

Compendium of Research in the Northwest Territories

2004 - 2005



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

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Andrew Applejohn, Aurora Research Institute

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ABOUT THE AURORA RESEARCH INSTITUTE

The Aurora Research Institute (ARI) was established in 1995 as a division of Aurora College when the Science Institute of the Northwest Territories (NWT) divided into eastern (Nunavut) and western (NWT) divisions.

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:

- licensing 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

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FOREWORD

This Compendium represents two years of efforts and investigations by Canadian and foreign researchers to understand the environmental, social and cultural issues of our polar regions and the Northwest Territories (NWT). The Aurora Research Institute (ARI), along with the Department of Environment and Natural Resources (ENR), Department of Fisheries and Oceans (DFO) and the Prince of Wales Northern Heritage Centre, presents this compilation to provide a short overview of licensed scientific pursuits in the NWT. ARI, under the mandate of the NWT Scientists Act, ensures this annual publication is compiled and available to all communities and individuals interested and affected by result of research. This publication is meant to serve as a starting point to understanding the depth and breadth of the world-class science that takes place in the NWT. Contacting the researchers, using the contact information provided, will allow you to access more comprehensive publications and reports.

This Compendium shows the ever increasing interest in the social sciences in the NWT. With such a diverse social fabric consisting of many nations, peoples, languages and governments, the NWT is a vibrant and unique place to research human interactions. With this increased interest in the human world comes a rise in community driven and community run research projects. These projects provide the opportunity to develop collaborative research models that are culturally sensitive and relevant to all involved.

Traditional knowledge remains an important piece to all research in the North. The Government of the Northwest Territories works to promote and support its newly evolving place in research. There are some projects in this Compendium that are specifically categorized under traditional knowledge, however, elders, youth, hunters, wildlife monitors, and community members provide their knowledge of the land and tradition to all researchers they work and interact with. This information becomes the background by which research is conducted and provides a unique addition to data gathered in the NWT.

The NWT is a hub of all types of research. It is an important place to study changes to the North, its people and its landscape. ARI works to connect researchers with the communities of the NWT by promoting and supporting studies which improve the understanding of the natural resources, indigenous knowledge and cultures of the area. This Compendium is an overview of this research climate and it is my hope that it inspires more questions and discovery within the NWT.

Andrew Applejohn
Director, Aurora Research Institute

TABLE OF CONTENTS

About the Aurora Research Institute	i
Foreword	ii
Table of Contents	iii
About This Book	v
<i>Figure 1: Land Claim Regions in the Northwest Territories</i>	viii
2004 Licensed Research Projects	9
<i>Aurora Research Institute</i>	
Scientific Research Licences	
Biology	10
Contaminants	39
Engineering	40
Fossils	52
Geology	54
Health	61
Physical Sciences	64
Social Sciences	86
Traditional Knowledge	97
<i>Prince of Wales Northern Heritage Centre</i>	
Archaeologists Permits	104
<i>Department of Environment and Natural Resources</i>	
Wildlife Research Permits	119
<i>Department of Fisheries and Oceans</i>	
Fisheries Scientific Licences	135
2005 Licensed Research Projects	142
<i>Aurora Research Institute</i>	
Scientific Research Licences	
Biology	143
Contaminants	167
Engineering	170
Fossils	182
Geology	184
Health	189
Physical Sciences	193

Social Sciences	217
Traditional Knowledge	229
 <i>Prince of Wales Northern Heritage Centre</i>	
Archaeologists Permits	237
 <i>Department of Environment and Natural Resources</i>	
Wildlife Research Permits	246
 <i>Department of Fisheries and Oceans</i>	
Fisheries Scientific Licences	259
Glossary	283
 Researcher Index	296
 Index	302

ABOUT THIS BOOK

The Compendium of Research in the Northwest Territories is a summary of research licences/permits that were issued in the Northwest Territories during 2004. The information contained in this book is a collaboration between the Aurora Research Institute (ARI), the Prince of Wales Northern Heritage Centre (PWNHC), the Department of Environment and Natural Resources (ENR) (formerly Department of Resources, Wildlife and Economic Development) and the Department of Fisheries and Oceans (DFO). The Compendium series began in 1986.

