers, students, and the community, but the curriculum development work was less successful due to the very rigid school environment.

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File No: 12 410 940
Region: NS, SS
Licence No: 16100
Location: Blachford Lake Lodge, Yellowknife

Decolonizing water Indigenous research methods
The goal of this research project is to help Indigenous communities govern water resources effectively and equally with their community partners. There are five project objectives. First, the research team wants to see how the current 'Western' systems for water management may work with Indigenous water law and governance. Second, they want to develop new research methods to study Indigenous water governance collaboratively with their community partners. Third, they want to help Indigenous communities improve their own water governance by starting a community Environmental Monitoring and Information System. Fourth, the researchers want to help Indigenous communities create laws, regulations, and policies that will ensure that more Indigenous community members engage with water managers about water governance. Finally, they want to spread information about this research and their findings in a new way, using video, digital media, photography, briefing notes, and an interactive website in English, French, and Dene. This will make their findings accessible to diverse audiences.

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File No: 12 410 1093
Region: DC
Licence No: 16115
Location: Ft. Simpson, Ft. Liard, Ft. Providence

Addressing rural and remote healthcare workplace satisfaction during change
The research conducted under this licence was a Workplace Satisfaction Survey that was distributed to employees of the Northwest Territories Health and Social Services Dehcho Region in November 2017. The survey link was emailed to 90 employees, and 34 employees completed the survey. The survey consisted of 16 questions about work place satisfaction. The results of the survey have been collected, but the results have not been analyzed at this time.

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File No: 12 410 1096
Region: GW, NS
Licence No: 16140
Location: Inuvik and Yellowknife

Community involvement in technology infrastructure in northern Canada
The goal of this research project is to study how, and why, being connected to the internet is important to members of community organizations in the north. This project explored 'digital divides' in the north. A digital divide refers to how some people have good internet connections, and some do not. The project also looked at how quickly people are adopting the internet in Canada's northern communities. The researcher is looking at digital divides and internet use across the whole community, including many organizations and many types of people, and also looking at how the community is connected with other communities. The researcher interviewed northerners and asked about how people are using the internet. The researcher is asking, in particular, about how settler colonialism, government policies, and industry have affected internet use and internet services in communities in the Northwest Territories. The interviewees said that self-determination, empowerment, community involvement, youth, training, and the 'First Mile'

approach to digital technology adoption were all important. The First Mile approach means that community leadership decides how internet services will start in small communities, rather than industry.

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File No: 12 410 1078
Region: NS

Licence No: 16188
Location: Yellowknife

Evaluation of climate change impacts on transportation systems
No research was conducted under this licence in 2017.

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File No: 12 410 1105
Region: IN, GW, NS

Licence No: 16181
Location: Inuvik and Yellowknife

Non-renewable resource development, homelessness, and the potential for community-based housing governance and policy in the Northwest Territories, Canada
Research and field work for this project began in 2017. The research team reviewed the available academic literature, and set up consultation meetings with Alternatives North, their community partner. The researchers also conducted 13 research interviews over two weeks in Yellowknife. They started to plan a second phase of fieldwork. This phase will take place next year, and will include research interviews and collaborative graphic design workshops.

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File No: 12 410 890
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Licence No: 16144
Location: Aklavik, Inuvik, Ft. McPherson, Tsiigehtchic, Tuktoyaktuk

Arctic Borderlands Ecological Knowledge Co-op: community and individual engagement analysis
Over the last 20 years, the Arctic Borderlands Ecological Knowledge Coop (ABEKC) has collected a large amount of information about caribou, fish, other animals, and berries. In addition to gathering this information, the ABEKC has also provided a forum for scientists, regional agencies, and people from communities to meet, share, and exchange their experience and knowledge. The purpose of this project was to see how the ABEKC has contributed to building relationships and common learning among its participants, such as scientists, community monitors, board members, and representatives from local organizations. This information was gathered using a web survey. The web survey also asked if the ABEKC has improved the use of community-based knowledge within management organizations. According to the survey, most people agreed that ABEKC members are good at sharing, building relationships, and communicating. However,

answers about the use of local knowledge information collected through ABEKC for decision-making were more variable. Some respondents said they use ABEKC data for management decisions, while others said they do not often make use of the information. Based on the survey results, it is important to look at community-based monitoring programs beyond just collecting information. These programs must also build relationships between their members.

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Licence No: 16044
Location: Yellowknife

Natural resource development, privatized aid, and sport for development in Canada
No research was conducted under this licence in 2017.

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Licence No: 16155
Location: Aklavik, Inuvik, Tuktoyaktuk, Paulatuk, Sachs Harbour, Ulukhaktok

Project Jewel: using Inuvialuit ways of knowing to understand how on-the-land programming can foster wellness
Project Jewel is an on-the-land wellness program in the Inuvialuit Settlement Region (ISR). It is an 'after care' program for people who have received medical or other services. The goal of this research project is to see how Project Jewel's on-the-land programming offers culturally safe programs that address past trauma and violence, and that meet the needs that residents of the ISR have identified. In partnership with the ISR, the research team conducted focus groups and 'photovoice' interviews with participants in Project Jewel at two on-the-land experiences: one outside of Paulatuk, and the other at Reindeer Point. Photovoice is a research method that uses photography as a form of research and activism. The focus group and photovoice interview data are still being analyzed. The research team are applying for another research licence so they can continue their research in 2018, because there is still a lot to learn.

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File No: 12 410 582
Region: SA

Licence No: 16157
Location: Sahtú Settlement Region

Culturally appropriate search and rescue (SAR) prevention and survival training in the Sahtú Region, Northwest Territories: an on-the-land program
This research project has two goals. The first is to help Sahtú residents avoid the need for search and rescue services by not getting lost on the land. The second is to increase their chance of survival if they do get lost. These goals were met through on-the-land programming. The research

team worked with Sahtú residents at Bennett Field at the Sahtú Renewable Resources Board's Dene T'sili School. Participants made digital stories using iPads and learned about boating safety, navigation training, hunter safety, wild food gathering, and food preparation. The participants also evaluated the program on the iPads. The research team are applying for another research licence so they can continue their research. The researchers have found that mental health needs are a factor in search and rescue prevention and prevention training. Currently, this is not a part of the training programs.

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Region: DC, SS

Licence No: 16096
Location: Ft. Simpson, Kakisa Lake, Jean Marie River, Wrigley

Envisioning sustainable heritage in the face of climate change: a call to align national heritage management policies across borders

The goal of this study is to figure out the best way to do research and create policies that will save important places on the land from the effects of climate change. The research methodology and policies should work for different organizations within a community or region, and between nations as well. This research was completed between June and August 2017 with the communities of Jean Marie River First Nation and Liidlii Kue First Nation. The researcher interviewed First Nation community members in each community, as well as representatives from government, museums, and non-governmental organizations. The interviews were about creating 'sustainable' best practice heritage management policies. In this case, sustainable means that the policies will work for many years. The researcher asked questions about traditionally and culturally important landscapes. Furthermore, the researcher asked how traditional knowledge is currently being shared between generations, and how this knowledge sharing is affected by climate change, colonization, residential schooling, and the Truth and Reconciliation Commission. In addition, the researcher examined other projects that aim to protect these landscapes and their cultural heritage for future generations. This included on-going projects to construct a museum in Jean Marie River First Nation and the Heritage Centre in Ft. Simpson.

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File No: 12 410 1086
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Licence No: 16091
Location: Yellowknife

Examining alcohol warning labels as a tool to increase public awareness of alcohol-related health risks and reduce alcohol intake at the population level

The primary goal of this research project is to test if, in a real-world setting, labelling alcohol containers with health messages leads to more careful and safe use of alcohol. The researchers partnered with the Yukon Liquor Corporation to test the impact of posting warning labels on all alcohol sold in the Whitehorse liquor store for an eight month period. They compared this to the alcohol sold in the Yellowknife liquor store, which does not have the new alcohol warning labels. Starting on November 20th, 2017, two types of labels were applied to alcohol containers in the Whitehorse liquor store until the study was halted on December 19th because of pressure from

the alcohol industry. The first label advised that alcohol can cause cancer, and mentions two types of cancers that are particularly common in Canada, including in the Yukon. The second label showed Canada's low-risk drinking guidelines. A third label was planned, which would have given consumers information on the number of 'standard' drinks contained in different sizes and strengths of alcoholic beverages. The researchers conducted surveys in Whitehorse and Yellowknife from both before and after the alcohol warning labels were used in the Whitehorse liquor store, to see if people were getting the key messages from the labels and changing their alcohol intake as a result.

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File No: 12 410 1038 **Licence No:** 16153
Region: SA, NS **Location:** Dél̨ı̨ and Detah

Traditional Sahtú Dene and Yellowknives Dene astronomy and sky-related knowledge
No research was conducted under this license in 2017.

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File No: 12 410 1085 **Licence No:** 16086
Region: IN, GW, SA, DC, NS, SS **Location:** All NWT

Canadian domestic homicide prevention initiative with vulnerable populations (CDHPIVP)
The goal of this project is to help service providers have a better idea about the risks for, and prevention of, domestic violence. In particular, the project is looking at risk assessments (how much risk there is), risk management (ways to reduce risk), and safety planning (how people can safely leave a dangerous situation). The goal of the project is to decrease the risk of dying from domestic violence for particular 'vulnerable populations'. Vulnerable populations are groups of people who are at a greater risk than the rest of the population. The researchers used information from an online national homicide database. They also gathered information through a national online survey and interviews. A total of 1405 people from across the country completed the survey between January and May 2017, with 22 participants from the NWT. The survey showed that the majority of service providers - more than six out of 10 - do risk assessments, risk management, and safety planning frequently or regularly with families experiencing domestic violence. The survey also gathered information about the types of risk assessment tools that the service providers used. The research team also conducted some follow-up telephone interviews. The research team will use the survey and the interview results to further study risk factors, risk assessment, risk management, and safety planning for domestic homicide prevention. The research team will share all of the results from this study as they become available.

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File No: 12 410 648 **Licence No:** 16030

Region: NS, SS **Location:** Detah, Ndilo, Łutsel K'e

The verb system of Tetsot'ine Yatie (Yellowknife): Łutsel K'e, Detah, and Ndilo dialects
The researcher is currently finishing a verb grammar of the Chipewyan dialect spoken by many elders in Yellowknife. A verb is an action word, like hejën which means 'he/she is singing', nálzé which means 'he/she is hunting', or yałtı which means 'he/she is speaking/praying'. The verb grammar will have lists of all the possible verb forms in the present, past, and future, in both roman orthography and syllabics. The book will most likely be published by Alaska Native Language Center Publications some time in 2018, and copies will be distributed to communities. The book will also come with an electronic version (on a CD or memory stick) with sound files that can be selected and listened to. The research team expect that this grammar will be useful for language teaching, as well as for interpreter/translator training and Dene literacy classes. This grammar was produced by working with several elders, as well as an interpreter and a youth assistant who cut up all of the sound files for the electronic version. Many thanks to everyone who participated in this project.

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Region: IN, GW **Location:** Aklavik

On the land and in the water: connecting and disconnecting the Mackenzie Delta
The goal of this research project is to study the current uses and meanings of the Mackenzie Delta for the people of Aklavik. Previously, the researcher lived in Aklavik to get to know the people living there. The project is now fairly well known in the community. Building on this, the researcher can start to make longer visits and interview people not as a stranger, but as a better-known visitor. The researcher met with representatives from both the Gwich'in Tribal Council and Inuvialuit Regional Corporation in Inuvik to discuss the project, and to address some questions that had come up during the project proposal review stage. In Aklavik, he also met with the Aklavik Indian Band, Tribal Council representatives, the Hunters and Trappers Committee, and the Hamlet. For the 2017 fieldwork season, the researcher stayed in Aklavik and visited people at their camps near Aklavik in order to get to know the people living there. As a result, the project and researcher became fairly well known in the community. Building on this, the researcher started to make longer visits and interview people not as stranger, but as a better-known visitor. In late summer and fall the researcher visited some homes and camps and participated in fishing and berry picking. The researcher continues to study and learn by participating in everyday activities. The researcher also participated in Gwich'in language revitalization activities and an Inuvialuit on-the-land program. He is also learning about Inuvialuit beaver hunting, trapping, and skinning.

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Region: NS **Location:** Yellowknife

Feasibility study on solid waste processing

This research project has three goals. First, the researchers want to determine how solid waste (garbage) is disposed of in Yellowknife. Second, they want to determine what the regulations are for solid waste disposal in Yellowknife. Third, they want to see if it would be possible to use a 'micro auto gasification system' in Yellowknife. This system converts garbage into heat and a small amount of 'biochar'. Biochar is produced by burning the garbage and is not dangerous. Rather, it is useful for farming. This system could reduce garbage in the landfill, produce heat, produce the biochar which may be useful in agriculture, reduce transport costs, reduce greenhouse gases, reduce animal problems at landfills, and improve how the landfills look. For the system to work, it needs local champions (people who are keen to help), training, and technical expertise to maintain it. Several organizations have expressed an interest in using this system, including mines, the city of Yellowknife, local waste haulers, and isolated communities. It is likely that the cost to install and operate the system, along with the costs for training and maintenance/service, are preventing the system from being used. All of these issues can be overcome, and Yellowknife could be an important market for the company that sells these systems to develop because it would be a good jumping off point for other locations in the NWT and the Arctic.

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File No: 12 410 1082 **Licence No:** 16057
Region: DC, NS, SS **Location:** Great Slave Lake area

'Framing' negotiation: the process of agreement-making between multinational corporations and Indigenous communities in the resource extraction context

The goal of this research project is to help the people and organizations who enter into development agreements so they can negotiate more effectively and make the best possible decisions. Fieldwork took place over the summer of 2017 in the Northwest Territories. During this time, the student researcher was based in Yellowknife, but visited Detah and Ndilo, Hay River, the communities of the Katlodeeche First Nation, Ft. Resolution, and Behchokǫ̀, where she attended the annual assemblies. The researcher learned about the culture and histories of the First Nations and introduced the project to the communities. The communities identified people with relevant experience of the diamond mining industry, or those who held roles in government, corporations, and First Nation governments and organizations, who the researcher should interview for this project. Interviewees were asked a series of questions about their perceptions and experiences while they negotiated Impact Benefit Agreements.

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File No: 12 410 1062 **Licence No:** 16147
Region: NS **Location:** Ndilo and Detah

Developing YKDFN youth-led health messaging programs with communities

This research project has two goals. First, to understand the views of Yellowknives Dene First Nation (YKDFN) youth and other community members on community strengths, and how best to communicate health information. Second, to work with youth to develop the health information. Throughout the past year, the research team have shared the results of their work in the summers

of 2016 and 2017 with the youth and community partners. The researchers held planning meetings with community members, including elders and staff from the Yellowknives Dene First Nation. The researhers and community partnets held a worsshop for youth to talk about their community strengths and make a video storyline based on strengths. The research team also worked with youth and community partners to develop surveys about health and health messaging to be used later in the project. The community has shown a great interest in continuing to involve youth in health research.

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File No: 12 410 1050
Region: IN

Licence No: 16054
Location: Inuvik, Aklavik, Ulukhaktok, Tuktoyaktuk, Paulatuk, Sachs Harbour

Knowledge co-production for the identification and selection of ecological, social, and economic indicators for the Beaufort Sea

An indicator is something like water temperature, employment rates, fish health, or caribou birth rates that is easy to measure and that represents something else that is harder or more complex to measure. For example, the health of a whole river system can't be easily measured, but the health of a particular fish species and the water temperature of the river can be used instead to make a good guess at the bigger picture. The goal of this project is to identify good indicators of marine health, and the health of marine mammals, based on work that has already been done by other scientists and by talking to the organizations that make marine management decisions. In 2017 the researchers interviewed community members about marine indicators. They also continued to work on a list of 'datasets', which are the results from research and monitoring projects. The research team also spoke with community members in Aklavik, Tuktoyaktuk, Paulatuk, and Sachs Harbour about their interest in monitoring the marine environment. They expanded their list of datasets that can be used as potential indicators, including datasets that are specific to beluga whales. Finally, the researchers assessed currently-used beluga health indicators to see how well the indicators are working, to see if belugas are healthy, and to see whether beluga health is changing. Specifically, the research team looked at blubber thickness, girth, and length to see how useful these indicators are.

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Licence No: 16113
Location: Ulukhaktok

ACCESS open minds: youth mental health – Ulukhaktok

The goal of this research project is to improve the mental health services available to youth aged 11 to 25 years old in Ulukhaktok. The researchers also want to see if these services are having an impact. To start, ACCESS hosted a community information session to introduce the project and collect feedback from community members, youth, stakeholders, and leadership. ACCESS hired two local staff who are being trained to collect data and offer support services within the community. The project also received a large barge shipment of equipment for youth activities. At

this time, the project team has only done outreach activities and no data has been collected. Data collection should begin early in 2018.

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Region: GW **Location:** Inuvik

Exploring Indigenous digital literacy with Gwich'in Tribal Council Department of Heritage
The goal of this research project is to work with the Gwich'in Tribal Council's Department of Cultural Heritage to develop digital literacy research and resources focuses on digital content and connectivity in the north. For this project, 'digital content' refers to photographs, videos, and books that are available in a sort of library on the internet. 'Connectivity' refers to how people access the internet, for example through a satellite connection, Wi-Fi or fibre optics. A day-long workshop focused on digital content and connectivity in Gwich'in communities was held in Inuvik. This pilot was designed by Gwich'in Tribal Council (GTC) staff and partners from the University of Alberta. A total of 19 people participated in the workshop, including youth who travelled by road and plane from four Gwich'in communities (Ft. McPherson, Tsiigehtchic, Aklavik, and Inuvik). Participants from Inuvialuit communities also joined. Along with an introduction to key aspects of digital content and connectivity, the workshop showcased northern-based projects and innovations that had been undertaken by the GTC, including their interactive online atlas and ethnobotany database. The research team used this pilot workshop as a basis for additional worskshops held in the Gwich'in Settlement Area. Feedback and input from worshop participants contributed to developing local digital literacy workshops and curiculum with the GTC.

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Region: NS **Location:** Yellowknife

Consultation and consent: intercultural perspectives in resource governance
The goals of this research project are to learn more about how Indigenous governments and communities have shaped the NWT Water Stewardship Strategy (WSS), and to see if they are able to influence its implementation. In particular, the project looks at the NWT's approach to transboundary water negotiations with neighbouring provinces and territories. To meet these goals, the researcher interviewed government officials and members of the Aboriginal Steering Committee of the NWT WSS. The research showed that those transboundary agreements follow the principle of 'free, prior, and informed consent', as enshrined in the United Nations Declaration on the Rights of Indigenous Peoples. High levels of trust, based on effective engagement between Canadian, territorial, and Indigenous governments, was a key ingredient in the creation of the WSS. To ensure participants ongoing confidence in the WSS, it will be necessary to maintain and deepen this level of engagement and collaboration. It is also important to note that the WSS and the work of the Aboriginal Steering Committee is based on shared interests. These ways of working together could be vulnerable over time, for instance when there are competing interests about the use and protection of water resources.

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Region: NS **Location:** Yellowknife

Contesting infrastructure: political claims along pipelines

The goal of this project is to study current pipeline controversies in North America by looking at the history of pipeline regulations, financing, and public debate. The team will focus on debates over pipelines in the Canadian north that took place in the 1970s, as this was an important time for oil and gas infrastructure in Canada. The Berger Inquiry was a major challenge to the federal government, who before this time were able to proceed with northern development more easily. The project team will place more recent debates over pipelines in BC and Alberta (e.g., the Northern Gateway pipeline proposal) into this historical context. Overall, this project is designed to meet three goals. The first is to track changes in finance and corporate ownership of pipelines in Canada. The second is to study how pipelines, and the roads and railways that served them, shaped debates over development like mining and oil and gas in the Canadian north and west. And third, the project will map out the connections and relationships between people and organizations who were and are involved in debates over pipelines from the 1970s through to the present. The researchers hope to see how alliances and strategies of resistance have changed over time, especially in relation to changing corporate finance.

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Region: NS **Location:** Yellowknife

Assessing regulators' information needs to make decisions regarding cumulative effects under the MVRMA

'Cumulative effects' is a term that refers to all of the changes that can happen due to development considered together - for example, climate change, logging, roads and seismic lines, impacts to animals, and impacts to human use. The goal of this project is to see what information about cumulative effects is needed by regulators, so they can make good decisions and understand how development may impact water quality in the NWT. The researcher also wants to see if cumulative effects information can be provided through the NWT Cumulative Impacts Monitoring Program, or another agency responsible for monitoring. In the spring of 2017 the researcher reviewed impact assessment decision reports and Type A water licenses. He also interviewed various board members, government representatives, industry representatives, and others who are involved in monitoring in the NWT. Although there is a lot of environmental monitoring in the NWT, the project results indicate that a more deliberate approach is needed to ensure that cumulative effects are considered. This would improve decision-making at both the local (i.e. project) and regional scales. Further study of current government-led monitoring programs is needed to see if the information collected by government scientists is similar to industry-led monitoring programs. This type of study will help integrate industry-led and government-led environmental monitoring, and will also support regulatory decision-making by land and water boards in the north.

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Location: Aklavik

Foundations for student persistence and success in Inuit Nunangat

The goal of this research project is to answer two questions. First, what is helping Inuit students stay in school, particularly at grade transitions (when they move from one grade to the next)? And second, how are teachers measuring the achievements of Inuit students? To address these two questions, the researchers are looking at the whole community and how it supports education. They are also conducting interviews with post-secondary graduates and looking at case studies across Inuit Nunangat. In May 2017, the team visited Aklavik to conduct a case study for the Inuvialuit Settlement Region. This case study included interviews and focus groups with parents, teachers, school administrators, high school graduates, members of the District Education Authority, and community members. The researchers were asking about factors that lead to success in education. The researchers heard about incentives to increase attendance that are being used by Moose Kerr School, the role of learning centres as a key link to post-secondary education, the importance of on-the-land programming for male and female high school students, and a tutoring program where teachers volunteer after school to help students one-on-one. A report on this case study will be shared with education professionals, and their feedback will be requested. The research team hopes that their project will help identify effective education policies and programming that can be used in other northern communities.

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Location: Inuvik, Paulatuk, Sachs Harbour, Tuktoyaktuk

Integrating local knowledge of ecologically sensitive and culturally important marine areas in the Inuvialuit Settlement Region

The 'Low Impact Shipping Corridors' will be a policy that will guide how the federal government invests in marine navigation safety in the north. This policy will include improved ocean maps and information (such as charting and hydrography), which will be made in partnership with northerners. The Low Impact Shipping Corridors team plan to work with Inuit and northerners to find out the potential impact of marine vessels on community members and marine areas used for cultural and livelihood activities, and to develop potential management strategies for the corridors. Workshops were held in Sachs Harbour, Paulatuk, Tuktoyaktuk, and Inuvik to document these impacts and potential strategies. The workshops included elders, active harvesters, and youth. Workshop participants were asked to describe local marine use areas, including significant cultural, archaeological, and ecological areas, and local travel routes. They were also asked about the potential impacts of marine vessels on important ocean areas and on community members. Finally, the workshop participants were asked for suggestions of how to manage the Low Impact Shipping Corridors and Arctic marine vessels.

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Region: IN **Location:** Ulukhaktok

A longitudinal approach to community vulnerability and adaptation to climate change
The goal of this research project is to understand how hunters from Ulukhaktok are experiencing and adapting to climate change over time. To meet this goal, the research team used fieldwork data that was collected in both 2005 and 2016. In September 2017, the research team shared their findings from this project with community members from Ulukhaktok and other Inuvialuit Settlement Region communities using a presentation and a summary booklet. They also attended the Inuvialuit Final Agreement Research Day in Whitehorse at the beginning of September and shared their results with other researchers and stakeholders. Project results will also be shared at the Arctic Change conference in Quebec City at the beginning of December 2017. One or two members of the research team will visit the community again in January or February of 2018 to talk about how this first stage of their research went, and to plan for the next stage of their research. Depending on their communications with the community, the research team will hopefully be able to start working with hunters to set up a community-based GPS monitoring program that will focus on land-use and climate-related risks.

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Region: NS, SS **Location:** Ft. Smith and Yellowknife

Decolonizing learning in communities across Canada: stories of hope
The Stories of Hope Project is a two year partnership designed to start a Canada-wide conversation about improving the education system for Indigenous youth. In the first year, researchers from Aurora College, University of New Brunswick, University of Alberta, University of Saskatchewan, and University of Toronto looked at different ways that teachers are 'decolonizing' learning in their own communities. Decolonizing in this context means that the teachers value, understand, and teach that Indigenous ways of knowing exist, and that they value these ways in the same way that they value mainstream knowledge. The results will be presented as a series of case studies. In August, the researchers and the community members they have been working with came together to discuss some of the challenges they are experiencing as they promote a decolonized approach to education. They also decided on next steps for the partnership. The researchers are also producing a web documentary to share the findings from the gathering.

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File No: 12 410 1075 **Licence No:** 16063

Region: IN, GW, SA, DC, NS, SS

Location: Yellowknife, Ft. Smith, Ft. Providence, Ft. Simpson, Inuvik, Norman Wells

Breaking trail: developing community-engaged curriculum with former residential schools students in the NWT

This project is a case study about how the Government of the NWT Department of Education, Culture, and Employment developed the NWT's residential school curriculum. The research team will study how the curriculum was created, who was involved, and what the experience was like for the different participants who helped produce the curriculum. The research team conducted participant interviews and transcribed the recordings. They are now analyzing the information from the interviews. In August, the research team provided an update to the Stories of Hope partnership group. Discussions are continuing with the research team to determine how best to present their findings.

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Region: SS

Location: Wood Buffalo National Park, Ft. Smith

B. Ed., a journey

No summary available at this time.

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Region: NS

Location: Behchokǫ̀

Recipes for literacy

No research was conducted under this licence in 2017.

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Licence No: 16088

Region: IN

Location: Paulatuk, Ulukhaktok, Sachs Harbour, Tuktoyaktuk, Inuvik, Aklavik

Digital Library North

The Digital Library North (now called the Inuvialuit Digital Library) is the first Canadian cultural heritage digital library of its kind. A digital library is like a regular library except it is online, and all the books, recordings, and videos are digital files that are accessible on a computer with an internet connection. It was developed for the Inuvialuit Settlement Region (ISR) in Canada's western Arctic region. The project came from a close collaboration between University of Alberta researchers at the School of Library and Information Studies, and the six Inuvialuit communities.

To start, the project team identified which types of information (books, reports, and so on) are most needed in the ISR, so the library would best meet people's needs. The project team identified and digitized (turned into computer files) thousands of cultural and linguistic heritage materials, including text, audio files, videos, and pictures. These included language learning resources, oral histories, music and dance lessons, and other cultural events and activities. The Inuvialuit Digital Library now provides access to thousands of stories, images, and memories. It also helps people in Inuit communities develop computer skills, which are helpful considering how much information is now available online. The success of this project came from the close community collaboration, as many community members supported and assisted in the development of the Library. The Inuvialuit Digital library currently holds more than 5200 digital objects, and is available at www.inuvialuitdigitallibrary.ca.

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File No: 12 410 678 **Licence No:** 16003
Region: SA **Location:** Délı̨nę

Mapping, language, and stories in Délı̨nę
No summary available at this time.

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File No: 12 410 1081 **Licence No:** 16045
Region: DC, SS **Location:** Hay River and Łutsel K'e

Understanding changes in the freshwater ecosystems and drinking water in northern Canada
This research project had two goals. The first was to see if people are drinking bottled water, tap water, or lake water. The second was to find out how people felt about water safety and pollution. About a third of the participants drank bottled water at home, and the majority drank bottled water while on the land hunting and fishing. Most people thought that household tap water was safe, and that most natural sources of water were safe to drink if required. Only two people would not drink water from Great Slave Lake. Many people expressed concerns over the pollution from Alberta and Saskatchewan, and were concerned about the growing impacts of mining and oil and gas development within their area. Similar research was conducted in the Dene Tha' First Nation communities. Comparing the results from Dene Tha' with Hay River and Łutsel K'e showed that although they are only three hours apart, there are substantial differences in drinking water practices and concerns among the communities. This research project has also helped to define, for the first time, levels of water security for Indigenous communities both within the home and from natural sources. This can help the communities assess their water security and allow them to increase the level of their water security. Overall, this research project will allow both communities to gain a better idea of what their members think of their drinking water, and why, both within the home and while out on the land.

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File No: 12 410 1037 **Licence No:** 16011
Region: NS **Location:** Yellowknife

Community-based food systems research in Yellowknife, NT
Since 2016, Wilfrid Laurier University has been supporting the Yellowknife Food Charter Coalition and other local partners in order to make a case for a local food strategy with the City of Yellowknife that uses a 'food systems approach'. A local food strategy sets out ways that Yellowknifers can eat more local food rather than relying on imports. It brings together many people, organizations, and industries, including government decision-makers, to work together to reduce food insecurity and diet-related diseases. A food systems approach means that the researchers are aware of how the actions of one group (such as people who buy food or people who grow food) affect other groups in the system. It also means that the researchers account for the social, cultural, economic, and environmental consequences of food-related activities. The researchers have worked with the Food Charter Coalition to see what needs to be done to get the Yellowknife City Council to agree to the strategy. The project team has also worked with other researchers to plan and carry out other food-related initiatives across Yellowknife. This includes the popular Fall Harvest Fair, the community-supported Supper Clubs, and a community engagement event that is part of the Food Policy for Canada consultation process.

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File No: 12 410 1037 **Licence No:** 16023
Region: SS **Location:** Kakisa

Building community resilience in Kakisa
The goal of this project is to help Kakisa become a more self-reliant, healthy, and self-sustaining community. It is being conducted by Wilfrid Laurier University in partnership with the Ka'a'gee Tu First Nation. The research team supported the planting of community gardens because the community would like to grow more of their own food. They also put on canning and food preservation workshops. The research team developed a recycling and composting pilot program, which allowed the community to divert significant amounts of waste from the local landfill. Researchers worked with community partners to develop the Ka'a'gee Tu Atlas project. The Atlas will help the community monitor the land and the community's health and well-being for any cumulative impacts from climate change and development. The research team worked with partners from the Government of the NWT to pilot a mapping outreach program with high school-aged youth in the community. They went on a three-day canoe trip where students documented environmental conditions along their route and created web-based story maps about their experiences. Finally, the team funded and worked on a regional youth on-the-land camp with other researchers, elders, and youth, who shared their experiences and knowledge about changing conditions on the land, and changes to lake and fish health.

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File No: 12 410 1055
Region: DC

Licence No: 16050
Location: Jean Marie River

Human dimensions of a thawing landscape
The goal of this research project is to help communities develop climate adaptation strategies. For example, this may include policies about how to safely build roads and buildings despite thawing permafrost in the area. In particular, the researcher wants to help communities understand how the information they already have access to, such as scientific reports and ancestral and local knowledge, can be used to meet their needs. In both 2016 and 2017, workshops with community members were held in Jean Marie River, as well as in Dawson City in the Yukon. During the workshops the team provided an overview of all the climate change and landscape change research and projects that have happened in the area. In Jean Marie River, the research team reviewed the climate change priorities that the Jean Marie River First Nation had identified in previous work. They also reviewed the impacts that Jean Marie River may experience due to climate change, and reviewed research about these impacts. The research team then went through some exercises with the community to identify priorities for future projects and research. Once there were five potential projects, the community members selected which ones they felt should go ahead. Since deciding on community priorities can be hard, the research team tried different prioritization techniques and gathered feedback on them from community members.

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File No: 12 410 1101
Region: DC, NS, SS

Licence No: 16169
Location: Wood Buffalo National Park, Nahanni National Park, Parks Canada, and NWT offices in Yellowknife

Pyrogeographies in context: geographies of wildfire knowledge in Canada
This project investigates how the people in certain institutions come to 'know, govern, and encounter' wildfire. This means how they learn about fires (both specific fires but also in general), and how they make management decisions about fires. The researcher focused on Parks Canada, and spoke with fire managers, ecologists, and even computer modelers (who predict how fires will grow) about wildfires and prescribed fire. While in the NWT, the researcher met with and interviewed employees from Parks Canada and the Government of the NWT about their work. During these meetings, the researcher tried to find out how fire is known, governed, and encountered by each institution. He also asked how the interviewees learned about local concerns, and how fires that cross borders are dealt with. Similar research is being carried out in southern parts of Canada, and the researcher will compare the similarities and differences between the NWT and other parts of the country. After the interviews in the NWT, the researcher will do interviews and have meetings with experts who work in the territory but are based outside of the NWT. During a second visit in the future, the researcher will study how his fieldwork methods may have affected the results of the project.

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File No: 12 410 934
Region: IN

Licence No: 16083
Location: Aklavik, Inuvik, Tuktoyaktuk, Paulatuk, Sachs Harbour, Ulukhaktok

Food security, environment, and community health: integrating participatory methods, tools, and knowledge to promote food security in the Inuvialuit Settlement Region

The goal of this on-going project is to study food security. Food security refers to the ability of people to get their own healthy and nutritious food now, and into the future. The project was created in response to priorities that were identified by local and regional representatives from the Inuvialuit Settlement Region during workshops that were held in Inuvik in 2012 and 2014. The researchers will compare food pricing in Inuvik and Tuktoyaktuk from before and after the Inuvik-Tuktoyaktuk Highway was completed. They have also conducted twelve interviews with representatives in Inuvik and Yellowknife who work for organizations that are currently involved in food-related decision-making and programming. The interviews included questions about how food policy decisions are made in the region, and how to better address food security at a regional scale. In spring 2017, the researchers surveyed people in Paulatuk about country food harvesting and food sharing. The researchers found strong food sharing networks within the community and broader region, and that people harvest a lot of food for themselves. They also found that people have a range of opinions about buying and selling country food. The research team will identify local priorities related to food security, community strengths and programs, and will identify areas that may require support or development. This information will help the Inuvialuit Regional Corporation build a regional food security strategy.

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File No: 12 410 1107
Region: IN, GW, SA, DC, NS, SS

Licence No: 16193
Location: All NWT

A comparative analysis of provincial/territorial harm reduction policymaking in Canada: key informant interviews

'Harm reduction' refers to strategies that governments can use that will reduce the harm caused by drug use. The main goals of this research project are to compare the harm reduction policies in the NWT with those in other provinces, to find out what is preventing or helping the NWT government in their use of harm reduction services, and to see how policy makers describe harm reduction to the public. This research is part of a larger national project. In total, 75 people from across Canada were interviewed about harm reduction policies or practices. This included two people from the NWT, who were interviewed in December 2017. Interviewees were asked about their thoughts and opinions on harm reduction policy. The researchers identified trends in what the interviewees were saying. These trends show that people had very different views on how the provinces and territories should set policies for harm reduction services. Some people described the governments as out-of-touch and not in line with the real-life experiences of either people who use drugs or the people who provide services. Others said the research team needed to create new policies or improve existing ones. Some felt that not having policy was helpful and allowed them to better do their job. One theme mentioned by many interviewees was that provinces and territories were disorganized, and only thought about harm reduction policies in response to crisis situations.

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File No: 12 410 1095
Region: IN

Licence No: 16137
Location: Aklavik and Shingle Point, Yukon (69°00'00N, 137°22'00W)

Human-beluga relations and subsistence hunting in Aklavik, NT

Recently, Aklavik harvesters have not been able to hunt nearly as many beluga whales as they used to. At the 2016 Beluga Summit in Inuvik, representatives from Aklavik proposed this project to study the decline in the community's beluga harvest. The goal of this project is to study human-beluga whale relations over time, as well as any implications for subsistence livelihoods in Aklavik. The researcher conducted ethnographic research that had been agreed on with the Aklavik Hunters and Trappers Committee. Ethnographic research means that the researcher lives with the people they are studying in order to gain first-hand knowledge about their day-to-day lives. The researcher also conducted interviews with 32 community members from Aklavik. The interviews were conducted between June 21st and August 22nd in both Aklavik and at Shingle Point, Yukon. The interviews lasted from 30 minutes to one-and-a-half hours. Finally, the researcher asked Aklavik residents to list all of the country foods they knew of in a technique known as 'free-listing'. This was designed to show the country food preferences of the community. The researcher will visit participants again in future to ensure that the information that was gathered for this study is correct, and that the participants are comfortable with the results. The researcher has started transcribing the interviews (typing them out word for word) from the audio recordings, and has also started typing up the notes that were taken during this study.

Traditional Knowledge

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File No: 12 410 1106
Region: IN

Licence No: 16186
Location: Aklavik, Ulukhaktok, Inuvik, Sachs Harbour, Tuktoyaktuk, Paulatuk

Inuvialuit traditional trails
No research was conducted under this licence in 2017.

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File No: 12 410 1099
Region: SS

Licence No: 16150
Location: Łutsel K'e Dene First Nation

The role of traditional knowledge in the reclamation and monitoring of mines in northern Canada
In recent years many Łutsel K'e Dene First Nation community members have raised concerns about how increasing mining activities are affecting the movement of caribou on the land. The goal of this project was to address some of these concerns in collaboration with the Łutsel K'e Dene First Nation Wildlife, Lands, and Environment Committee. The project focused on the status of caribou around the Kennady North Diamond Project. In July 2017, guided by community members, the researcher collected 31 black spruce roots along caribou trails from across the barren lands. The researcher used dendrochronology analysis (also known as tree ring dating) to analyze the tree root samples and found an unexpected peak in caribou activity around the Kennady North Diamond Project between 2006 and 2015. Following the collection of the tree roots, the researcher conducted 26 interviews with youth, hunters, and elders, asking questions about alternative approaches to reclaiming the landscape after the current phase of diamond mining. Combining the tree-ring information with traditional knowledge and community perspectives from the interviews, the researcher found new approaches for future reclamation (reclamation means returning the land to the state it was in before it was damaged or changed by development). The idea of ceremonially and spiritually healing the land emerged as a necessary and viable part of reclaiming a contaminated landscape for future generations.