Licensing in the NWT

Under territorial legislation, all research in the NWT requires a licence/permit from one of three 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 (GNWT) — Wildlife
- Aurora Research Institute — All other research in the NWT

Included in this Compendium are fisheries research projects conducted by the Department of Fisheries and Oceans staff. Other researchers conducting fisheries research are required to have a Science Licence and are included in this section of the Compendium. In addition to one of these licences/permits, there may be other permits required depending on the nature of the research work.

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.

Although the Compendium is a summary of all licences/permits issued in the NWT by all three licensing/permitting bodies, it is not a list of actual research conducted. The reader is encouraged to contact the researcher for further verification and additional information.

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.

1. Reference Number

The reference 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 two agencies refers 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 in Figure 1. Some of the land claim regions are still under negotiation and boundaries shown are only approximations. The abbreviations shown for each region are as follows:

DC	Deh Cho	SS	South Slave
NS	North Slave	SA	Sahtu 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.

4. Index

At the back of this book, you will find two indices. These have been developed to help the reader cross reference material more easily. The numbers used in the Researcher Index refer to the number listed with each research description. The numbers listed in the Subject Index refer to the page numbers.

Available in Print, CD, or Free Download

The Compendium is available as a printed publication or digitally on CD. The Compendium can be downloaded from the Aurora Research Institute's website (www.nwtresearch.com) or a copy can be requested by contacting the Aurora Research Institute. We encourage photocopying of the printed publication to promote its distribution.

For More Information about the Research Listed in This Book

Please contact:

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**Prince of Wales Northern
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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 about the Compendium. Contact us by mail, fax, email or telephone (see address above).