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File No: 12 410 1098
Region: SS

Licence No: 16143
Location: Łutsel K'e, Snowdrift River (62.3169°N, 110.5016°W)

Tracking Denesoline knowledge and narratives along the ancestral waters of the Snowdrift River
The purpose of this study is to record and interpret the Denesoline traditional knowledge (TK) and stories that were told during a multi-day trip. Working with Łutsel K'e Dene First Nation (LKDFN)

representatives, the researcher documented how traditional land-based knowledge and narratives (stories and ways to learn) can contribute to Dene self-determination, land and water governance, and 'cultural livelihoods'. In this context, cultural livelihoods means the ability of a people to live and work in culturally appropriate ways. The researcher went on a seven day canoe tripe with LKDFN youth, as well as a local land-user and elder as guides. The trip was along ancestral waters, and ended at the community of Łutsel K'e at Desnethch'e. Five research questions that were established in collaboration with community representatives guided this study. First, what TK and narratives are shared during travel and while camping on the land? Second, what cultural, environmental, and social changes have been seen by LKDFN representatives? Third, how are stories used to share knowledge among LKDFN representatives while they travel? Fourth, how does travelling and sharing knowledge help LKDFN govern their ancestral waters and lands? And finally, what impact does travelling and camping on the land have on LKDFN youth connections with the land, traditional knowledge, and culture? The researcher will prepare a report for the community, as well as a Master's thesis.

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File No: 12 410 1102 **Licence No:** 16170
Region: GW **Location:** Ft. McPherson

Land-based learning in Teetl'it Zheh: a university-community bush camp partnership
The goal of this research project is study how universities and First Nations communities can form research partnerships that work well to study First Nations topics. In other words, this project studies the best ways to do research. The research team includes academics and community knowledge holders in a university-First Nation partnership. They established a bush camp for on-the-land teaching and learning. The project team will ensure that the needs of the community are being met, and at the same time develop and use a research method that also meets the needs of the university researchers. This project team will build collaborative research relationships between university and community partners to talk about how to do good land-based research that values and is based on Indigenous ways of knowing. The team will also compile Teetł'it Gwich'in knowledge about how they share information about the land with each other, and how the Teetł'it Gwich'in 'manage' or take care of their lands. The team will create land-based education curricula to help youth reconnect with their traditional culture. Finally, the researchers will organize a land-based pilot project that connects Teetł'it Gwich'in elders, youth, knowledge holders, and university researchers at a bush camp.

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File No: 12 410 906 **Licence No:** 16078
Region: IN, GW **Location:** Aklavik, Inuvik, Sachs Harbour, Tuktoyaktuk, Tsiigehtchic, Ft. McPherson

Using Inuvialuit and Gwich'in observations to monitor environmental change in the Beaufort Delta Region
The Beaufort Delta Region is a dynamic (constantly changing) environment that is ecologically and culturally significant. This area is experiencing rapid environmental changes that are

expected to get worse with continued climate warming and other man-made changes. In some areas, changes are occurring so rapidly that it is impossible to maintain an inventory of the changes. Inuvialuit and Gwich'in land users in the region are in an excellent position to see how the land is changing and help monitor these changes. The objective of this research project is to document Inuvialuit and Gwich'in observations of the environment. To accomplish this, the research team worked with participants to capture photos and videos of environmental change, and asked questions about these images to gain information about the local conditions. In 2016 and 2017 the team conducted 26 interviews with 29 people, some who fish regularly, and some who do not. The researchers asked questions about environmental changes that could be affecting fish and people's 'access' to fishing areas (in other words, if people are finding it harder to get to the fishing areas). They also asked how environmental change and changes to their access to fish affect the well-being of individuals in Gwich'in communities. The research team went to four fish camps and employed six youth representatives who joined the team at the camps. Youth were given training in multimedia equipment use (such as video cameras and sound recorders) and interview techniques.

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File No: 12 410 1097 **Licence No:** 16141
Region: DC **Location:** Jean Marie River First Nation

Using traditional knowledge of JMRFN elders to better understand changes in the boreal caribou habitat

The goals of this project are to see how forest fires and permafrost degradation (thawing) are impacting boreal caribou habitat, and how the degradation of caribou habitat is affecting the Jean Marie River First Nation. To do this, the research team used a holistic approach that integrated traditional and scientific knowledge, with a larger emphasis on traditional knowledge (TK). TK was collected in one-on-one interviews, and scientific knowledge was collected from existing research publications. The researchers analyzed the interviews and mapped out areas where the quality of boreal caribou habitat has changed. The found that the quality of boreal caribou habitat has decreased in 35% of the areas, remained stable in 64% of the areas, and increased in 1% in the areas. Forest fires impacted 29% of boreal caribou habitat, and permafrost degradation impacted 88%. The boreal caribou habitat in the Jean Marie River area is in a medium state of health and is degrading. This means that boreal caribou could move away from their traditional territory and herd sizes could decrease. For the community, this means increasing difficulty accessing caribou meat, and reduced opportunities to practice traditional activities.

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File No: 12 410 1084 **Licence No:** 16085
Region: SS **Location:** Hay River

Pine Point rail bed - traditional knowledge and users' survey

The Pine Point rail bed follows the south shore of Great Slave Lake from east of Hay River to the decommissioned Pine Point Mine, near Ft. Resolution. It is contaminated from when it was used to transport metal from the mine. The goal of this project was to see if people are using the route

for traditional activities, and are therefore possibly at risk from the pollution. The research team collected and verified information using an on-line survey, in person interviews, and three round table workshops in Ka´tl'odeeche First Nation, Hay River, and Ft. Resolution. There was limited response to the survey and open houses. Thirteen on-line surveys were completed. Two people attended the Hay River meeting, ten attended the Ft. Resolution meeting, and two attended the Ka´tl'odeeche First Nation meeting. A total of 12 interviews were held, of which two were conducted by telephone. The information that was collected is assumed to be a true statement of the individual's actions and is treated as confidential. Only anonymous information is included in the final results. The surveys gave the researchers information about how people are using the rail bed. The study area remains important to several families in the region for recreation and food harvesting (plants and wildlife). For this reason, the rail bed should be monitored to determine the risk to human health and the ecological effects of contaminant exposure.

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Region: IN, GW, SA, DC, NS, SS **Location:** All NWT

Tracking change: local and traditional knowledge in watershed governance
This research project has two goals. The first is to document and share local and traditional knowledge (LTK) about changes in three large river basins: the Mackenzie River Basin, the Lower Mekong in Asia, and the Lower Amazon in South America. The second goal is to see how LTK is used in watershed governance. The research team focused on four themes. First, they looked at how and what people are noticing about the health of the aquatic environment (e.g., water quality, quantity, flow, groundwater, and permafrost conditions), in both modern times and in the past. Second, they looked at how and what people are noticing about changes to fish species (e.g., their population, movements, diversity, and invasive species) and other aquatic species (e.g., geese, beaver). Third, they looked at the sustainability of fishing livelihoods (e.g., harvesting levels and practices, diet, health, access issues, perceptions of change in the health of valued fish species). Fourth, they looked at how the changing environment and culture may affect governance (e.g., how to maintain healthy relationships to the aquatic ecosystem, maintaining respectful and spiritual relationships, and respecting treaty rights). In 2017, 12 research projects were funded in the three river basins. The methods and activities included fish camps, canoe trips, youth-elder knowledge exchanges, interviews, workshops, and literature reviews. The project team also worked with and helped other similar research projects in the basin.

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File No: 12 410 575 **Licence No:** 16061
Region: SS **Location:** Ft. Smith

We had a good mind to do it: oral histories of aboriginal forest firefighters, Ft. Smith (NT)
The goal of this research project is to record, preserve, and share the knowledge, values, experience, and techniques used by former Aboriginal firefighters who worked on fire crews based out of Ft. Smith. Former firefighters felt their expertise would be useful to others in the future, and so requested that this project take place. Their knowledge is based in a combination of traditional knowledge, oral history, traditional leadership styles, and years of experience. This project also

complements increasing interest in this issue in other boreal forest communities. The researcher interviewed 30 participants, with interviews taking at least half an hour, and some taking much longer. Most of the potential participants are quite interested in the topic and wished to participate. The researcher has also carried out some individual interviews with the oldest participants. These interviews are currently being transcribed (typed out word for word). A more formal organizational meeting for the project is planned for January, when the project will be completed and reviewed and the next phase of activities will be planned, including additional interviews and story-telling sessions.

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Region: NS **Location:** Behchokǫ̀

Non-canonical relative clauses: universals and variation in compositionality
This research project asks how people say things, and also asks if people use the same patterns of speaking even if they are speaking different languages. The researchers are particularly interested in sentences like 'The dog that my sister is going to get for her son is very small still', and 'All the boats that my uncle made last year are in the water now'. This kind of sentence is interesting because the patterns in different languages can be complicated. Still, people speaking the same language can understand each other. Two researchers interviewed one Tłı̨chǫ person about this question (in February and August 2017). Together they are writing an essay about how this kind of thing is said in the Tłı̨chǫ language, although the essay is not yet complete. The researchers would like to continue this work in 2018.

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File No: 12 410 678 **Licence No:** 16167
Region: SA **Location:** Colville Lake, Déline, Ft. Good Hope, Norman Wells, Tulita

From Dene Kede to Dene Ts'ili: review of Dene language and cultural revitalization initiatives in the Sahtú Region
In Canada and around the world, Indigenous languages and ways of life are increasingly recognized as key components of well-being. They are an essential priority for all levels of government in Canada. In the Sahtú Region of the Northwest Territories, three major dialects and several additional variants of Dene Kedə (Dene language) are spoken in the five Sahtú communities. Sahtú communities also have a strong spirit of self-determination and continued land-based practices. The project team is studying how best to support and revitalize the use of Dene languages and land-based ways of life in the region. To do this, they are identifying community and regional strengths by reviewing more than fifty years of literature, using their own experience, and interviewing youth for their current knowledge. They found that different 'domains' like law, policy, education, and local knowledge all impact languages and ways of life. The also found that change can be mapped in each of these domains across time. This means that revitalizing language and ways of life is complex, and there are many challenges in planning for revitalization since each 'domain' has its own history and therefore planning for the present

and future will be different. The research team have sought to identify Sahtú-based processes that may be solutions to barriers to revitalization.

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File No: 12 410 1059
Licence No: 16072
Region: SA
Location: Tulít'a and Norman Wells

Nááts'ihch'oh National Park Reserve traditional knowledge study
The goal of this project is to gain a more comprehensive understanding of culturally important places and cultural resources found in the Nááts'ihch'oh National Park Reserve. The researchers also want to understand the value of these places and resources to support the planning and management of the park. In May 2017, Nááts'įhch'oh National Park Reserve hosted the final workshop that sought new information for a traditional knowledge study. At this workshop, the project team and workshop participants reviewed information from previous sessions, and several additional place names in the park were identified. Following the workshop, the researchers checked transcripts with interview participants to ensure their words were recorded accurately. The researchers have completed the first draft of the study report, and it has been reviewed by the majority of study participants. The study report is therefore close to being finalized.

Archaeology

Beckhusen, Gary
University of Saskatchewan

Permit Number: 2017-008
Region: SA
Class: 2
Location: Stelfox Mountain

Moose Horn Pass (KjRx-1) caribou fence: dendroarchaeology in the Mackenzie Mountains
The goal of this multi-year project is to conduct dendrochrononological analysis (tree ring dating) and drone surveys of a caribou fence in the Moose Horn Pass area to identify when it was built and used. The research team took a one-day field trip to the Moose Horn Pass caribou fence to gather more tree-ring samples to add to those collected in previous years. To find out when the trees used to build the fence were cut down, the researchers need samples of trees from before, during, and after that time. Living trees were sampled in areas right next to the fence, as well as to the east and south, where samples had not been previously taken. Fence samples were taken from the previously unsampled corral structure as well. Snags, which are standing dead trees that are useful because they don't decay very quickly, were sampled whenever possible. In all, the research team took samples from 35 living trees, 15 snags, and 14 fence posts from the area around the fence. Additional samples were also taken from another 20 trees, as well as from five axe-cut stumps. At the time of writing, the researcher has made a master 'chronology' (timeline) of tree ring growth extending to the early 1700s. This has allowed the researcher to figure out some possible dates for when individual fence timbers were growing and cut down to use in the fence.

Dixon, Ashley
self

Permit Number: 2017-013
Region: DC
Class: 2
Location: K'ágee Tu and posssibly Tathlina Lake

K'ágee Tu First Nation archaeology project
The goal of this project is to document the archaeological record in the traditional use area of K'ágee Tu First Nation. This means the research team will try to map out where there are archaeological sites, when these sites date back to, and what the people who were using the sites long in the past were doing there. First, the researchers will determine archaeological potential in the project area by mapping out where they are more and less likely to find undiscovered sites. Using this map, they will survey on foot to find and document new sites, and revisit and study known ones. They will survey the area on foot and dig test pits by shovel to see if there are any artifacts in the ground. If archaeological sites are found they will do actual archaeological excavations.

Foster, Jean-Paul
Stantec Consulting Ltd.

Permit Number: 2017-020
Region: SA, NS
Class: 2
Location: North of Norman Wells, east of Behchokǫ̀

AIA of GNWT INF Highways 1 and 3 borrow/access
The goal of this project is to conduct an Archaeological Impact Assessment to make sure that a number of potential gravel pits ('borrow sources') will not affect any archaeological sites. These borrow sources will supply bedrock and other rock for highway and roadway construction. The

researchers identified areas of high archaeological potential (where archaeological sites are likely to be found) within each borrow source. Since this exercise often provides only a broad overview of the area, the researchers needed to assess the archaeological potential of each borrow source and the new highway alignment in the field. They checked the entirety of the project footprint by surveying on foot, and in the case of the Norman Wells/Highway 1 portion, they surveyed by helicopter and looked for good landforms. The borrow sources were typically landforms that were high in elevation, level, and better-drained than surrounding areas, which means it is more likely that there will be archaeological sites there than in the areas around them. The researchers focused on these areas, and the locations where the road alignment crossed creeks, as archaeological sites are often found around creeks. The researchers dug a total of 274 shovel tests looking for archaeological artifacts and found one pre-contact site. In addition, they found one historic site, dating to the 1940s, and two traditional land use sites. The researchers recommended that the road construction avoids the pre-contact site, and that the road construction team reach out to the local community regarding the two traditional land use sites.

Foster, Jean-Paul
Stantec Consulting Ltd.

Permit Number: 2017-018
Region: NS

Class: 2
Location: Southeast of Ingraham Trail, between Reid Lake and Dorothy Lake

AIA of PWGSC bullmoose area mine sites

The goal of this project is to conduct an Archaeological Impact Assessment of areas that may be impacted by the planned remediation of the Bullmoose Area Mine Sites Project. Remediation refers to cleaning up a contaminated or damaged area and returning it to its natural state. The research team looked at gravel pits ('borrow sources') and new winter roads, and revisited the old Ruth Mine campsite. The remediation will cross lands in the traditional territory of the Yellowknives Dene First Nation. Two Yellowknives Dene Elders, accompanied by the archaeological team, surveyed the borrow sources and new winter road alignments and noted any areas of potential concern to the Yellowknives Dene. The Gordon Lake borrow sources were considered the most likely to have archaeological sites, as they are high and level landforms, have a good view of the surrounding landscape, and are well-drained. The researchers focused their survey on these areas, and on some other areas of similarly well-drained high points along the winter road. They also surveyed and recorded the mid-20th century Ruth Mine camp. The team dug over 300 shovel tests looking for archaeological artifacts. They found two new pre-contact sites within a Gordon Lake borrow source, and a newly discovered pre-contact component at the old Ruth Mine camp site. They also recorded two traditional land use sites, one which was a series of hearths that was identified by the Yellowknives Dene Elders.

Foster, Jean-Paul
GNWT Department of Infrastructure

Permit Number: 2017-003
Region: NS

Class: 2
Location: Corridor from Hwy 3 to Whatì

Archaeological impact assessment of granular and bedrock prospects associated with the Tłı̨chǫ all season road project

The goal of this project is to conduct an Archaeological Impact Assessment for proposed borrow sources (gravel pits) and their access roads. The borrow sources will be used to provide bedrock and other rock for the Tłı̨chǫ all season road. The crew worked through late May to survey the area under snow-free and frost-free spring field conditions. Before they went into the field, they

identified areas that were more likely to have archaeological sites, which included many of the borrow sources. They surveyed all of these areas on foot. The borrow sources were generally high and level landforms that were better-drained than the surrounding areas, which makes them more likely to have archaeological sites. The research team dug over 700 shovel tests and found five pre-contact archaeological sites. Since previous archaeology work in this area has been limited, the discovery of these pre-contact sites will add to the understanding of how past peoples were using and travelling across the land. They also found one historic site, dating to the mid-20th century, and two traditional land use sites. They recommended that the road construction avoid the pre-contact and historic sites, and also recommended outreach to the local community about the two traditional land use sites.

Friesen, Max
Inuvialuit Cultural Resource Centre and University of Toronto

Permit Number: 2017-006
Region: IN
Class: 2
Location: Richards Island and the Tuktoyaktuk Peninsula

Arctic cultural heritage at risk

Many archaeological sites on Richards Island and Tuktoyaktuk Peninsula are at risk from climate change and erosion. Archaeologists are working to excavate and record these sites before they are lost forever. In 2017, the researchers completed the excavation of one of the houses they found at Kuukpak, an extremely important and very large Inuvialuit heritage site. They are also updating site maps and surveying other areas at Kuukpak that may erode. A team of ten people worked at Kuukpak for six weeks. They found previously-hidden houses, recorded erosion damage, and collected artifacts from the beach. Most importantly, the team completed excavation of an extremely large three-alcove winter house of a kind that is well known in Inuvialuit traditional knowledge. Based on the historic artifacts of metal and glass found there this house dates to the 1800s. The house's driftwood architecture was extremely well preserved – the walls and floors were found exactly as they had been left. The artifacts will tell the team about hunting and fishing practices, and other aspects of Inuvialuit history. Finally, the researchers surveyed the coasts of Richards Island and McKinley Bay by helicopter. They observed rapid erosion at McKinley Bay (over five metres in the past year alone). At Satkualuk, a very early site on Richards Island, they collected a small piece of caribou antler for radiocarbon dating.

Kramers, Patrick
De Beers Group Companies

Permit Number: 2017-002
Region: NS
Class: 1
Location: MacKay Lake to Kennady Lake area

Gahcho Kué Mine archaeological monitoring

The objective of this monitoring project is to confirm that known archaeological sites remain undisturbed by diamond mining activity and remain well-marked with stakes where necessary. The stakes in question were placed around previously recorded archaeological sites during previous investigations. The stakes clearly and visibly mark the location of the sites so the mining activities, or the operation of the winter spur road, do not affect the sites. The project team visited the sites and maintained the stakes from June 26th to 28th. They went to the 11 sites that have the highest risk of impacts from mining operations. At each site the area was checked for any signs of disturbance, and any damaged, missing, or loose/leaning stakes were replaced. Additionally, all of the stakes were repainted using a highly visible orange paint that is used by surveyors. Of

the 11 sites visited, none showed any signs of disturbance, but all 11 required some maintenance of the marking stakes.

Kwiecien, Grzegorz
Taiga Heritage Consulting Ltd.

Permit Number: 2017-023
Region: DC
Class: 2
Location: The Cameron Hills, the Hay River, and the lowlands south of Tathlina Lake

Stories from the ground
The goal of this project is to document Dene Tha' First Nation traditional land use sites in the southern Northwest Territories. The project is being conducted with the participation of Dene Tha' First Nation.

MacKay, Glen R.
Prince of Wales Northern Heritage Centre

Permit Number: 2017-012
Region: DC
Class: 2
Location: Two kilometers on either side of Hwy 1, between km 180 and km 220

Highway 1 baseline archaeological inventory
The goal of this project is to record the location of archaeological sites in the Highway 1 corridor. To record these sites, the research team will survey the area on foot to map the area and any archaeological sites. They will also dig shovel tests to find any buried archaeological artifacts.

MacKay, Glen R.
Prince of Wales Northern Heritage Centre

Permit Number: 2017-009
Region: SA
Class: 2
Location: Mackenzie Mountains

NWT ice patch monitoring program
This project has two goals. The first is to record archaeological sites and artifacts from ten ice patches in the Mackenzie Mountains. This will be conducted using a helicopter survey. During the survey the research team will collect and stabilize any exposed artifacts. The artifacts are melting out of the ice patches as they shrink due to the changing climate, and without archaeological work these items would weather and disappear. The second goal is to continue the archaeological study of the Moosehorn caribou fence.

Murphy, Brent
Lifeways of Canada Limited

Permit Number: 2017-022
Region: IN
Class: 2
Location: Near Tuktoyaktuk

Former Imperial Oil Ltd. oil and gas exploration base near Tuktoyaktuk, NWT
The former Imperial Oil Ltd. oil and gas exploration base near Tuktoyaktuk will be remediated in the future, which means any buildings will be removed and any contamination will be cleaned up. The research team conducted an Archaeological Impact Assessment of the area to ensure the remediation activities will not affect any archaeological sites. The area is surrounded by tundra,

with the Mayogiak Inlet to the east and Tuktoyaktuk Harbour to the west. The base operated from the early to late 1980s, and served as the Imperial Oil Ltd. logistical base for exploration activities in the area. There were storage areas, a camp, a tank farm, barge docks, an air strip, warehouses, and garages. Most of the buildings were removed from the site in the late 1980s and other debris was removed in the late 2000s. The base covers a land area of approximately 54 hectares (for comparison, the land area of Tuktoyaktuk is about 100 hectares). The researchers surveyed the base, and the areas that may be used during remediation, on foot. The project area has been disturbed extensively in the past by the construction of the exploration base. The researchers recorded a single archaeological site on the bank of Mayogiak Inlet, NiTo-5, which is a campsite with a hearth. NiTo-5 lies outside of the project area and, therefore, will not be impacted.

Murphy, Brent
Lifeways of Canada Limited

Permit Number: 2017-021
Region: DC
Class: 2
Location: Fort Simpson

Enbridge Line 21 segment replacement project
The goal of this project is to conduct an Archaeological Impact Assessment for areas that may be impacted by the Line 21 segment replacement project. During this project about 2.5 km of the existing Line 21 pipeline will be replaced by drilling horizontally beneath the Mackenzie River. The work will take place within the existing Line 21 right-of-way, but a new temporary workspace will be required for the drilling equipment and worker camps. The existing pipeline segment that is being replaced will likely be left in place but cleaned up. There will be construction activities on both the north and south sides of the Mackenzie River and at the South Camp location. The project team surveyed these sites on foot to check them for archaeological sites. The archaeological work was guided by Indigenous participants who led the survey and provided insight into modern and past land use. No archaeological sites were found, however several modern land use features were seen including a trapper's trail, a cutline from a telegraph/phone line, and a memorial.

Smethurst, Naomi
Prince of Wales Northern Heritage Centre

Permit Number: 2017-016
Region: SS
Class: 2
Location: Great Slave Lake, Hay River, Buffalo River

Katl'odeeche First Nation archaeology project
The goal of this project is to document the archaeological record of the traditional territory of Katl'odeeche First Nation, focusing on locations near the south shore of Great Slave Lake. This means that the research team will try to map out where archaeological sites are located, figure out when these sites date back to, and see what the people who were using the sites long in the past were doing there. To find the archaeological sites, the research team surveyed the area on foot and by boat. They also dug shovel tests to look for archaeological artifacts.

Soucey, Kristin
Circle CRM Group

Permit Number: 2017-001
Region: DC
Class: 2
Location: Ft. Simpson

Construction monitoring of the Public Works and Services maintenance workshop in Fort Simpson

A new Public Works shop is being constructed in Fort Simpson, along with a new permanent fence that will encompass possible burials next to the Sacred Heart Cemetery. A survey in 2015 that used a ground penetrating radar found that there might be burials in the area in question. The goal of this project was to monitor the construction of the shop and the fence. This monitoring was to ensure that none of the possible gravesites detected during the survey were impacted by the installation of the foundation piles for the shop, nor the fence posts. No human remains or other evidence of burials were observed during the construction monitoring.

Walker, Daniel
TerraX Minerals Inc.

Permit Number: 2017-007
Region: NS
Class: 2
Location: Approximately 15 km north of Yellowknife, west of Prosperous Lake

Yellowknife City gold project

The Yellowknife City gold project is a potential gold mine near the city. Before any construction can start, the mine needed to conduct this Archaeological Impact Assessment to identify archaeological sites so they can be protected. This project had four goals. First, the project team looked for and recorded archaeological sites within or near to the proposed development area. Second, they compared the site locations to the development locations to see if there will be any impacts on the sites. Third, they provided recommendations for further archaeological studies which should be done, and fourth, they recommended ways to reduce impacts on the sites. One archaeological site was found during the foot survey of the area. The site was a small scatter of debris from the manufacturing of stone tools. It was on a bedrock outcrop that overlooks a small pond to the east of Jackson Lake. The rock debris was ‘quartzite’, a type of rock that looks like melted and fused glassy sand. It was found near a quartzite vein in the bedrock, and beneath the moss downslope of a large rock. This large rock may have been a resting place for the person who was making the stone tools. The research team also recorded historic cabins, campsites, and claim posts, and other remains associated with mineral exploration. A mineral exploration camp made up of three log tent bases was located on the northeast shore of Likely Lake.

Young, Patrick
Golder Associates Ltd.

Permit Number: 2017-019
Region: NS
Class: 2
Location: Tibbitt to Contwoyto Winter Road

Tibbitt to Contwoyto Winter Road improvements

Two locations along the Tibbitt to Contwoyto Winter Road are scheduled for constrution. These are the Portage 25 Marshalling Area and Portage 48A. This project is an Archaeological Impact Assessment of both locations. During the field program, the research team examined the two portage routes for archaeological sites. Portages are where the winter road crosses land along lake shores and between waterbodies. Archaeological sites may occur in these portages. Portage 25 is located between Charlie’s and Brown Lakes about 125 km northeast of Yellowknife. It generally follows a drainage. Portage 48A crosses a point of land on the south shore of MacKay Lake about 215 km northeast of Yellowknife. Both portages were relatively short, with each crossing only about 250 m of land (around the length of two city blocks). The research team surveyed the two areas in one day using a low-level helicopter survey, followed by a survey on foot. They also dug shovel tests where warranted. Although the portages were generally located

in areas where archaeological sites are more likely to be found, along drainages and lakeshores, Portage 25 was a low, poorly drained area and Portage 48A was a low-lying cobble and boulder field. A recent camp was found at Portage 25 (consisting of modern refuse and cut, burnt logs), but no archaeological sites were identified that conflict with the project.

Young, Patrick
Aurora Geosciences Ltd.

Permit Number: 2017-011
Region: NS
Class: 2
Location: Near Kelvin Lake, approximately 130 km northeast of Łutselk'e

Kennady North property

The goals of this project are to revisit and document known archaeological sites, and look for unrecorded sites, within the Kennady North mine project area so the mine can protect and avoid them. The research team spent five days in the field, using helicopter surveys as well as foot surveys. They also performed shovel tests. They re-visited ten previously-recorded archaeological sites and found eight new sites. The ten known sites were chosen because they were the few remaining sites in the study area that had not been revisited since their initial recording almost 20 years ago. These sites needed their coordinates (latitude and longitude) confirmed and their site condition updated. All of the known and newly recorded sites were of lithic scatters (waste flakes from stone tool production). One of the new sites also had two hearths, indicating that people stayed there. Two quartz scrapers and one retouched chert flake (a flake from which other tiny flakes are removed to make it a better cutting tool) were found. No tools were found that could be used to tell the archaeologists how old the sites are. The location of each site will be used by Aurora Geosciences in current and future project planning to make sure that the sites are managed properly and are avoided by the Kennady North Property.

Fisheries

Blais, Jules
University of Ottawa
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Licence Number: S-17/18-3032-YK-A2
Species: All fish species **Location:** Long Lake, Small Lake, Handle Lake, Lower Martin Lake

The impacts of legacy Giant Mine activities on inorganic arsenic bioaccumulation and transfer in the freshwater food chains in Yellowknife, NT, Canada
This project has two goals. First, to assess how the Giant Mine operations affected the accumulation of arsenic in freshwater plants and animals. Second, to understand how arsenic moves through the food chain in freshwater lakes. For the second goal, the researchers are focussing on several lakes in Yellowknife. They want to understand how people can be exposed to arsenic through their diets when they eat wild fish. Arsenic accumulates in lake sediment and water, and then can move into wild fish. The information about how arsenic moves from sediment and water into fish will be helpful for the on-going Giant Mine clean-up project. The overall purpose of this project is to fill a knowledge gap in the scientific literature about how this particular type of arsenic (called 'inorganic arsenic species') moves through freshwater food webs.

Carson, Richard
RC BioSolutions
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Licence Number: S-17/18-3033-YK
Species: All fish species **Location:** Flat River

Cantung Mine 2017 environmental effects monitoring program
This project is checking if the Cantung Mine's water monitoring program is working the way it should. The project has two main goals. First, the researchers are checking the various study sites used by the monitoring program to see if there are differences in the tiny plants and animals that live in the water. They're looking for differences between both study sites and years. Second, the researchers are checking whether the differences found in the most recent (2015) Environmental Effects Monitoring study are still present, and whether any differences are the result of mining practices. Specific to fisheries, this study will evaluate fish health, how the fish are able to get enough to eat, how they store fat for leaner times, and their age distribution, both in lakes exposed to the mine runoff and other lakes that are not affected by runoff.

Clarke, Kim
ConocoPhillips Canada Resources Corp.
Kim.P.Clarke@conocophillips.com

Licence Number: S-17/18-3012-YK
Species: Benthos **Location:** Beaufort Sea

Seabed evaluation – Thetis Bay
The 'Tarsuit Caissons' are large concrete structures that were brought into the Beaufort Sea in the 1980s to act as retention berms. They contain and protect an artificial island made of sand that was used for oil and gas exploration. The caissons were recently moved and stored on shore. The objective of this project is to document the physical condition of the seabed after the Tarsiut Caissons were removed. The project includes sampling the plants and animals that live in and near the seabed, and using special instruments to scan the disturbed and undisturbed areas of

the seabed to see how it may have changed. This information can be used as a benchmark for future studies that look at how natural processes will restore the seabed at the footprint of the Caissons.

Easterling, Katie
Stantec Consulting Ltd

Licence Number: S-17/18-3008-YK-A2
Species: All Species **Location:** Bullmoose Lake

Bullmoose Ruth remediation project – Bullmoose Creek fisheries assessment
The objective of this project is to study the fish habitat and fish community in Bullmoose Creek to support planned 'remediation' efforts. Remediation refers to cleaning up a contaminated or damaged area and returning it to its natural state. Remediation at this location will include the removal of polluted sediment. Using the information about fish and fish habitat that's collected during this project, the researchers will evaluate if the sediment removal will impact the existing fish habitat. If they need to, the researchers will develop appropriate mitigation steps, or even create artifical habitat for the fish. A fish 'salvage' will be required as part of the remediation and reconstruction work at Bullmoose Creek. To do this, fish will be collected from the work area and re-located downstream.

Evans, Marlene
Environment and Climage Change Canada
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Licence Number: S-17/18-3020-YK
Species: Burbot, lake trout, northern pike **Location:** Great Slave Lake area

Spatial and long-term trends in persistent organic contaminants and metals in fish from the NWT
This study investigates whether contaminant levels in fish in the Northwest Territories are changing. The study focuses on fish in Great Slave Lake, which the team have studied since the early 1990s. The research team collected and studied the contaminent levels in fish from Great Slave Lake including lake trout from the Hay River and Łutsel K'e areas, burbot from the Łutsel K'e and Fort Resolution areas, and northern pike from the Fort Resolution area.

Gallagher, Colin
Fisheries and Oceans Canada
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Licence Number: S-17/18-3006-YK
Species: Arctic charr, broad whitefish, flounder **Location:** Darnley Bay, Hornaday River, starry Lasard Creek

Arctic charr monitoring in Darnley Bay NT, 2017
This on-going project has two goals. The first is to check on the Arctic charr populations in Hornaday River, Darnley Bay, and at the mouth of Lasard Creek. The second is to gather information about the life history of Arctic charr captured at the mouth of the Hornaday River and Lasard Creek. The researchers are also studying some fish known locally as 'blue charr' which are found near Tippitiuyak (western Darnley Bay). Local harvesters consider these fish to be different than Arctic charr. Finally, the research team continued to work with the community of

Paulatuk to provide important information that's needed to fulfill the the Paulatuk Charr Management Plan.

Gallagher, Colin
Fisheries and Oceans Canada
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Licence Number: S-17/18-3016-YK
Species: Arctic charr **Location:** Fish Lake

Assessment of Arctic charr stock from Fish Lake and age validation study 2017
This project has two objectives. First, the researchers are collecting catch numbers and biological information about Arctic charr to check whether the population is healthy or changing. Second, they are developing a model that will predict the response of the population to harvest. The predictions will be based on information collected by the researchers before, during, and after the harvest season.

Gallagher, Colin
Fisheries and Oceans Canada
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Licence Number: S-17/18-3017-YK
Species: Dolly Varden **Location:** Rat River, Bid Eddy, Fish Creek

Population studies on Dolly Varden from the Northwest Territories and Yukon North Slope
The goal of this on-going project is to collect information about Dolly Varden in the Rat River. There are several types of Dolly Varden that can be found in Rat River. Some travel to the ocean to feed and return to the Rat River to spawn, while some stay in the creeks instead of migrating to the ocean. The research team worked with local harvesters to collect fish they had previously tagged, which gives the research team information about the population size. They also recorded information such as the weight and size of the fish that were caught. The researchers asked harvesters how many fish they caught compared to how much time they spent fishing, which is also used to understand population size. The researchers travelled to Fish Creek, a tributary of Rat River, when the Dolly Varden were spawning in the fall. They caught fish and recorded information about them before returning the fish to the creek. They also harvested some of the fish that stay in the creek all year so they could take samples for later study. Finally, they put ten satellite tags and 42 'archival' tags on Dolly Varden. An archival tag has a tiny computer in it that records and stores information such as the temperature, salt level, and depth of the water. The computer also records information about the fish itself, like its pulse and swimming speed.

Gallagher, Colin
Fisheries and Oceans Canada
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Licence Number: S-17/18-3019-YK
Species: Arctic grayling, Dolly Varden, whitefish
Location: Babbage River system, Firth round River system, Herschel area, Joe Creek fish hole (Ivvavik National Park), Little Fish River

Population studies on Dolly Varden from the Northwest Territories and Yukon North Slope

The goal of this on-going project is to check on the population of Dolly Varden. The researchers are estimating how many fish there are using a method called 'mark-recapture'. To do this, they catch fish and place tags on them, and then later return to the same place and harvest fish again. By counting the tagged and non-tagged fish that they harvest the second time, they can make a good guess at the number of fish in the population. They do this every year, and in 2017 they put a total of 2,100 tags on fish from the Big Fish, Babbage, and Firth Rivers, and from Joe and Fish Creeks. The researchers also harvested fish in order to study them. They took samples of two types of fish: resident fish that do not migrate, and 'anadromous' fish that migrate between freshwater rivers and the ocean. For anadromous fish, they harvested small spawning Dolly Varden from the Babbage and Firth Rivers, and from Joe Creek. They also harvested 25 recaptured Dolly Varden from Babbage River, Firth River, and Joe Creek, and 30 from Fish Creek (Komakuk Beach). For resident fish, the researchers harvested 20 from Big Fish River, Babbage River, Firth River, and Joe Creek, and 50 from Fish Creek near Komakuk Beach. The resident fish were caught in the fall. The researchers recorded the length, weight, age, sex, maturity, and diet of the fish, and took samples from the fish to test for contamination. They also took samples from fish caught by community members at Herschel Island and Ptarmigan Bay in the Yukon.

Gallagher, Colin
Fisheries and Oceans Canada
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Licence Number: S-17/18-3021-YK
Species: All fish species **Location:** Shingle Point

Community based monitoring of coastal fish ecology and harvest of Dolly Varden

The goal of this on-going community-based monitoring program is to learn more about the ecosystem of the Tarium Niryutait Marine Protected Area. The term 'ecosystem' refers to all of the plants and animals in an area, as well as their non-living environment, and how all of these things work together. To meet this goal, the researchers collect samples from fish that were caught by local fishermen at Shingle Point. The samples are tested for chemicals that show what the fish ate. The researchers also record how many Dolly Varden the fishermen have caught, and other information about these fish such as their length, weight, sex, and age. They take samples of Dolly Varden as well. The researchers will test the DNA of the Dolly Varden samples, and will look at their stomach contents to see what the fish ate. The researchers will use the information they collect to understand the normal yearly variations in the fish, and how this variation affects what people are harvesting. The program provided training that supports long-term, community-based, coastal monitoring. The program also helped other researchers check if the oceans are changing due to the combined effects of development and other man-made changes.