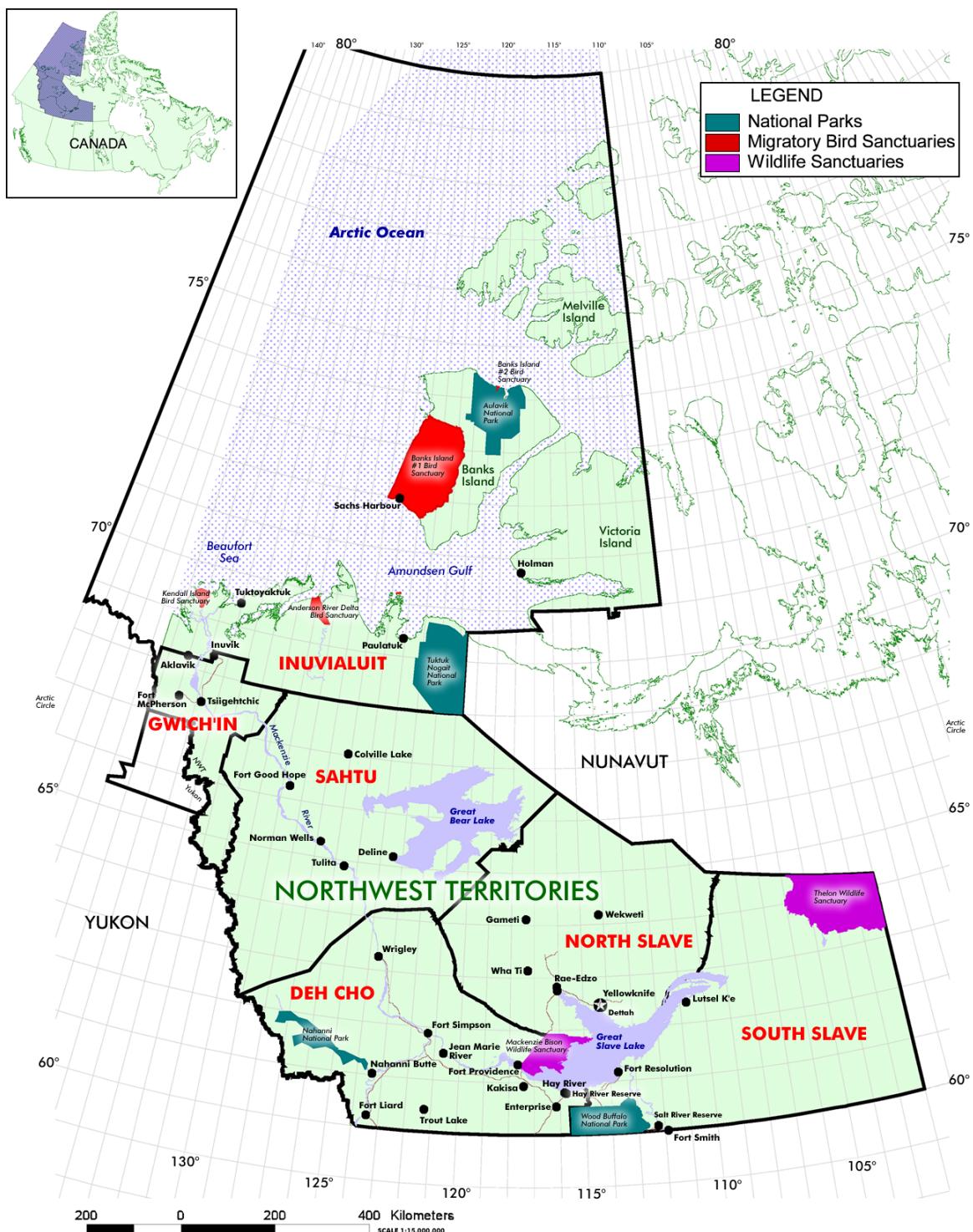


Figure 1: Land Claim Regions in the Northwest Territories Aurora Research Institute

2004 Licensed Research Projects

Scientific Research Licences

BIOLOGY

001

Biology

Caughill, Dave
 Golder Associates Ltd.
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File No: 12 402 696**Licence No:** 13697**Region:** NS**Location:** Back Bay/Yellowknife Bay

INVESTIGATION OF THE EXTENT OF HISTORIC TAILINGS IN BACK BAY/YELLOWKNIFE BAY

A survey of the chemical, physical, biological characteristics of the sediment in Yellowknife Bay and Back Bay of Great Slave Lake (the Bay) was conducted. The data obtained from this study were combined with previous studies conducted on the submerged sediments, and with the known characteristics of tailings to evaluate the aerial extent of tailings in the bay. The Yellowknives Dene First Nation provided assistance with the field work.

The five principal sources of information that were reviewed include: an existing geophysical survey of beach aerial tailings; total and extractable arsenic content of sediments; benthic invertebrate abundance and community composition; air photo interpretation of Back Bay and Yellowknife Bay, and visual assessment of the sediment cores from the study area. A weight-of-evidence approach was applied to outline the probable extent of tailings in the bay.

The chemical, biological and visual data suggest that sediments from the historical tailing deposit have been remobilized along the western side of the bay from Back Bay to the mouth of the Yellowknife River. North of the historical tailing deposit, tailings are present along the western edge of the Bay (approximately 300 m wide band), while to the south and into Back Bay, tailings are inferred to be present over a wider area.

002

Biology

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File No: 12 402 704**Licence No:** 13595**Region:** SA**Location:** Carcajou Range of the Mackenzie Mountains

DENDROCHRONOLOGICAL FIELD INVESTIGATIONS AT THE NORTHERN NORTH AMERICAN TREE LINE

As part of a research project funded by the National Science Foundation (NSF, USA; Dendroclimatic Field Investigations at the Northern North American Tree line), living white spruce trees in the Coppermine and Mackenzie Mountains areas of the NWT were sampled. This sampling was nondestructive. Subfossil wood samples were also collected, with the goal of extending the living tree record back in time. These wood samples have now been processed for ring width and limited maximum latewood density data, and have been incorporated into a large-scale analyses of past Northern Hemisphere temperature variability for the past millennium.