Howland, Kimberly
Fisheries and Oceans Canada
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Licence Number: S-17/18-3018-YK
Species: All fish species **Location:** Great Bear Lake (Keith Arm)

Long-term monitoring of cumulative impacts to fisheries and ecosystems in Great Bear Lake

The goal of this long-term monitoring program is to check the health and population levels of trout and cisco in the Dareli (Keith), Turili (McVicar), Kwit tla (McTavish), Tugacho (Dease), and Tirato

(Smith) arms of Sahtú (Great Bear Lake). The researchers recorded the size and age of lake trout and the number of eggs per female, which helps them determine how productive the fish are. In other words, this information helps the researchers determine how many young ones the fish will have. The research team used this information to see if lake trout numbers, or the lake trout themselves, are changing over time. The researchers also wanted to find out how many types of ciscos are in Great Bear Lake. To figure this out, they took ciscos that had been caught and frozen in the past seven years, and carefully studied them by measuring things such as their size, scales, and fins. Finally, the research team studied the whole living system of Great Bear Lake that supports the fish as they grow and reproduce. This included the plants and small animals that the fish eat and the quality of the water.

Hynes, Kristin
Fisheries Joint Management Committee
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Licence Number: S-17/18-3030-YK
Species: Arctic charr, Arctic cisco, saffron cod **Location:** Sachs Harbour area, Sachs River

Banks Island coastal harvest monitoring of fisheries, 2017
The goal of this project is to learn more about sea-run Arctic charr stocks, and other fish species, near the community of Sachs Harbour using an exploratory harvest monitoring program. The Sachs Harbour Hunters and Trappers Committee has identified this as a community priority because harvest levels in the Sachs River have dropped in recent years. To meet this objective, Inuvialuit monitors will work with a biologist from the Fisheries Joint Management Committee to set nets and record 'catch effort' in Blue Fox Harbour, Sachs River, and Masik River. Catch effort refers to the number of fish that are caught over a period of time that is spent fishing, which is used to understand fish population size. The monitors and biologist will also record biological information about the fish, and collect samples from them.

Insley, Stephen
Wildlife Conservaton Society Canada
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Licence Number: S-17/18-3015-YK
Species: Bearded seal, ringed seal **Location:** Amundsen Gulf, Darnley Bay

ISR seal monitoring
The goal of this project is to monitor ringed seals and bearded seals in the Amundsen Gulf of the Inuvialuit Settlement Region. This monitoring project is long-term and community-based, and focuses on the diet and body condition of the seals. A reliable and consistent record of ringed and bearded seal diet and condition is important, because it gives the researchers and the community information about the health of the whole ecosystem. This type of monitoring will also identify climate change impacts in Arctic marine species.

Janjua, Muhammad Yamin
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Licence Number: S-17/18-3004-YK
Species: All fish species **Location:** Buffalo River closed area

Buffalo River spring sampling
The goal of this on-going research program is to continue the long-term monitoring of inconnu (coney) at the mouth of the Buffalo River during the spring season. The research team are also measuring the population of fish to establish the population level that would be a 'limit reference point'. A limit reference point refers to the point when a population level drops so low that it may never recover if serious steps are not taken. Finally, the researchers are taking new biological samples to study.

Janjua, Muhammad Yamin
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Licence Number: S-17/18-3036-YK
Species: All fish species **Location:** Great Slave Lake

Great Slave Lake trout monitoring program
The goal of this project is to promote fisheries development in Great Slave Lake, while ensuring the conservation and sustainability of the fisheries. The researchers collected samples of lake trout. They also measured the population of lake trout using commercial gill nets and a research method called 'catch effort'. Catch effort is determined by comparing the number of fish caught to the amount of time spent fishing. This is used to understand fish population size. Having a good understanding of the fish population size helps the various departments and boards that manage fishing make good decisions. In particular, it helps them identify a 'management reference point' for lake trout. A management reference point is the population level that indicates that the fish species is in danger, and management practices should be brought into place. Finally, the researchers gathered scientific information about lake trout that will support management decisions about the species.

Janjua, Muhammad Yamin
Fisheries and Oceans Canada
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Licence Number: S-17/18-3040-YK-A1
Species: All fish species **Location:** Buffalo Lake, Buffalo River (upper), Taltson River system

Taltson River and Buffalo River genetic sampling
The objective of this study is to understand the genetic differences and similarities in coney (inconnu). The researchers collected 30 inconnu from Taltson River, and 50 inconnu from Buffalo Lake and Big Buffalo River. They took samples from these fish for DNA analysis.

Kuchapski, Kathryn
ERM Consultants Canada Ltd.

Licence Number: S-17/18-3009-YK
Species: All fish species **Location:** Unnamed stream (Pigeon Stream)

Pigeon Stream diversion monitoring program
The goal of this ten-year project is to monitor Pigeon Stream for any effects from the construction of a diversion channel. The diversion channel is a man-made creek bed that moved the course of the creek away from, and around, the Ekati Mine. It was carefully planned to ensure that it would be a good place for fish from Pigeon Stream to live. This (2017) was the fourth year of the project,

and the third year of sampling. The research team studied how fish, especially Arctic grayling, use both the Pigeon Stream diversion channel and the un-altered portion of Pigeon Stream. They also mapped out the migration patterns of Arctic grayling and other fish species as they used the stream and the new channel to move between downstream and upstream lakes, such as Fay Bay and Upper Pigeon Pond A. They also looked at how fish moved between the diversion and Pigeon Stream itself. Finally, the researchers took samples to compare the fish using the new diversion channel to those in Pigeon Stream.

Lea, Ellen
Fisheries and Oceans Canada
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Licence Number: S-17/18-3001-YK
Species: Bearded seal, ringed seal **Location:** Safety Channel

Assessment of reproduction, condition, disease, and contaminants of ringed seals and bearded seals

The goal of this on-going project is to check on the health of ringed and bearded seals, and to see how regional ice conditions affect their health. Seal health is determined by looking at whether the seals are in good enough condition to have young ones, if they have any diseases, and if there are a lot of contaminants in their flesh. The research team can use the health of the seals to monitor seal populations in general, and to see whether the plants, water, and animals that the seals rely on are also healthy. The researchers gathered information by examining and taking samples from seals that were harvested by hunters in Ulukhaktok. They took samples from 100 ringed seals and five bearded seals that were harvested in the Ulukhaktok area. The researchers also recorded what types of prey animals the bearded seals prefered to eat. Finally, the researchers shared information and samples with other researchers outside of the Canadian arctic. In 2011, there was an 'unusual mortality event', or a sickness that caused a lot of seals to become ill, lose hair, and die. The cause of this unusual mortality event has not been determined, although the disease appears to have mostly run its course. Sharing information with other researchers working on the event may shed further light on the issue.

Lea, Ellen
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Licence Number: S-17/18-3010-YK
Species: Arctic charr **Location:** Ulukhaktok area, coastal marine waters

Ulukhaktok summer coastal harvest monitoring 2017

The goal of this on-going project is to collect information about Arctic charr that are harvested in the Ulukhaktok area, to ensure that the community's fishing management plans are based on up-to-date information. Community monitors work with local harvesters to gather information about the fish, such as their size and how many were harvested. The information collected by the monitors is used in the community's fishing management plans. These plans are created through a partnership between the Olokhaktomiut Hunters and Trappers Committee, the Fisheries Joint Management Committee, and the Department of Fisheries and Oceans Canada.

Lea, Ellen
Fisheries and Oceans Canada
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Licence Number: S-17/18-3022-YK
Species: All fish species **Location:** Tuktoyaktuk Harbour

Tuktoyaktuk Harbour fish study
This multi-year project about fish and fishing in the Tuktoyaktuk Harbour has five main goals. First, the researchers want to chart the population of traditionally-important fish that are harvested during the main fishery in July and September over a three year period. The researchers want to see how the population numbers of traditionally-important fish relate to the populations of cisco and other species that make up their diets. Second, the researchers want to record the number, size, sex, age, and maturity of Arctic cisco and other fish that are harvested from Tuktoyaktuk Harbour during the months of July and September. Third, the researchers want to compare the fish harvested now to those that were harvested between 1997 and 1999, to see if any differences in the number, size, and types of fish occurred over time. Fourth, the researchers want to study the kind and number of fish that are found in different areas of the peninsula that have different conditions. They are doing this to understand what might happen in the future if community harvesting changes due to climate change, erosion, or industrial development (such as oil and gas). Finally, the researchers want to work more effectively with the community and improve the use of community expertise in scientific monitoring projects.

Lea, Ellen
Fisheries and Oceans Canada
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Licence Number: S-17/18-3024-YK
Species: Inconnu **Location:** Great Slave Lake (North Arm), Marian Lake, Russel Lake

Great Slave Lake North Arm inconnu sampling
The goal of this on-going research project is to collect DNA and other biological samples from inconnu (coney) from different areas of Great Slave Lake. This will tell the researchers about the 'natal stocks' – that is, the parent populations – of the fish that are harvested. In 2017, sampling took place in the North Arm of Great Slave Lake, as well as some other places.

Lea, Ellen
Fisheries and Oceans Canada
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Licence Number: S-17/18-3027-YK
Species: Arctic charr, Dolly Varden, lake trout **Location:** Tuktoyuktuk area

Tuktoyaktuk Peninsula charr project 2017
Fish researchers do not fully understand a couple of important questions about the charr family in the area around the Tuktoyaktuk Peninsula. First, they do not know all of the locations where the members of the charr family (including Dolly Varden charr, Arctic charr, and lake trout) can be found. Second, in areas where they know that charr can be found, they do not necessarily know which family those charr belong to. In order to answer these questions, the Tuktoyaktuk Hunters and Trappers Committee hired sampling crews to catch charr using gill nets of various sizes. The sampling crews worked at McKinley Bay, Char Point, and other locations along the Tuktoyaktuk Peninsula that are ideal for fishing. These crews worked for up to 14 days in July and August of 2017.

Lea, Ellen
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Licence Number: S-17/18-3034-YK
Species: Bowhead whale **Location:** Beaufort Sea

Bowhead whale tagging - Beaufort Sea 2017
The goals of this on-going project are to study how and where bowhead whales move, where their feeding areas are, and where they spend their time as residents. The project is also studying the diving behaviour of bowhead whales, and tracking if their behaviour changes when they are near seismic operations or other industrial noises. To get this information, the research team put two types of tags on some bowhead whales. The first type of tag is a satellite transmitter, which sends information to the research team about where the bowheads are in the ocean. The other instrument is an 'acoustic tag', which record how often the bowhead whales call compared to the background noise in the ocean.

Lister, Andrea
Wilfrid Laurier University
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Licence Number: S-17/18-3047-YK
Species: All fish species **Location:** Kakisa Lake

Assessments of health, reproductive condition, and mercury levels in fish at Kakisa Lake, NT
The goal of this study is to find out three things about the fish in Kakisa Lake. First, to find out how healthy the fish are. Second, to find out if they are in good enough health to reproduce and have young ones. And third, to test for mercury. With this information, the researchers can see if environmental change (in other words, climate change) is affecting the fish. They can also study how mercury moves through the 'ecosystem', which is a term that includes the sediment, water, lake vegetation, and fish as a whole system.

Low, George
Deh Cho Aboriginal Aquatic Resources and Ocean Management
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Licence Number: S-17/18-3037-YK
Species: Lake whitefish, northern pike, walleye **Location:** Horn River

Horn River creel survey and stock study
The goal of this project is to collect information about the walleye population in the Horn River. Population information is used to support the management of the fishery and to make changes to its regulations. In order to reach their goal, the researchers set gill nets of varying mesh sizes in the Horn River. They sampled and took measurements of a portion of the catch. The samples will provide information on the age of the fish. The measurements that were recorded included the length, weight, sex, and maturity of the fish. These measurements give the researchers information about the fish population and their spawning. The researchers also interviewed anglers to learn more about the current recreational fishery. The interview included questions about the amount of time the anglers spent fishing, the number and type of fish they caught, the

amount of fish that were released, and where the anglers lived. The interviews were also an opportunity for community monitors to develop good recording techniques.

Low, George
Deh Cho Aboriginal Aquatic Resources and Ocean Management
jmichaellow@gmail.com

Licence Number: S-17/18-3038-YK
Species: Lake whitefish, northern pike, walleye
Location: Sanguez Lake

Sanguez Lake fish-down study

Some of the fish in Sanguez Lake contain too much mercury to be safe to eat. A number of the large adult fish will be removed (this is called a 'fish-down') to make the rest of the fish in the lake safer to eat. There are two reasons why this will make the remaining fish safer to eat. The first is that older, larger fish are less safe to eat because the longer a fish lives, the more mercury it has in its flesh. The second is that adult fish eat younger fish, so when adult fish are removed from the lake there will be more younger fish that are safer to eat. In order to carry out the fish-down, the research team will get an estimate of the walleye population using nets and sonar. They will also measure mercury concentrations in both walleye and pike. The research team will then remove some adult walleye and pike from the lake. The researchers will check the size and age of walleye after the fish-down, and will leave a suitable number of large walleye adults as spawning stock. After the 'fish-down', the researchers will monitor the population and age of the fish, as well as their mercury concentrations, over a ten year period. When stocks have stabilized, a safe harvest level for walleye will be found. The researchers will check if the fish-down method used in Sanguez Lake may work in other lakes in the region that have fish with high levels of mercury. Finally, the project will provide traditional knowledge and science experience for the youth of the Dehcho.

MacPhee, Shannon
Fisheries and Oceans Canada

Licence Number: S-17/18-3014-YK
Species: Beluga
Location: Darnley Bay, Hendrickson Island, Kendall Island, Sachs Harbour area, Shingle Point, Tuktoyaktuk area, Ulukhaktok area - coastal marine waters, Whitefish Point

Assessment of health in beluga whales through harvest-based monitoring

The goal of this on-going research program is to check on the health of beluga whales that are harvested around Hendrickson Island. It is a partnership between the Fisheries Joint Management Committee and Fisheries and Oceans Canada. The program, which includes sampling of harvested beluga, is focused on the Tarium Niryutait Marine Protected Area. Although Hendrickson Island is the main sampling site, the research team also supports community monitoring programs at other beluga hunt locations. A science crew works at both Hendrickson Island and East Whitefish, and the Fisheries Joint Management Committee supplies sampling kits and funds to support sampling at all other locations. Using the information they collected about beluga, the researchers can chart out how both the conditions and the beluga populations change naturally from year to year. This information is needed to predict potential impacts to beluga. The researchers want to be able to predict how regional-level changes, such as climate change, will affect beluga. They also want to see how smaller-scale changes, such as oil and gas activities,

might affect beluga. Finally, the research team is building capacity for science and long-term monitoring of beluga health in the Inuvialuit Settlement Region.

Mason, Kristine
Golder Associates Ltd.
kmason@golder.com

Licence Number: S-17/18-3025-YK-A1
Species: All fish species **Location:** 64°35'51.4068'N, 110°8'38.94'W; 64°35'53.736'N, 110°7'57.3348'W

Dominion Diamond Ekati Corporation (DDEC) - Jay Road construction
Jay Road is a proposed road to a new expansion of the Ekati Mine. Watercourse crossings will be constructed as part of the Jay Road construction project. To protect fish and their habitat during construction, creek water will be 'isolated', or dammed away from the location of the road. Contruction of the road will therefore not come in contact with flowing water. Once the isolation structure (the dam) is installed, the project team will salvage fish from the two fish-bearing streams, Stream B0 and Stream Ac35. Fish will be captured by backpack electrofishing and dip netting, and possibly also using minnow traps. The captured fish will then be moved outside of the isolated area. After the fish are moved, the isolated area will be drained so that construction can take place.

McLean, Sarah
De Beers Canada Inc.
sarah.mclean@debeersgroup.com

Licence Number: S-17/18-3002-YK
Species: All fish species **Location:** Kennady Lake watershed

Gahcho Kué project
The Gahcho Kué mine was required to develop an Aquatic Effects Monitoring Program as part of the environmental review process. The purpose of the monitoring program is to ensure that the development of the mine is not impacting the lakes, rivers, and water life around it, beyond what is allowed in the mine's license. The Aquatic Effects Monitoring Program design plan outlines the monitoring program that is required during construction. In 2017, the mine was required to conduct three different surveys. The first survey was of fish habitat. Habitat refers to all the living and non-living things the fish need to stay alive, such as their food and the water chemistry. The second survey was a community monitoring survey. For the third survey, the mine checked the tiny plants and animals that live in the water during the open-water season, because some fish eat these tiny life-forms.

McNicholl, Darcy
Fisheries and Oceans Canada
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Licence Number: S-17/18-3011-YK
Species: All fish species **Location:** Paulatuk area

Darnley Bay nearshore fish survey
The goal of this multi-year project is to study the fish that live close to the ocean coastline in Darnley Bay. This includes capelin in particular, although other species of fish were collected as well. Capelin are a small fish that is eaten by larger fish and sea mammals. The researchers also

studied how the whole living system of the ocean works at Argo Bay and Bennet Point, which are at the southern end of Darnley Bay. They studied how the plants and animals in the water work with the non-living elements of the ocean, such as the water temperature and salt levels, to support life. Because this study is on-going, the researchers can use information gathered over many years of research, not just a single year. In addition, the researchers can include information that was gathered by other projects. The researchers are also studying how the nearshore and offshore areas are linked. This information will be used for the development of a proposed Marine Protected Area in Darnley Bay.

Miller, Matthew
Northwest Territories Power Corporation
mmiller@ntpc.com

Licence Number: S-17/18-3029-YK
Species: All fish species **Location:** Taltson River system

Taltson Twin Gorges hydro generating facility aquatic effects monitoring program (AEMP)

The Northwest Territories Power Corporation (NTPC) has to conduct an aquatic effects monitoring program to meet the requirements of a water license. The goal of an aquatic effects monitoring program is to make sure that a development isn't harming a waterway beyond what was agreed to in its license. The NTPC checked both Trudel Creek and Lower Taltson River to see if fish were stranded during the time when the flow from the dam was reduced to allow for annual maintenance. This reduction of flow from the dam is called a 'rampdown'. Field crews were ready to catch and relocate any fish that became isolated or stranded during the rampdown. All stranded fish were identified and counted. The research team took a sample of each species and age class, which were measured and weighed. They also took samples that provided information on how old the fish was (e.g. fin rays, scales) so they could learn more about the fish community.

Morinville, Genevieve
Rescan Environmental Services Ltd.
gmorinville@rescan.com

Licence Number: S-17/18-3035-YK-A1
Species: All fish species **Location:** Horseshoe Lake (64°85.9676"N, 110°49.0621"W), HWL2 (64°86.9545"N, 110°57.9422"W), Ross Lake (64°87.1579"N, 110°66.5342"W), Logan Lake (64°89.9109"N, 110°63.3389"W)

2017 Ekati Diamond Mine Sable AEMP baseline

This project is a part of a larger, on-going monitoring project known as the Sable Aquatic Effects Monitoring Program (AEMP). The goal of an aquatic effects monitoring program is to make sure that a development project isn't harming a waterway beyond what was agreed to in its license. The goal of this specific component of the larger project was to collect information on the population of large fish in five lakes which the mine may affect during development. The mine needs to know more about these fish before development starts. This will ensure that fish populations are not impacted by future mining activities.

Reist, Jim
Fisheries and Oceans Canada
jim.reist@dfo-mpo.gc.ca

Licence Number: S-17/18-3028-YK
Species: All fish species **Location:** Beaufort Sea

Canadian Beaufort Sea – marine ecosystem assessment
Protecting the Beaufort Sea and all of the plants and animals living there is important. In order to protect and conserve this area, all levels of government need good scientific information. At this time, there are gaps in the available scientific information about the Beaufort Sea. For example, offshore marine fish, and the water conditions, plants, animals, and other fish that support them, are not well understood. The goal of this study is to address this gap by creating an inventory of Beaufort Sea marine fish, which in turn will help efforts to conserve arctic biological diversity. In addition to helping with conservation, the study will help ensure that shipping corridors through the Arctic Ocean have as little impact as possible on fish and marine mammals. It will also help marine resource managers make sure that there will be abundant Arctic fisheries in future. Finally, this study contributes to a science-based approach to the development of oil and gas, and other marine resources, in the region.

Ross, Peter
Ocean Wise Conservation Association

Licence Number: S-17/18-3042-YK
Species: Arctic cisco, Arctic cod, rainbow smelt **Location:** Tuktoyaktuk area

Microplastics in the beluga food web
This project, the first of its kind, will evaluate 'microplastics' in beluga whales and their prey. Microplastics are plastic particles that are smaller than 5 mm, or about a quarter of an inch. The researchers collected a variety of samples - for example, they sampled sediment, water, zooplankton (the tiny animals found in the water), fish, and beluga stomach contents. By studying these samples, they will be able to tell if microplastics are found in the southern Beaufort Sea, and if so, whether they are making their way into the beluga food chain.

Ruben, Diane
Paulatuk Hunters and Trappers Committee
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Licence Number: S-17/18-3013-YK
Species: Arctic charr, Arctic grayling, burbot **Location:** Billy Lake, Hornaday River

Paulatuk whitefish assessment
The objectives of this research project are to find out what whitefish eat, and to check them for contaminants.

Schryer, Richard
Fortune Minerals Limited
rschryer@fortuneminerals.com

Licence Number: S-17/18-3000-YK-A1
Species: All fish species **Location:** Burke Lake and area, Marian River

Supplemental baseline monitoring plan

Before a development project starts, the developer must study the conditions at the site so that any changes due to the development can be identified. The conditions at the site before the development starts are called the 'baseline' conditions. The NICO mine is conducting a supplemental baseline monitoring plan to provide additional baseline information that they need to create several other monitoring plans and meet the requirements of their water licence. The researchers monitored Burke Lake, Reference Lake, and the Marian River in the vicinity of the NICO project. They measured water quality, sediment quality, benthic invertebrates (the tiny animals that live in the underwater sediments), fish health, and contaminants in fish. The researchers are also integrating traditional knowledge in their study. Fish from Burke Lake and Reference Lake will be assessed for health and contaminants. The researchers also conducted a fish population and contaminant survey in the Marian River.

Sharpe, Rainie
Dominion Diamond Ekati Corporation

Licence Number: S-17/18-3026-YK
Species: All fish species **Location:** Lac du Sauvage, Afridi Lake

Dominion Diamond Ekati Corporation - Jay 2017 baseline survey
The goal of this on-going project is to check on the health of fish in Lac du Sauvage and Afridi Lake to see if they have been affected by the Dominion Diamond Corporation's Ekati mine. In 2017, the project team took samples of small-bodied fishes to find out what kinds of fish are there, how many of each kind there are, and if there are any contaminants in the fish. They will continue to check on the fish through their aquatic effects monitoring program, as required by their water licence. The research team sampled all small fish, but focused their sampling on slimy sculpin. Slimy sculpin are a small fish that make up an important part of the diet of many larger fish. The research team also collected samples of the tiny plants and animals that live in Lac du Sauvage and Afridi Lake that form a part of a healthy water system, as well as being food for the fish that live there.

Somers, Gila
Department of Environment and Natural Resources
gila_somers@gov.nt.ca

Licence Number: S-17/18-3005-YK-A3
Species: All fish species **Location:** Alexie Lake, Chitty Lake, Banting Lake, Walsh Lake

Metal levels in large-bodied fishes near impacted lakes near Yellowknife, NWT
The goal of this on-going project is to study the level of metal contaminants in larger fish in lakes close to Mackenzie River communities, and to compare these levels with those found in fish that are exposed to mine waste in lakes near Yellowknife. The research team collected fish tissue samples from the types of fish that people regularly harvest and tested them for metal contaminants. Common metal contaminants include arsenic and cadmium. The researchers looked for patterns in contamination levels over the length of the Mackenzie River and throughout the Yellowknife region, and also checked if there were seasonal or yearly changes to contaminant levels. The researchers will share their results with other research teams to help the scientific and local communities understand region-wide impacts and changes in the Northwest Territories, including changes to both living systems and non-living things.

Somers, Murray
Indigenous and Northern Affairs Canada

Licence Number: S-17/18-3031-YK-A2
Species: All fish species **Location:** Mill Pond

INAC Tundra Mine remediation project: Mill Pond water level drawdown
The water level in Mill Pond is being lowered to make it easier to remove a dam that held tailings (mining by-products), and to 'remediate' the area. Remediation refers to cleaning up a contaminated or damaged area and returning it to its natural state. Following the dam removal, water will return to the natural pre-mining water level, and this will bring back the natural flow path of the watershed. Draining the lake has the potential to strand fish in isolated pools that may form as the water level lowers. The project team will look for stranded fish during the draining, and will move any stranded fish back in to Mill Pond using live catch and release methods.

Stevens, Cameron
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cstevens@golder.com

Licence Number: S-17/18-3043-YK
Species: All fish species **Location:** Hislop Lake

Tłı̨chǫ Marian watershed stewardship program – Hislop Lake fish sampling
The goal of this study is see how healthy several types of fish are in Hislop Lake, including lake whitefish and a predatory species (either walleye or northern pike). To do this, the project team will collect muscle tissue and take samples that will tell them how healthy the fish was. They will take samples from up to 20 lake whitefish and up to 20 walleye or northern pike. This is the second year of this program. The first year of sampling was in 2013.

Stevens, Cameron
Golder Associates Ltd.
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Licence Number: S-17/18-3044-YK
Species: All species **Location:** Rae Lake

Tłı̨chǫ aquatic ecosystem monitoring project – Rae Lakes fish sampling
The goal of this study is to see how healthy several types of fish are in Rae Lakes, including lake whitefish and lake trout. Lake trout is a predatory species. To do this, the project team will collect muscle tissue and take samples that will tell them how healthy the fish was. They will take samples from up to 20 lake whitefish and up to 20 lake trout. This is the second year of this program. The first year of sampling was in 2013. The fish are being collected under the Tłı̨chǫ Aquatic Ecosystem Monitoring Project, which is a community-led and community-based monitoring program intended to build community capacity and determine fish health over time in lakes within the Tłı̨chǫ territory.

Stevens, Cameron
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Licence Number: S-17/18-3045-YK
Species: Cisco, lake whitefish **Location:** Tartan Rapids (Yellowknife River), Yellowknife River closed area (Bluefish Rapids)

Yellowknife River cisco monitoring
The goal of this project is to learn more about cisco migrations and spawning. In particular, the researchers want to find out when the cisco migrate to spawn, how long the migration lasts, and where spawning takes place. The research team will also take samples of fish throughout the run and test them to see how healthy they are. They will also measure length, weight, and age. The researchers will use the same methods for the fish surveys and processing that they used in previous years at the Tartan Rapids and Bluefish Rapids. This project will support Fisheries and Oceans Canada as they develop an integrated management plan for river-run cisco in the Yellowknife River in cooperation with the Yellowknives Dene First Nation. This study is funded by Fisheries and Oceans Canada.

Vecsei, Paul
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Licence Number: S-17/18-3007-YK
Species: All fish species **Location:** Paulette Creek

Offsetting baseline study at Paulette Creek
The goal of this project is to study the species that spawn in Paulette Creek in the spring, with a focus on longnose sucker. In particular, the research team are studying whether there are any species that spawn in the spring, and if so, where these species can be found, and when their migration and spawning happen. Finally, the researchers want to see if existing beaver dams are a barrier to 'adfluvial' migrating fish species, such as longnose sucker. The term adfluvial refers to fish that spawn in tributary streams, where the young fish stay and grow for a few years before migrating to a lake. They grow to maturity in the lake, and then return to the tributary to spaw. The project team will sample fish from Paulette Creek to see which species of longnose sucker are present.

Weber, Michael
ARCADIS Canada Inc.

Licence Number: S-17/18-3041-YK
Species: All fish species **Location:** Alpha Lake, Gamma Lake, Marian River, Mill Lake, Sherman Lake

Rayrock Mine site assessment and materials abatement
The Rayrock Mine site was a uranium mine that was active for about two years in the mid-1950s. The team assessed the environmental risks at the mine site and started a preliminary remediation program to clean up contamination from the uranium mining activities. Remediation refers to cleaning up a contaminated or damaged area and returning it to its natural state. The research team checked if there were fish in the lakes and rivers near the mine site, and took samples of fish tissue to check for contaminants. The research team used multiple types of fishing gear in Mill Lake, Jan's Pond, Gamma Lake, Beta Lake, and Lake A, so they could be certain whether or not fish were present in each lake. In lakes where fish were present, the researchers made a map of the lake depth and surveyed the lake conditions to see how well they would support fish life. Depending on the fish species that were present, the research team sampled the lake multiple times. The researchers also collected tissue (muscle and organ tissue) from fish in all the sampled lakes in order to gather more information about contaminants in fish in general. They also sampled fish and surveyed the conditions in the drainage features running from the Rayrock site to the Marian River, to see how well these drainages would support fish life.

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

Licence Number: S-17/18-3023-YK
Species: All fish species **Location:** Lac de Gras (Diavik)

Diavik Diamond Mines Inc. A21 de-fishing execution plan
The water in the dike surrounding the A21 kimberlite pipe at Diavik Diamond Mines was fished out and drained. This took place in two phases during the open water season of 2017. The fish-out happened first, and allowed the dike to be drained and mining operations to take place. This minimized the amount of fish that were harmed or killed by the draining process.

Zhu, Xinhua
Fisheries and Oceans Canada
xinhua.zhu@dfo-mpo.gc.ca

Licence Number: S-17/18-3003-YK
Species: All fish species **Location:** Great Slave Lake

Monitor/assess cumulative impacts on important fish population productivity and community diversity in Great Slave Lake
This on-going, multi-year study has two goals. The first is to monitor fish in Great Slave Lake, taking ‘cumulative impacts’ into account. ‘Cumulative impacts’ refers to all of the impacts on the environment taken together, from climate change, to mines, to oil and gas production, and so on. The fish monitoring program will look at both fish population productivity (whether the fish are in good enough shape to reproduce and have young ones) and community integrity (whether there are a normal and healthy amount of both males and females, and both younger and older fish). The second goal is to work with other scientists and communities on this monitoring program. This will ensure that the Great Slave Lake fisheries and ecosystem are healthy enough to support sustainable fishing into the future.

Wildlife

Allaire, Danny
Department of Environment and Natural Resources
danny_allaire@gov.nt.ca

Permit Number: 500437
Species Studied: Moose, boreal caribou, wood bison, wolf, wolverine, black bear, lynx, fox, porcupine, snowshoe hare, sandhill crane, red squirrel, marten, ruffed grouse, sharp-tailed grouse, spruce grouse, ptarmigan
Region: DC
Location: Near communities in the Dehcho region

Dehcho trail camera study
The goal of this project is to study wildlife, especially rare wildlife, using motion-detecting cameras set up on the land. Nine cameras were set up near the communities of Ft. Simpson, Wrigley, Jean Marie River, Trout Lake, Ft. Liard, and Nahanni Butte. Cameras were set up on harvester trails, seismic lines, the Enbridge pipeline, waterways, and winter roads. Lessons were learned from the thousands of photos that were taken of willows moving in the wind and of moving ice on the waterways. Camera placement is key, because the cameras are motion sensitive. A total of 134 of the 222 usable photos were taken on traditional harvester trails. This was the most successful area for cameras. Black bear, snowshoe hare, red squirrel, and lynx were the most common species that were photographed. Wolves were rarely photographed. No photos were taken of rare wildlife yet, but the cameras are still in the field.

Armstrong, Terry
Department of Environment and Natural Resources
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Permit Number: 500526
Species Studied: Wood bison
Region: NS, SS
Location: Ft. Providence and Behchokǫ̀ areas

Mackenzie wood bison population monitoring project
The goal of this project is to conduct a 'classification' survey within the range of the Mackenzie wood bison population. A classification survey counts how many bulls and calves there are compared to cows, which can help researchers predict if the population is shrinking or growing. Bison were difficult to find in the summer of 2017, and have been difficult to find since 2014. Unlike the previous three years, the research team were able to find and classify 84 bison and estimate the herd composition. However, this is a small number of bison, so is a very small proportion of the total population. Using a small number like this to estimate herd composition means that the following results need to be used with great caution. The calf ratio was 67.7 calves per 100 cows (the average since 1999 is 34.0), and there were 19.4 yearlings per 100 cows (the average is 19.0). The ratio of bulls to cows was 83.9 bulls per 100 cows (the average is 85.8). In addition to the flights for the classification survey, the research team flew over the area four times to look for evidence of anthrax. They did not detect any anthrax mortalities in the Mackenzie population in 2017. There were no reports of disease in the bison that were killed in collisions or by hunters in 2017, either.

Armstrong, Terry
Department of Environment and Natural Resources
terry_armstrong@gov.nt.ca

Permit Number: 500414 / 500532
Species Studied: Wood bison

Region: SS

Location: Slave River Lowlands, Ft. Smith to Ft. Resolution area

Slave River Lowlands - bison population studies

The goal of this project is to conduct a 'classification' count of bison in the Slave River Lowlands. During a classification count, the researchers count how many bulls and calves there are compared to cows, which can help the researchers predict whether the population is shrinking or growing. A total of 152 bison were classified. This was a much lower number of animals than were classified in 2016, and the survey took place much later than the normal time for classification surveys. There were 34.7 calves per 100 cows (the average since 1999 is 36.2), and 12.5 yearlings per 100 cows (the average is 18.0). The ratio of bulls to cows was 63.9 bulls per 100 cows (the average 89.7). In addition to the flights for the classification survey, the research team conducted four flights over the Slave River Lowlands to look for anthrax, but did not detect any anthrax mortalities in 2017. They didn't collect any bison tissue or fecal samples to test for disease in 2017.

Ball, Jeffrey
Ducks Unlimited Canada
j_ball@ducks.ca

Permit Number: 500441
Region: IN

Species Studied: King eider and common eider
Location: Masoyuk Island 10 km south of Ulukhaktok

Ulukhaktok spring eider survey and contaminants analysis

Summary not available at this time.

Behrens, Stephanie
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Permit Number: 500520
Region: SA

Species Studied: Dall's sheep
Location: Katherine Creek Study Area and Palmer Lake Study Area in the Mackenzie Mountains

Mackenzie Mountain Dall's sheep monitoring

The goal of this project is to count Dall's sheep in two study areas in the Mackenzie Mountains. One is the Katherine Creek study area (411 km²) and the other is the Palmer Lake study area (391 km²). For comparison's sake, the city of Yellowknife is about 40 km². The highest number of Dall's sheep that have been observed in Katherine Creek was 204 in 1998, and the lowest was 26 in 2014. In Palmer Lake, the highest number was 496 in 2004, and the lowest was 148 in 2017. This year, the count in Katherine Creek was on the low side. Researchers counted 58 Dall's sheep The numbers were also very low in Palmer Lake, with 148 sheep counted. Scientists use another way of counting sheep to help them understand if the animal population is healthy or not: this is the number of ewes relative to the number of lambs (the ratio). Usually, there are between four and nine lambs for every ten ewes in the Katherine Creek population (the average is 6.5 lambs for every ten ewes). In the Palmer Lake population there are between two and more than nine lambs for every ten ewes (the average is about six lambs for every ten ewes). This year, the ratio of lambs to ewes in Katherine Creek was almost seven lambs for every ten ewes, and in Palmer Lake it was about 4.5 lambs for every ten ewes. On average, about four out of every ten lambs

survive to adulthood in both populations. This year, only about one out of ten (Katherine Creek) and 2.5 out of ten (Palmer Lake) survived.

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Permit Number: 500516
Region: SS

Species Studied: Whooping crane
Location: 200 km radius of 60˚10'N, 113˚20'W (the nearest community is Ft.. Smith)

Ecology and recovery of endangered whooping cranes

The goal of this project was to check on pairs of whooping cranes. Observers found 98 nesting pairs during airplane surveys in May 2017, which is the highest count to date. In addition to nesting pairs, 20 territorial pairs were found. This suggests that the population will expand further in upcoming years. Territorial pairs do not have nests but are setting up a new territory for themselves to use in the future. Of the 98 nests that were observed, seven were outside of Wood Buffalo National Park. One was in the Lobstick Creek area on Salt River First Nation reserve lands, and six were north of the Nyarling River. The researchers also counted young birds that had hatched and grown feathers ("fledged"), which helps scientists predict how many will grow into adults. In July 2017, observers counted 63 fledged young in 59 family groups (there were four family groups that had two chicks). For every ten nests, about 6.5 nests had a fledged young. This is above the 20-year average of about five out of every ten nests, but is within the long-term natural range of variation. In August 2017, ten whooping crane chicks were captured in 11 attempts, with each one handled for an average of 21 minutes. These cranes were banded and fixed with a transmitter that will collect up to 48 GPS locations every day. With this information, the researchers will be able to see what kinds of natural habitats the birds are using, and learn more about their spring and fall migrations.

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Permit Number: 500510

Region: SS

Species Studied: Wood frog, boreal chorus frog, Canadian toad, red-sided garter snake
Location: Within 300 km of Ft. Smith (Wood Buffalo National Park and the South Slave Region)

Disease dynamics of infectious diseases in low-diversity northern ecosystems

The goal of this project was to check on the health of toads and frogs, as well as the health of their habitat. The project team was trying to understand animal heath from a population level, rather than the level of an individual animal, because this is helpful for understanding whether the animals are at risk of disappearing. In 2017 the researchers studied frogs and toads in and around Wood Buffalo National Park. They checked for a virus, known as a "ranavirus", that can affect and kill frogs and toads. They took a total of 1345 samples from wood frogs, Canadian toads, and boreal chorus frogs. The samples were small (a toe clip or tail clip) and did not kill the animal. The researchers found that about 17.5% of the toads and frogs had the ranavirus. However, even if an individual animal has the ranavirus, it does not necessarily mean that the individual animal is sick. Some infections do not kill the animal. Aside from illnesses, the researchers also looked for physical problems like missing legs or healed wounds. The team found several adults and larvae (young animals) with physical issues like this. All of them had been injured when another creature tried to eat them, so they did not have developmental abnormalties. In addition, four red-sided

garter snake carcasses were found and collected for further examination. These garter snakes had all died on roads.