003**Biology****d'Entremont, Marc**

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File No: 12 402 700**Licence No:** 13624**Region:** SA, SS**Location:** Deline and Lutsel K'e**FISH HABITAT CREATION STUDY, LUTSEL K'E AND DELINE, NWT**

To ensure lake infrastructure developments (e.g., docks and breakwaters) are consistent with sound environmental principles, the Department of Transportation retained Jacques Whitford to conduct a two-phase investigation to determine if recently completed lake structures enhanced or created fish habitat at Deline, Great Bear Lake (dock and causeway) and Lutsel K'e, Great Slave Lake (breakwater). Based on moderate, dock-associated catch rates of lake trout and cisco of similar population characteristics as determined for those species in control areas, the causeway and dock in Deline have not enhanced fish productivity. In addition, based on lack of habitat complexity and substrate stability, the causeway and dock have not enhanced habitat diversity over that which is provided by natural foreshore environs. In Lutsel K'e substrate composition and foreshore gradient varies between impact and control areas. Riprap used in the construction of the breakwater provides unique fish habitat, atypical of that which occurs naturally along Lutsel K'e near shore areas. Fish relative abundance and species richness were greatest within the impact area during July compared to control areas. In September, more species were also captured from the impact area, while total catch rates between impact and control areas appear similar. However, significant differences ($p \leq 0.05$) were not found between control and impact area catch rates (total and species-specific), species diversity, species richness and age structure during September.

004**Biology****Dick, Terry**

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File No: 12 402 722**Licence No:** 13698**Region:** NS**Location:** Chitty Lake, north of Yellowknife**SEASONAL MOVEMENTS OF LAKE TROUT, LAKE WHITEFISH, AND NORTHERN PIKE IN A SMALL NORTHERN SHIELD LAKE**

Fieldwork at Chitty Lake occurred between September 15 and 19, 2004. The objectives were to initiate a tagging study by placing acoustic receivers in the lake and capturing fish for both implanting of acoustical tags and biological sampling. Ten VEMCO VR2 receivers were positioned in Chitty Lake and one in Alexie Lake. Eight net sets captured a total of 72 fish, 29 of which were tagged. Eleven lake-whitefish, 16 lake trout, and two northern pike were sedated and had an acoustic tag surgically implanted into their body cavity. Fish that were too small, not healthy enough or died in the nets were taken and processed at camp in order to collect data (length, weight, sex, maturity, tissue and otoliths) and viscera (diet, parasites and energetics) for further analysis at the University of Manitoba. Thirty lake-whitefish and 13 lake trout were sampled. On the last day of fieldwork six receivers were downloaded in order to confirm that fish were still alive and moving in the lake. The results demonstrated that some fish were still active in the area where they were released while others had moved to the northern portion of the lake.

005**Biology****Dick, Terry**

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File No: 12 402 722**Licence No:** 13719**Region:** SA**Location:** Mackenzie River tributaries**BIOLOGICAL AND PHYSICAL CHARACTERIZATION OF SMALL TRIBUTARIES TO THE MACKENZIE RIVER IN THE SAHTU SETTLEMENT AREA**

Fieldwork was carried out from September 21-27, 2004 at ten sites located on tributary creeks leading into the Mackenzie River. Sites included Oscar Creek, Bosworth Creek, Canyon Creek, Big Smith Creek, Little Smith Creek, Saline River, and Billy Creek. Species collected included Arctic grayling, northern pike, slimy sculpin, spoonhead sculpin, burbot, and emerald shiner. Fish were frozen and shipped to the University of Manitoba for further examination to determine age, sex, and physical measurements. Other examination included tissue samples, food items, and the presence of parasites.

006**Biology****Fraiken, Chris**

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File No: 12 402 718**Licence No:** 13693**Region:** SA**Location:** Mackenzie River, 2 km upstream and downstream of Norman Wells**2004 AQUATIC EFFECTS MONITORING, IMPERIAL OIL RESOURCES NWT LIMITED**

The study, conducted on the Mackenzie River in the vicinity of Norman Wells, took place in the fall of 2004. The study consisted of two parts: chemical analysis of effluent river water, and sediments and effluent dispersion modelling. For the first part of the study, water, bottom sediments and suspended sediments were collected from four sites during the open-water period in September 2004. Sampling occurred at a site upstream of Norman Wells, a site exposed to oil seeps, a site downstream of the former refinery, and a site located downstream of Norman Wells. Samples were analyzed for a suite of petroleum-related chemicals as well as other chemicals related to water quality. Samples from three of Imperial Oil's effluents were collected during the same period and analyzed for the same compounds analyzed in river water. For the second component, a field dye tracer study, also conducted during the fall of 2004, examined the mixing characteristics of three separate effluents in the Mackenzie River. Dye was injected into the water release channels for the Central Processing Facilities and the former refinery, and in Bosworth Creek, which receives the discharge from the Battery 3 site. The data obtained from the dye study was used to describe the dispersion of the effluent plume in the Mackenzie River.

007**Biology****Goad, Robin E.**

Fortune Minerals Ltd.
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File No: 12 402 697**Licence No:** 13610**Region:** NS**Location:** Fortune Minerals' NICO property

ENVIRONMENTAL SURVEYS OF THE FORTUNE MINERALS' NICO PROJECT

Golder Associates Ltd. was contracted by Fortune Minerals Ltd. to conduct environmental surveys from July to October, 2004 at their NICO property, located approximately 160 km north-west of Yellowknife. Baseline environmental data was collected to augment existing information on species and habitat in the area to support potential development applications. The scope of the environmental surveys included wildlife, vegetation, fish and fish habitat, water and sediment quality, hydrology, and meteorology. The wildlife survey documented sensitive wildlife features, wildlife sightings, and signs of wildlife. The vegetation survey documented the main type of plant communities in the study area and determined the presence and location of rare plant species. The aquatics survey documented fish presence, fish habitat, and water and sediment quality in small lakes and streams within the NICO property. In total, six water bodies were studied for fish and fish habitat. Water samples and readings were taken from eight water bodies, and sediment samples were collected from six water bodies. The hydrology survey provided a preliminary evaluation of stream-flow discharges, drainage area boundaries and flow direction for sub-basins. A meteorological station was installed to record local weather data. A final report on the 2004 environmental surveys was submitted to Fortune Minerals Ltd.

008**Biology****Goad, Robin E.**

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File No: 12 402 697**Licence No:** 13681**Region:** NS**Location:** Fortune Minerals' NICO property and along the route of the proposed road**ENVIRONMENTAL SURVEYS FOR THE PROPOSED ALL-WEATHER ACCESS ROAD TO FORTUNE MINERALS NICO PROJECT**

Golder Associates Ltd. was contracted by Fortune Minerals Ltd. to conduct environmental surveys from July to October, 2004 at their NICO property, located approximately 160 km north-west of Yellowknife. Baseline environmental data were collected along a proposed route of an all-weather road to the Fortune NICO property to augment existing information on species and habitat in the area to support potential development applications. The scope of the environmental surveys included wildlife, vegetation, fish and fish habitat, water quality, and heritage resources. The wildlife survey documented sensitive wildlife features (esker), wildlife sightings (waterfowl, shorebirds, muskrat, beaver), and signs of wildlife (raptor nests, beaver lodges) along the proposed route. The vegetation survey documented the main types of plant communities within 50 m of either side of the proposed road route. No rare plant species were observed. The aquatics survey documented fish presence, fish habitat, and water quality in small streams along the proposed road route. In total, two small streams and one river were studied for fish and fish habitat. The heritage resources survey examined an area of 50 m within either side of the proposed road route. One previously recorded heritage site and one new site were recorded. A final report on the 2004 environmental surveys of the proposed road route has not been submitted to Fortune Minerals Ltd.