Branigan, Marsha
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Permit Number: 500496
Region: IN
Species Studied: Polar bear
Location: Beaufort Sea

Southern Beaufort Sea polar bear survey

The goal of this project is to count polar bears and record their family groups. There were two crews, one based out of Herschel Island, and one out of Tuktoyaktuk. Surveys were conducted by skidoo and by following the bears with helicopters. The Herschel Island-based crew saw polar bears a total of 22 times, including two separate family groups that were made up of a female with two yearling cubs. They collected 18 biopsy samples using a special gun that fires a dart that hits the animal and collects a small sample of hair and skin. The Tuktoyaktuk-based crew saw polar bears a total of 23 times, including five separate family groups. They took 12 biopsy samples. The survey crews saw six of the polar bears on transects (these are set survey lines). However, many of the observations were made off-transect, when the researchers were looking for safe crossings at lead edges, while flying along open leads, or by following tracks. Throughout the survey, there were many times when the researchers observed signs that polar bears had been in the area, as well as observations of signs of other species had been in the area. These observations were recorded separately.

Carriere, Suzanne
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Permit Number: 500539
Region: IN, NS, SA
Species Studied: Many wildlife species, including insects
Location: Tuktoyuktuk, Inuvik, Norman Wells, Ft. Simpson, and Yellowknife

BioBlitz Canada 150 NWT-TNO

A “BioBlitz” is a short, intense period when all the living species in an area are surveyed. During a BioBlitz, groups of people (including both scientists and volunteers) work together over a set period of time to record all the plants and animals they see. The Department of Environment and Natural Resources in the Government of the Northwest Territories co-hosted an NWT BioBlitz in five different communities between July 28th and August 12th, 2017. A total of 382 community members participated in these five events. All of the plants and animals that were identified were posted on www.iNaturalist.org, a website that stores observations about the natural world. The lichens and mosses that were collected are being processed, and will be identified in the future. Working with the Canadian Wildlife Federation and Heritage Canada, this project came under the umbrella of BioBlitz Canada 150 NWT-TNO, a Canada 150 Signature program that was held across the country to celebrate Canada’s 150th birthday.

Clark, Karin
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Permit Number: 500560
Species Studied: Barren-ground caribou

Region: NS

Location: Lac de Gras region from Ekati to areas north and east from the mine site

2017 caribou behavioural monitoring near and far from mining infrastructure in the NWT
The goal of this project was to see if the Ekati mine is affecting caribou behaviour. The research team met this goal by observing caribou around the mine. Although they were challenged by weather constraints, the team did see and record caribou behaviour. They used two methods to observe the caribou. The caribou appear to act similarly to other herds (such as the Bathurst and Porcupine herds). They did not see enough caribou to be able to tell if the animals behave differently at different distances from mining infrastructure, but with continued sampling (perhaps a few times a year) the team may be able to tell if that's the case. The research team also hope to gain access to all of the information about caribou behaviour that the mine has recorded to give them a bigger picture.

Cox, Karl
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Permit Number: 500477
Region: SS

Species Studied: Moose
Location: Buffalo Lake area

Moose population survey - Buffalo Lake area (2016/17)
Summary not available at this time.

Cox, Karl
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Permit Number: 500483
Region: SS

Species Studied: Wood bison
Location: Ft. Providence and Hay River area

Bison control area program 2017 surveillance season
Summary not available at this time.

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Permit Number: 500472/500486
Region: SS

Species Studied: Wolves
Location: South Slave region

Wolf research and monitoring - South Slave 2016-2017
Summary not available at this time.

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Permit Number: 500476/500409
Region: SS

Species Studied: Boreal caribou
Location: Hay River Lowlands, Mackenzie, and Pine Point/Buffalo Lake areas

Boreal caribou population trends and habitat use in the Hay River Lowlands, Mackenzie, and Pine Point/Buffalo Lake areas
Summary not available at this time.

Croft, Bruno
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Permit Number: 500418
Region: NS, SS, SA

Species Studied: Barren-ground caribou
Location: Délı̨nę, south of Great Bear Lake, Keller Lake and Grandin Lake, and all areas between the communities of Behchokǫ̀, Whatì, Gamètì, Wekweètì, Detah, Łutsel K'e, and the area between Great Slave Lake and the mining locations of Snap and Kennady Lake

Monitoring Bathurst and Bluenose-east caribou herd
Summary not available at this time.

Davies, Linda
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Permit Number: 500549
Region: NS, DC

Species Studied: *Hymenogastraceae*, genus Hebeloma
Location: Yellowknife and Ft. Simpson

Species delimitation and infrageneric relationships with the fungal family *Hymenogastraceae*
The goal of this project is to better understand a particular family of mushrooms that are found across North America. The family of mushrooms is known as *Hymenogastraceae*. The researchers want to find out how many types of this mushroom are present in North America, and where they are found. This family of mushrooms is not well known because many of the members of the family look very similar to one another. However, it's important to learn more about them because these mushrooms grow symbiotically (in a co-dependent relationship) with some plants, and are essential for forest growth and health. Until the North American species are better understood, and all the samples in plant collections have been assessed, it is not possible to figure out how all of these mushroom species are related. Mushroom samples from over 200 types are currently being studied. Five species from the *Hebeloma* genus (*H. heimale, H. crustuliniforme, H. longicaudum, H. neurophyllum,* and *H. pusillum*) have previously been found in the NWT, and samples of them exist in herbarium collections. The researchers will examine these samples to check the species identification later. Although analysis is still incomplete, at least three of the species of mushrooms collected in Yellowknife (*H. alpinum-complex*, *H.* cf *clavulipes*, and *H.* cf *grandisporum*, all from the *Hebloma* genus*)* are expected to be new records for the NWT.

Davison, Tracy
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Permit Number: 500423
Region: IN, GW

Species Studied: Muskox, Porcupine caribou
Location: Aklavik

Muskox ecology west of the Mackenzie Delta
Summary not available at this time.

Davison, Tracy
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Permit Number: 500522
Region: IN, GW

Species Studied: Moose
Location: Inuvik region, Mackenzie Delta and surrounding areas.

Moose abundance and composition survey
The goal of this project is to survey the number of moose in the Mackenzie Delta and surrounding area, and to see how many cows, calves, and bulls there are. To meet this goal, the research team held community workshops to make sure their field work plan and the locations they planned to survey made sense. The workshops were held between February 8th and 24th in Inuvik, Aklavik, Ft. McPherson, and Tsiigehtichic. After the meetings, the researchers conducted the survey using a Cessna 185 between March 16th and 24th. In the eight areas that the survey was focused on, they found that moose density ranged between one and 14 moose for every 100 km^2. Of the eight areas that were surveyed, seven overlapped with the 2011 moose survey, and one was a new survey area. Of the seven survey areas that were surveyed twice (in 2011 and 2017), four showed an increase in moose densities and three showed a decrease.

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Permit Number: 500534
Region: IN, GW

Species Studied: Dall's sheep
Location: Northern Richardson Mountains, NWT and Yukon

Dall's sheep aerial survey in the Richardson Mountains
The goal of this project was to count Dall's sheep in the northern Richardson Mountains. To meet this goal, the research team flew over the northern Richardson Mountains and counted sheep. They surveyed the area between June 19th and 22nd, 2017. This was a co-operative project between the Government of the NWT, the Yukon Government, and the Gwich'in Renewable Resources Board. The team counted a total of 647 Dall's sheep. Of this number, 323 were nursery sheep (a term that refers to ewes, yearlings, and young rams), 141 were lambs, and 183 were rams. There were more sheep counted in 2017 than during the last survey of the area in 2014, in which 496 sheep were observed. Of the 496 sheep observed in 2014, 259 were nursery sheep, 92 were lambs, 112 were rams, and 33 were unclassified.

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Permit Number: 500405
Region: SS

Species Studied: Boreal caribou
Location: Slave River Lowland ecoregion between Buffalo River and Little Buffalo River

Deninu Kue traditional knowledge study - boreal caribou habitat and habitat use

The goal of this project is to identify critical habitat for boreal caribou in the South Slave region of the NWT using both traditional knowledge and scientific knowledge. Critical habitat refers to areas that are so important to the health and survival of the boreal caribou that they must not be disturbed. Knowledge of critical habitat areas is important for wildlife managers so they can help boreal caribou populations recover from declines. Critical habitat was mapped using a computerized mapping program. The known locations where boreal caribou live were mapped in relation to environmental map layers, such as land cover (for example, the type of forest), linear disturbances such as roads and seismic lines, and recent and historic forest fires. The research teams made maps that showed areas that are likely suitable to meet the needs of the boreal caribou during the winter and calving periods. These maps were created by comparing the food requirements and other specific needs of the caribou to the types of plants and trees in the area. The research team created the list of the specific needs that boreal caribou have in the winter and during calving using traditional knowledge and scientific literature. They collected traditional knowledge during individual interviews, a boreal caribou workshop, and from participants in the field surveys. The researchers found that the best caribou calving areas are wetlands with plants and shrubs. During the winter, the caribou prefer wetlands with trees and open coniferous forest. The research team recommended that to help caribou populations recover, managers should improve fire management, restrict or ban caribou harvesting, and increase community monitoring efforts.

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Permit Number: 500543

Species Studied: Mallard, northern pintail, American wigeon, and American green-winged teal

Region: DC

Location: Mills Lake Station

Western Canada cooperative preseason waterfowl banding program - Mills Lake, NT
The governments of Canada and the USA work together to put leg bands on a small number of migratory waterfowl every year. This is done to help researchers better understand these birds. In the 2017 season, the research team banded a total of 1,766 ducks (1,179 mallard, 547 northern pintail, 39 American green-winged teal, and 1 American wigeon) and 1 American coot. The proportion of young, as a percentage of the total population that was caught and banded, totaled 66% for mallard ducks and 15% for northern pintail ducks. During this study 43 previously banded ducks were recaptured (30 mallard and 13 northern pintail), which gives the researchers valuable information about the migration and population of each species. Water levels were normal to above normal compared to previous years, and remained fairly stable throughout the month of fieldwork. Fieldwork sites were mainly inside Mills Lake and also near the Mackenzie River. The weather was noticeably warmer during this field season, with mid-day temperatures averaging 22°C (75°F) and night-time temperatures averaging 10°C (51°F). Winds from a strong weather system forced the team to close the traps that were used to capture the birds for a night. Detailed information can be obtained from the Mills Lake 2017 Preseason Banding Report, which is available from the South Slave GNWT office.

Hache, Samuel
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Permit Number: 500413

Species Studied: Vultures, hawks, grouse, doves, cuckoos, owls, nighthawks, swifts, hummingbirds, kingfishers, woodpeckers, and passerines

Region: NS

Location: Along the Tibbitt to Contwoyto Winter Road

2016/17 winter road long-term landbird monitoring program

Under the Migratory Birds Act, the federal department of Environment and Climate Change is supposed to monitor and take care of migratory bird populations. Currently, there is not enough information on these birds to know if the populations are getting smaller, getting larger, or staying the same size. There also isn't enough information to know whether the birds are using the same areas every year. The short-term goal of this project is to gather more information on boreal birds that breed in Bird Conservation Region 7, which is along the Tibbitt to Contwoyto Winter Road. To do this, the researchers recorded how many birds were there, and where they were found. They also recorded which species of birds were found throughout an area that has important changes due to latitude, with different conditions in the southern part of the area compared to the northern part. The team also considered whether bird monitoring programs along winter roads might work in other parts of the NWT. The long-term goal of the project is to gather information about changing northern boreal breeding bird populations, and to see how climate change may influence how these birds expand their ranges.

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Permit Number: 500500

Species Studied: Songbirds

Region: DC

Location: Ft. Liard, Ft. Liard, Behchokǫ̀, Ft. Providence

Long-term population monitoring of songbirds in Fort Liard, NT - migratory connectivity of forest birds breeding in northern boreal regions

The research team have been monitoring songbird populations in Ft. Liard since 1998, and this was the 10th time that they collected this information. Environment and Climate Change Canada uses this information to protect and conserve songbirds. The information is also shared with developers when environmental assessments are conducted in the Liard Valley. Documenting the migratory patterns of songbirds is challenging because they cover a very large area, cross many political boundaries like territorial and international borders, and their small size generally prevents the use of GPS technology to track them. As a result, little is known about the specific routes that songbirds follow when they migrate. Also, little is known about the "migratory connectivity" of songbird populations, or the number of individual songbirds from a breeding site that migrate to the same wintering site. The researchers used special electronic tracking devices on songbirds, in particular olive-sided flycatchers and common nighthawks, which are both species at risk. The electronic tracking devices record the migratory route of the birds and where they stop. They also gathered feathers that had been dropped by breeding individuals when they were molting. They can use these samples to study the chemical make-up of the feathers, which will tell the researchers where the birds are at other times of the year. Knowing about migratory connectivity is important for conservation. For example, if the population of a particular group of songbirds is declining, the Canadian government must know where they spend the winter so both habitats can be protected.

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Permit Number: 500551

Species Studied: All plant species

Region: DC **Location:** Ft. Liard

Detailed 2017 vegetation inventory from Liard Valley landbird monitoring program
The goal of this study is to see how plants and trees in the Liard Valley are changing over time. To meet this goal, the research team visted around 170 different sampling locations. At each location they made a detailed vegetation inventory, which means they carefully identified and counted all of the plants, shrubs, and trees in a small plot. The research team are still in the early stages of their data analysis. They are making charts and maps that answer specific questions about the changes to plants and trees over the 20-year period of this study. When they are done, a technical report will be provided to the Acho Koe Dene First Nation, the Dehcho First Nations, and the Government of the NWT Department of Environment and Natural Resources.

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Permit Number: 500536 **Species Studied:** Peregrine falcon
Region: IN, GW **Location:** Mackenzie River from Johnston River to Separation Point

Bioelectronic monitoring of peregrine falcons along the Mackenzie River, NWT
The goal of this ongoing research project is to check on peregrine falcons and their nests. Peregrine falcon nesting sites along the Mackenzie River have been counted for fifty years. There were only eight occupied nest sites in 1969, which increased to 74 occupied nest sites in 2010. This increase followed a similar worldwide increase in peregrine nests, which was seen wherever the numbers of nests had been counted over time. The increase in nests is due to the reduction of organochlorine pesticides like DDT in the environment, which decreased after they were banned in the early 1970s. In 2017, 54 nest sites were occupied by at least one bird. Of these, 46 were considered “active sites”, a disappointing number after the 62 active sites that were counted in 2016. The researchers also used leg bands to learn more about the peregrines. Usually, when using leg bands, researchers only learn about the birds after they die and the leg bands are sent to the research team. Over almost 50 years of banding, only three peregrine leg bands from the Mackenzie population of peregrines have been returned to researchers. Those bands showed that peregrines will migrate to a wide range of winter destinations, including very far south in South America (Tierra de Fuego), Cuba, and Texas. During the past five years, 280 special leg bands were put on nesting peregrines. These leg bands have an electronic chip in them that can be read by a special monitor. Starting in 2017 a monitor was used at nesting sites to see if the peregrines are returning to their home nesting site. The research team also wants to learn about the age, life span, and breeding activities of peregrine falcons.

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Permit Number: 500431 **Species Studied:** Muskoxen
Region: SA **Location:** Hammer Mountain in Norman Wells (63.35N, 126.52W)

Muskox lungworms: understanding the effect of temperature on parasite development, survival and range expansion
Researchers do not know very much about muskox health, including the parasites and diseases that affect them. Recently, there have been large die-offs of muskoxen in northern Canada. The goal of this project is to study an important parasite that infects muskoxen in the Ulukhaktok area,

the lungworm. There are two species of lungworm in the Ulukhaktok area. In particular, the researchers want to see how climate change may affect the spread of the lungworm parasite. The lungworm needs more than one “host”, or animal that it infects and lives in, in order to complete its life cycle. The lungworm spends part of its life growing in the marsh slug. The researchers were wondering if the changing climate would affect how the lungworm larva (the young ones) grow inside the marsh slug. To study this, the researchers looked at how the larva grew at slightly different temperatures. They found that the lungworm larva grew better at warmer temperatures. The lungworm larva were also able to withstand freezing temperatures. Over 80% of the larva from both species of lungworm survived at all temperatures that were tested, including -10°C, -25°C, -40°C, and -80°C, for all lengths of time that were tested (2 days, 7 days, 30 days, 90 days, and 180 days). Survival decreased as the length of time they were frozen increased, and as the temperature decreased. The two lungworm species are expanding their ranges but at different rates, and the different rates appear to be based on the differing ability of the two species to handle warmth, not withstand cold.

Koneff, Mark
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Permit Number: 500424

Region: IN, GW

Species Studied: All species of geese, swans, and ducks

Location: Mackenzie Valley region from the southern border of the NWT to the Mackenzie Delta region

Cooperative waterfowl population surveys in the Northwest Territories

The governments of the USA and Canada work together to manage migratory waterfowl, as these birds move across both countries. For this project, the team surveyed the population of geese, swans, and ducks in the entire Mackenzie Valley. Overall, the populations of most birds were lower than the very high numbers that were seen in 2016, but were still well above the long-term average. In this survey area, the total duck estimate for 2017 was 19% lower than the 2016 estimate, but 54% higher than the long-term average. Mallard numbers were 27% below the 2016 estimate, and 62% above the long-term average. The American wigeon estimate was 20% lower than last year, but 54% higher than the long-term average. Gadwalls were 45% lower than the 2016 estimate, and similar to their long-term average. Both green- and blue-winged teal were similar to their 2016 estimates, and 108% above their long-term averages. Northern shovelers were 26% below the 2016 estimate, but 146% above the long-term average. The northern pintail estimate was similar to 2016, and 84% higher than the long-term average. Redhead numbers declined 47% from the 2016 estimate, yet remained similar to the long-term average. Canvasbacks were similar to both last year and the long-term average. The scaup estimate was 20% below last year, and similar to its long-term average.

Langlois, Karla
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Permit Number: 500512

Region: DC

Species Studied: Collared pika, forest birds, and rare plants

Location: Along the proposed Prairie Creek Mine all-season road corridor

Environmental baseline studies for the proposed Prairie Creek Mine all-season access road

The completion of survey results is expected in 2018.

Larter, Nic
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Permit Number: 500374
Region: DC

Species Studied: Boreal caribou
Location: Eight Dehcho First Nations, from 60° to 64°N latitude, and 119° to 123°30'W longitude

Continued monitoring and deployment of satellite collars on Dehcho boreal caribou

This ongoing project began in 2004, when the researchers placed satellite collars on ten caribou cows at the request of, and after consultation with, the Sambaa K'e Dene Band of Trout Lake. Other First Nations asked about joining the project, and after consultation with these communities, the research team increased the study area and number of First Nations partners in this study. Between 2004 and 2016 a total of 145 caribou cows were collared with satellite location-tracking collars. Using the information from the collars, the research team mapped out the range that was used by each collared caribou. The mean range size was around 3,000 km^2 (for comparison, Great Bear Lake is about ten times larger). During the program ten caribou have ventured into northeast British Columbia, and one has gone into northwest Alberta. In this study area, the peak of calving happens on May 15th, give or take seven days, which the researchers could tell by looking at daily movement patterns of the caribou. They used net-guns to capture the caribou and collar them, during which time they collected blood samples as well. Most of the caribou cows they captured, more than nine out of every ten, were pregnant. The high number of pregnancies and births by collared females implies that being captured and wearing a collar has not prevented female caribou from becoming pregnant and bearing calves.