009**Biology****Granchinho, Sophia**

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File No: 12 402 725**Licence No:** 13728**Region:** NS**Location:** Fox Pit area

2004 BASELINE AQUATIC AND FISHERIES SURVEY OF FOX PIT AREA

The fisheries investigations were conducted in September 2004 in the lakes and streams surrounding Fox Pit. Some of these lakes could potentially be influenced by the possible expansion of the Fox Pit waste rock pile. Current monitoring in this area will provide baseline data in the event that the current footprint of the waste rock pile is expanded. Monitored parameters for fish habitat and communities included lake and stream habitat, catch-per-unit-effort and size and age analysis of the species captured. These parameters were measured in Lake A, South Fox 2, Fox 2, and Fox 3 lakes. Lakes in the area surrounding Fox Pit were sampled for fish using gillnets and minnow traps. Sampling of some lakes was cut short due to an early onset of ice cover. All lakes were surveyed to assess habitat types available to fish in shallow waters near the shoreline. Habitat in larger lakes was dominated by boulder and had moderate organic components. Medium and small sized lakes had habitat made up almost entirely of boulder, with a small amount of sand. Many of the surveyed streams in the Fox Watershed Pit were dry, frozen, or entirely covered by boulder gardens, and were therefore unlikely to allow fish passage. However, a more accurate assessment will be possible when water flow is higher in June 2005. Round whitefish were found in South Fox 2 Lake (9), Fox 2 Lake (7), and Fox 3 Lake (5) but not in Lake A. The nine round whitefish caught in South Fox 2 Lake showed the greatest variability in size for this species with lengths ranging from 190 to 359 mm and weight ranging from 62 to 492 g. Lake trout were found in Fox 2 Lake (5) and Fox 3 Lake (11) but not in either Lake A or South Fox 2 Lake. Lake trout ranged in size in these lakes from 387 to 730 mm in length and 555 to 5824 g in weight. The fish communities in the lakes sampled were typical of other lakes within the area. Water quality, sediment quality and biological organisms (benthos, zooplankton and phytoplankton) were also monitored in lakes in the Fox Pit area. Water quality parameters indicated that the monitored lakes are oligotrophic (very dilute and low in nutrients) and are typical of other un-impacted lakes within the BHP Billiton (BHPB) claim block. Sediments are comprised primarily of silt and clay and have sediment quality indicative of un-impacted lakes. Biological data collected indicated densities and assemblages similar to those found in other un-impacted lakes in the BHPB claim block.

010

Biology

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File No: 12 402 677

Region: IN, GW

Licence No: 13660

Location: Along seismic lines in the Mackenzie Delta near Inuvik and south-east of Tsiigehtchic

TREE REGENERATION ON SEISMIC LINES

Experimental sowing of different seedbeds on old and new seismic lines was carried out to determine which are most conducive to germination, and whether scarring of the substrate increases germinant establishment. At this time study results indicate that moss is the best seedbed, while lichens are the least effective, and that scarification does encourage germinant establishment, although not to a significant degree. In addition seedbed surveys, germinant counts, and subsidence measurements were carried out. Overall it was found that the evidence of subsidence on seismic lines is weak, despite the active layer being much deeper on the lines.

In the delta, experimental cutting on willow/alder covered point bars was carried out to find out if increasing light availability to underlying white spruce seedlings would increase their growth. Results from summer 2004 indicate that this is not the case, pointing to the possibility that light is not a limiting factor in the Arctic summer.

Finally, work was continued on a long-term study in the delta, looking at the establishment of white spruce contaminants on different substrate types and the effects of granivory on survival rates. Granivory was found to be a significant factor in reduced survival rates. In general, germination rates were higher on

exposed, aerated mineral soil than on undisturbed soil and packed mineral soil.

011	Biology
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Gyselman, Eric	
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File No: 12 402 708	Licence No: 13608
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Region: IN, GW	Location: Mackenzie River near Inuvik (excluding 7(1)(a) land blocks in the Inuvialuit Settlement Region)
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EVALUATION OF THE POTENTIAL IMPACTS OF SEISMIC SURVEYS ON THE BEHAVIOUR AND AUDITORY PHYSIOLOGY OF FISH IN THE MACKENZIE RIVER

The purpose of this project was to determine the effect of seismic sound on fish behaviour in the Mackenzie River using a scientific-grade hydroacoustic survey system. The first phase of the two part experiment involved anchoring the hydroacoustic launch while the air gun barge steamed by to determine if there was a herding effect among fish in front of the air gun barge. The second experimental phase had the air gun barge anchored in an area of relatively high fish concentrations, while the hydroacoustic launch drifted by with the acoustics active. As the launch drifted over distinct fish targets, the air gun operators were signalled to fire, to determine how the individual fish responded to the sudden noise alone. Indications from data analysis suggest that fish behaviour is unaffected by seismic air gun firing, and they exhibit neither a herding effect in front of the seismic vessels nor an individual startle response. Statistical analysis is in progress to confirm this.

012	Biology
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Halliwell, Douglas	
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File No: 12 402 723	Licence No: 13707
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Region: IN	Location: Kendall Island Bird Sanctuary and surrounding area, including Mackenzie Gas Project's Taglu and Niglintgak Anchor Sites
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ASSESSMENT OF IMPACTS OF MACKENZIE DELTA PETROLEUM ACTIVITIES ON AQUATIC ECOSYSTEM HEALTH, YEAR 1: LAKES (BASELINE CHARACTERIZATION)

This study is the first of a three-year and possibly longer study designed to learn more about the lakes and rivers along the Mackenzie Gas Pipeline and the three drilling pad sites. It is important to understand the current features of these waters and the organisms that live in them in order for Environment Canada (EC) to better assess the potential impacts of pipeline and drill pad operations on these waters. It also will allow EC to contribute to the databases being generated by industry and other federal and territorial departments. In 2004, sampling was focused on lakes in the Mackenzie Delta. This region is very important, providing habitat for fish, birds, caribou, beaver and humans. In August, detailed sediment (mud), water, benthos (bottom animals) and zooplankton (microscopic swimming animals) studies were conducted at five lakes in the Kendall Island Bird Sanctuary (i.e., near the Taglu/Niglintgak drill pads). The lakes were warm, shallow, and the water was fresh. Most lakes were clear. The lakes had moderately high concentrations of phosphorus which is an important nutrient for plant growth. There were small differences in metal and organic concentrations in the water and muds of the lakes. The zooplankton and benthos communities were found to be healthy.

013**Biology****Halliwell, Douglas**

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File No: 12 402 723**Licence No:** 13715**Region:** IN**Location:** Parsons Lake, West Hans Lake, and East Hans Lake**ASSESSMENT OF IMPACTS OF MACKENZIE DELTA PETROLEUM ACTIVITIES ON AQUATIC ECOSYSTEM HEALTH, YEAR 1: LAKES (PARSONS LAKE ANCHOR SITE)**

This study is the first of a three-year and possibly longer study designed to learn more about the lakes and rivers along the Mackenzie Gas Pipeline and the three drilling pad sites. It is important to understand the current features of these waters and the organisms that live in them in order for Environment Canada (EC) to better assess the potential impacts of pipeline and drill pad operations on these waters. It also will allow EC to contribute to the databases being generated by industry and other federal and territorial departments. In 2004, sampling was focused on lakes in the Mackenzie Delta. This region is very important, providing habitat for fish, birds, caribou, beaver and humans. In August, detailed sediment (mud), water, benthos (bottom animals) and zooplankton (microscopic swimming animals) studies were conducted at three lakes in the Parsons Lake area. The lakes were warm, shallow, and the water was fresh. Most lakes were clear although some delta lakes had turbid (muddy) waters. The lakes had moderately high concentrations of phosphorus which is an important nutrient for plant growth. There were small differences in metal and organic concentrations in the water and muds of the lakes. The zooplankton and benthos communities were found to be healthy.