Larter, Nic
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Permit Number: 500436
Region: DC

Species Studied: Wood bison
Location: Within the current reange of the Nahanni wood bison population

Nahanni wood bison population monitoring

The goal of this ongoing project is to study the Nahanni wood bison population to see if it is growing, stable, or shrinking. The research team completed a summer 'classification survey', which means that they counted the number of young and adult wood bison, and also counted the number of bulls, cows, and calves. This type of survey can help the researchers predict how the population is changing over time. A total of 213 bison were observed, and 212 of them were classified. The researchers counted 93 females, 43 calves, 18 yearlings, and 58 males. There were 46.2 newborn calves per 100 adult females, which is above the average of 41.2 newborn calves per 100 adult females over the last 15 years. There were 19.4 yearlings per 100 adult females, which is below the average of 21.2 over the last 15 years. The proportion of males observed this year was 62.4 males per 100 adult females, which is lower than the average. Overwinter survival of calves was 34%, which was below the average of 52% over the previous 15 years but dramatically higher than the all-time low of 13% in 2016. The low overwinter survival of calves in 2016 was caused by extreme freeze-thaw events in March and April of that year. The researchers put tracking collars on four bison and monitored where they travelled. No bison

moved outside their usual range this year. Tissue samples were collected from five animals (four females and 1 male), and were sent to an Environment and Natural Resources vet to be tested for diseases.

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Permit Number: 500524
Region: NS

Species Studied: Herring gulls
Location: North Arm of Great Slave Lake

2017 chemicals management plan wildlife national monitoring program
The goal of this ongoing project is to see if there are contaminants in the eggs of herring gulls from across Canada. Fifteen eggs were collected in 2017 and will be analyzed. Eggs were also collected from Great Slave Lake between 2008 and 2016, although none were collected in 2013. The results from 2008 through 2016 showed that levels of flame retardants and perfluorinated compounds in eggs collected from Great Slave Lake were similar to those in eggs from island colonies on the Atlantic and Pacific coasts of Canada. However, these levels were much lower than those found in gull eggs from the Great Lakes, St. Lawrence, and prairie areas. Flame retardants are chemicals found in many consumer items including furniture and electronics. Perfluorinated compounds are chemicals that are also found in many consumer items as well as oils and greases. This annual monitoring program will continue across Canada in 2018, to track the chemical contaminants in all components of the environment, including wildlife.

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Permit Number: 500502
Region: DC

Species Studied: All migratory birds
Location: The Kotaneelee field near the NWT, Yukon and BC borders. The nearest community is Ft. Liard, located approximately 40 km northeast of the project

2017 wildlife mitigation for Kotaneelee remediation and well abandonment projects
The goal of this project is to survey the area around some abandoned well sites in the Kotaneelee field south of Fort Liard to see if there is any evidence of important wildlife species. The area will be reclaimed soon, and the reclamation must not harm important wildlife species or their habitats. The researchers conducted nest sweeps to see if migratory birds, raptors, or any other territorially-protected bird species are nesting within the project area or the surrounding areas. When nests used by protected species were found, the project team recommended ‘setbacks’ to reduce the chances that the reclamation activities will impact nesting birds. A setback is an area between the reclamation site and the nesting site that is left undisturbed. The majority of the surveys took place in the Yukon, with the exception of a barge landing site on the Liard River in the NWT. The barge landing site was investigated during three visits for the presence of nesting birds and key wildlife.

McLean, Sarah
De Beers Canada Inc.
Sarah.McLean@debeersgroup.com

Permit Number: 500480
Region: NS

Species Studied: Wildlife
Location: A 70 km by 80 km rectangle centered on Kennady Lake

Ongoing wildlife studies for the DeBeers Canada Gahcho Kue mine
Gahcho Kue Mine must conduct various studies on wildlife as part of their environmental licensing. This includes on-going monitoring for wildlife around the mine site. The goal of this project is to conduct routine wildlife monitoring, including daily observations of the winter road, weekly wildlife surveys around the site, and the collection of wildlife observations by the staff working at the mine. De Beers also checked if any raptors were seen in the mine pit. De Beers trapped small mammals in collaboration with Environment and Natural Resources, and provided the results and samples to them. The project team prepares a summary report each year and provides it to both government agencies and aboriginal organizations. They also make the report available to the public on the Mackenzie Valley Land and Water Board registry.

Michiel, Genny
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Permit Number: 500471
Region: IN

Species Studied: Grizzly bears and muskrats
Location: Along the Inuvik to Tuktoyaktuk Hwy right-of-way where winter work was planned

Grizzly bear denning survey for the Inuvik to Tuktoyaktuk Highway (ITH)
The goal of this study is to check on grizzly bear dens and other wildlife along the Inuvik to Tuktoyaktuk Highway. During the survey, the project team found no grizzly bear dens in the area of Borrow Source 312, which is a key gravel pit that will provide material for the highway construction. They found 11 locations with muskrat push-ups during the survey. Each location had between one and three push-ups. One of the push-up locations was in Lake KP61, which is the lake that will be used for water withdrawal this construction season.

Mulders, Robert
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Permit Number: 500495
Region: SA

Species Studied: Grizzly bear
Location: Along the north Canol Trail

Mackenzie Mountain grizzly bear DNA survey
The goal of this project is to find out the density of grizzly bears in the area around the Canol Trail. The density is the number of animals (in this case, grizzlies) there are per unit of area. To find this out, the research team used hair-snagging posts that were anchored in the ground. The posts have a special scent on them that attracts grizzlies, who rub against the posts to scratch. The posts also have barbs to hold tufts of hair that rub off of the grizlies. The posts were set up by helicopter in June, and checked three separate times between July 2nd and August 2nd. The team did a final check and removed the posts between August 11th and 16th. Hair tufts were removed from the posts and put in envelopes. Bears used the scratching posts many times (about 15 to 30 times) between each check. The researchers collected more than 1500 samples of grizzly hair, and will send a number of these to the genetics lab to identify individual bears that used the posts. Identifying individual bears at each post will allow the researchers to map out how far each bear travels, and how many bears use each area.

North Shore Environmental Consultants

Permit Number: 500518
Region: DC
Species Studied: All bird species, amphibians, and mammals that are in the project area or buffer zone
Location: Near km post 529, located approximately 9 km southeast of Ft. Simpson

Wildlife sweep
Summary not available at this time.

Obst, Joachim
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Permit Number: 500521
Region: NS
Species Studied: All 52 breeding bird species
Location: Daring Lake Tundra Ecosystem Research Station

Climate change impacts on habitats, breeding densities, and population trends of tundra birds at Daring Lake, NWT and accumulation of mercury in loons
The goal of this project is to see if the populations of tundra birds nesting near Daring Lake are in decline because of climate change and mercury contamination. The researcher surveyed breeding birds on foot for 28 days between June 11th and August 10th, 2017. The researcher also used a boat to survey loons. Many songbirds nested two weeks earlier than usual. Songbird breeding populations appeared to be normal except for natural population cycles. Redpolls had reached the bottom of their cycle. Other species of birds were not doing as well. Between 2013 and 2017, six types of breeding shorebirds declined by 63%, and semi-palmated plovers declined by 72%. Three additional shorebird species are no longer present. There are eight known yellow-billed loon territories on Daring Lake. Five of these were occupied by pairs of birds. Two pairs raised one chick each, one pair lost their nest to a fox, one bird in another pair was killed by an eagle, and the fifth pair was unproductive (did not have a chick). On Yamba Lake, two of the five yellow-billed loon territories were occupied. Three of the five red-throated loon territories were occupied, including two pairs of birds that were raising one chick each, while the third pair had disappeared. Four of six Pacific loon territories were occupied, including two pairs that were observed on nests, but none raised chicks. The team collected five yellow-billed loon samples, including feathers and egg shells that were left behind after hatching.

O'Donovan, Sean
University of Alberta
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Permit Number: 500434
Region: SS
Species Studied: Wolves
Location: South Slave region

Diet characteristics of boreal grey wolves in the South Slave Region
Summary not available at this time.

O'Keefe, Harry
Dominion Diamond Ekati Corporation
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Permit Number: 500450

Species Studied: Caribou, grizzly bears, wolves, wolverine, foxes, upland breeding birds, and falcons

Region: NS

Location: Dominion Diamond Corporation property, approximately 300 km northeast of Yellowknife

2016 wildlife effects monitoring program

One requirement of the environmental permits for the Ekati Diamond Mine is to study how the mine might affect the wildlife around it. For this reason, the mine monitors various animals every year. This is done by keeping track of the animals that are seen by the mine employees, with the goal of reducing any risks from the mining activities on the animals. The project team therefore included both researchers and employees. For caribou, the team recorded potential collisions with vehicles, incidents involving aircraft, general disturbances from the mine, and incidents at pits and the Long Lake Containment Facility. They also checked if the roads act as barriers for the caribou. For grizzly bears, wolves, and wolverines, the team recorded potential collisions with vehicles, disturbances that might affect the activity levels of the animals, and whether or not the mine is attracting bears, wolves, or wolverines. For upland breeding birds such as sandpipers and ptarmigan, the team counted the birds using scientific sampling methods and looked at bird count information that was gathered by the federal government. They also recorded any sightings of upland breeding birds, shorebirds, and waterfowl. Finally, for raptors, the team recorded whether the birds left the area due to mine activities, and also the productivity of the birds (how many young ones were hatched and survived to adulthood).

Olson, Steven
US Fish and Wildlife Service
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Permit Number: 500542

Species Studied: Mallards, northern pintail, American green-winged teal, blue-winged teal, and American wigeon

Region: SA

Location: Willow Lake (65°14'N; 125°25'W), Mackenzie River valley

2017 western Canada cooperative waterfowl banding program at Willow Lake, Sahtú Settlement Area

In 2017, the Sahtú Renewable Resources Board, the Tulít'a Renewable Resources Council, the Government of the Northwest Territories' Department of Environment and Natural Resources, and the United States Fish and Wildlife Service all worked together on the 21st year of duck banding at Willow Lake. A Fish and Wildlife Service waterfowl biologist supervised one other researcher and two contract employees from Tulít'a. The team set up a maximum of 16 swim-in style duck traps with trap doors, and left them open for 19 nights. The traps caught around 4.4 ducks per trap each night. The team also put legbands a small number of waterfowl. The leg bands have a web address and 1-800 phone number, so a hunter can report their catch. These leg bands allow the researchers from the partner organizations to track and understand changing waterfowl populations and migration. The research team banded a total of 1,200 ducks. This included 546 American green-winged teal (46% of all birds), 508 mallards (42%), 75 northern pintails (6%), 38 blue-winged teal (3%), and 3 American wigeon (3%). The number of ducks caught in 2017 was the 16th highest number out of the 21 study years, and was 14% below the long-term average of about 1,400 ducks caught per year. Approximately two out of every three banded ducks were young ducks that had hatched in 2017.

Rausch, Jennie
Canadian Wildlife Service
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Permit Number: 500501
Region: IN

Species Studied: Shorebirds
Location: Randomly selected survey plots within Arctic PRISM Region 7

Arctic shorebird monitoring program

The planned work in the Northwest Territories for 2017 did not occur due to logistical considerations.

Reed, Eric
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Permit Number: 500511
Region: NS

Species Studied: Dabbling ducks, diving ducks, loons, grebes, gulls, shorebirds, American wigeon, green-winged teal, lesser scaup, ring-necked ducks
Location: 400 m on each side of the Yellowknife Hwy, starting 16 km west of Yellowknife and going westward along the highway for 48 km

Abundance and productivity of waterfowl and other aquatic birds breeding in the boreal forest

The goal of this ongoing project is to monitor the population of ducks, geese, and other water birds in the Northwest Territories. In 2017, ponds were surveyed by foot or canoe once a month from May to August. The research team found that the population of some birds was higher than the long-term average (the average from 1985 to 2017), including the populations of ring-necked ducks, bufflehead, mallard, and American wigeon. Numbers of lesser scaup were average, and numbers of American green-winged teal were below average. Another way that researchers monitor duck population trends is to see how many ducklings hatch. There were more ducklings than average for American wigeon, bufflehead, and lesser scaup, and fewer than average for mallard, American green-winged teal, and ring-necked ducks. The Committee on the Status of Endangered Wildlife in Canada has found that the western population of horned grebe are declining (they are a species of 'special concern'), and this is one of the few long-term monitoring studies on this species in North America. Both the horned and red-necked grebes are seen relatively often in the area, which has a yearly average of 48 horned grebe and 32 red-necked grebe breeding pairs. There were fewer horned grebe pairs and young ones than average in 2017. For the red-necked grebe, there was an average number of breeding pairs but a lower than average number of young ones.

Reed, Eric
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Permit Number: 500513

Species Studied: Surf scoters, black scoters, white-winged scoters, greater and lesser scaup, red-breasted merganser and long-tailed duck, loons, grebes, terns, mergansers, and gulls

Region: SS, SA

Location: Lynx Lake Lodge (62.459783N 106.286519W), Ramparts River wetlands (66°15'N, 130°00'W)

Integrating fixed-wing and helicopter survey platforms to improve detection and species identification of North American breeding scoters

The goal of this project is to better understand the population of scoters, and to identify where scoters prefer to stay during their breeding season. Scoters are a type of black duck. The research team used helicopters and small planes to fly over areas where scoters might be found, including around Lynx Lake and Ramparts River in the Northwest Territories and Little Duck Lake in Manitoba. The Lynx Lake and Little Duck Lake sites ranged from tundra to tree-line to boreal. The researchers saw all three types of scoters, as well as mergansers, long-tailed ducks, and greater and lesser scaup, at both Lynx Lake and Little Duck Lake. Scaup are the other type of duck that are known as black ducks. The researchers combined their own observations with those of other scientists to confirm that the barrenlands region of Canada is indeed a core breeding area for North American scoters. The Ramparts River site had open black spruce bogs, shrublands, floating bogs, and sedge wetlands surrounding ponds and small lakes. The researchers found fewer scoters here, but the highest numbers of scaup. The three sites that they looked at had more scoters per square kilometer than did either Labrador or the Hudson Bay Lowlands of Ontario in 2009. The researchers have found that each species prefers a particular type of habitat.

Richard, Al
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Permit Number: 500535
Region: NS, SS

Species Studied: All vegetation
Location: Łutsel K'e (62º24' N, 110º44'W), Yellowknife (62º27'N, 114º22'W), Ft. Smith (60º0'N, 111º53W), and Ft. Resolution (61º40' N, 113º40'W)

Akaitcho - DUC wetland mapping project

The goal of this project is to make an accurate map of wetland vegetation (plants, shrubs, and trees) around Łutsel K'e, Yellowknife, Fort Smith, and Fort Resolution. To meet this goal, the research team is using satellite images, and are also doing fieldwork to ground-truth the satellite images. The research team visited more than a thousand field sites by helicopter. At each site they surveyed and recorded the vegetation. The vegetation was recorded for two reasons. First, to "train" the computer that will make the vegetation maps out of satellite images. Second, to use later to make sure that the final vegetation maps are correct. The vegetation maps of the Taiga Plains, Taiga Shield, and Southern Arctic ecozone regions in the project area will be ready in the fall of 2018. These maps will show uplands as well as five major wetland classes (open water, marsh, swamp, fen, and bog). The researchers are making a more specialized vegetation map of the Boreal Plains ecozone in the project area, which will show the highest value wetlands within the project area. It will be complete in December 2018, and will show 19 classes of wetland instead of the five classes shown for the other ecozones.

Simmons, Deborah
Sahtú Renewable Resource Board
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Permit Number: 500533

Species Studied: Nighthawk, olive-sided flycatcher, rusty blackbird, short-eared owl, yellow

rail, little brown myotis, northern myotis, northern leopard frog
Region: SA
Location: Tulít'a and Délı̨nę

Acoustic assessment and modeling responses of wildlife to environmental stressors in the Sahtú region
Summary not available at this time.

Shewan, Julia
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Permit Number: 500452
Region: NS
Species Studied: Caribou
Location: Courageous Lake (64°05′N, 111°15′W)

Courageous Lake project: wildlife baseline program
The goal of this project is to use remote cameras to monitor wildlife, specifically caribou. Using remote cameras is non-invasive, which means that the researchers don't actually touch the animals at all. The cameras allow the researchers to track where the caribou are and how they move through the seasons. At this time, there are no plans to study the pictures that were taken by remote cameras. The pictures are being stored for later use, when the developer will need information about how their proposed project might affect caribou (for example, as part of the Developers Assessment Report). It is likely that such a report would include information about how often the cameras detected and took pictures of caribou, which may be compared among seasons and areas to determine when and where caribou might be affected by the project. This will help the developers make plans that will reduce their impact on caribou.

Girvan, Rob
Tetra Tech Canada Ltd.
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Permit Number: 500529
Region: NS
Species Studied: Migratory birds
Location: Along the proposed Tłı̨chǫ all season road between Whatì and Behchokǫ̀

Tłı̨chǫ all season road - granular resource investigation: pre-clearing nest survey
Summary not available at this time.

Wells, David
Diavik Diamond Mine Inc.
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Permit Number: 500453
Region: NS
Species Studied: Barren-ground caribou, grizzly bear, wolverine, raptors (peregrine falcon and gyrfalcon)
Location: Diavik Diamond Mine study area located in the Lac de Gras region

Diavik Diamond Mine 2016 wildlife monitoring program
The goal of this on-going project is to check if and how the Diavik Diamond Mine is affecting the wildlife around the mine. The project team observed barren-ground caribou behaviour for two days in September 2016. They recorded two caribou groups that were both more than 22 km from the mine. The same information is recorded every year, to see if caribou behaviour changes when

they get closer to the mine. The project team also recorded every time a grizzly bear was seen around the mine. There were 137 grizzly sightings on East Island, including 14 observations of a sow with a blond-coloured cub. The mine had to use deterrant actions to divert the bears on 61 of these days. The project team also monitored wolverine using two snow-track surveys in March and April, which looked at 40 different locations. Wolverine tracks were seen at almost half the locations in March and almost two-thirds of the locations in April. Wolverines were involved in 12 incidents at the mine, and the mine had to use deterrent actions four times (two wolverines were relocated). Finally, the project team inspected the pit wall 29 times between May 7th and August 17th to check for raptor nests, but didn't find any nests.

Wells, David
Diavik Diamond Mine Inc.
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Permit Number: 500538
Region: NS

Species Studied: Grizzly bears
Location: Lac de Gras region

2017 joint regional grizzly bear hair snagging program
Summary not available at this time.

Glossary

Active layer -The area where the soil freezes during the autumn and thaws during the summer

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.

Aerial - In the air

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

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

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

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

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.

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

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

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

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.

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

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

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

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

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

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