014**Biology****Harris, Les**

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File No: 12 402 706**Licence No:** 13602**Region:** GW**Location:** Travaillant Lake**BIOLOGICAL CHARACTERISTICS AND MOVEMENTS OF FISH IN TRAVAILLANT LAKE**

Although the seasonal migrations of anadromous broad whitefish in the Mackenzie River drainage have been documented, the movements and habitats critical to the survival of the lacustrine life history form of this species are poorly known. For this study the researchers used radio telemetry to document the seasonal migration patterns and identify spawning and over-wintering habitats of a purported lacustrine form of broad whitefish in Travaillant Lake. They radio-tagged 50 mature broad whitefish from three locations within the Travaillant Lake system; 30 of these were tagged at feeding areas located within Travaillant Lake proper and 20 were tagged near spawning areas located in the north and south reaches of the Travaillant River. Tagged fish were relocated on 15 separate occasions through aerial tracking. Three specific reaches of the Travaillant River, 5, 11 and 16 km upstream of Travaillant Lake, were identified as potential spawning locations due to the congregation of many fish in these areas during the time when broad whitefish spawn. In addition, a spawning area was identified in the Travaillant River at the outlet of Travaillant Lake. Following spawning, broad whitefish either migrated into Travaillant Lake or into smaller lakes within the Travaillant system. The researchers presume that the broad whitefish over-winter in these locations; additional tracking in late winter/early spring may add to these findings. The results indicate that feeding, spawning and likely over-wintering take place within the Travaillant River system thus supporting the hypothesis that these populations represent a distinct lacustrine life history form.

015**Biology****Harris, James**

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File No: 12 402 714**Licence No:** 13679**Region:** IN**Location:** Cape Bathurst Peninsula**FIELD COLLECTIONS OF *Braya* AND ASSOCIATED PLANT SPECIES**

Due to insufficient research funds, the researcher was not able to complete the project as originally planned. However, a brief visit of approximately two hours was made to a location on Cape Bathurst Peninsula, the suspected type locale of *Braya pilosa*, a plant species that had been lost to science since 1850. A population of several hundred *Braya pilosa* individuals was successfully located at the site but due to time constraints the population could not be adequately studied. Now that the species has been rediscovered, the size and extent of the known population needs to be determined. Living tissues must be collected for cytological and reproductive studies, and the area needs to be searched for additional populations of this very rare plant. The researcher hopes to conduct additional field work during the summer of 2006. An article referring to fieldwork under this research licence entitled, "Pilose Braya, *Braya pilosa*" Hooker (Cruciferae; Brassicaceae), an Enigmatic Endemic of Arctic Canada," is due to be published in October in *The Canadian Field Naturalist*. A copy of the paper will be submitted to the Aurora Research Institute library.

016**Biology****Kingsley, David M.**

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File No: 12 402 642**Licence No:** 13601**Region:** SS**Location:** Fox Holes Lake**MOLECULAR ANALYSIS OF EVOLUTIONARY CHANGE IN STICKLEBACK POPULATIONS**

The goal of this research is to determine whether the same genes control similar skeletal changes in different populations and species of animals. Stickleback fish are ideal subjects for this study because different populations show significant differences in skeletal structures. Variation in the pelvic skeleton (the equivalent of our legs) may be the most striking of these differences: throughout the Northern Hemisphere, some populations of the ninespine stickleback and brook stickleback have large spines on their bellies and a supporting pelvic skeleton (possibly for defence against predators) while others have no pelvic structures at all. In order to test whether the same or different genes cause these similar skeletal changes, the researchers collected sticklebacks without pelvic skeletons from an exceptional population in Fox Holes Lake and crossed them in the laboratory with sticklebacks from other lakes in Alaska and Massachusetts. This work was conducted in June 2002 and 2004, and the progeny from these crosses were raised in the researchers' laboratory. From one of these crosses, DNA samples were taken to find links between the completeness of the pelvic skeleton and specific DNA sequences that occur in the fish. Thus, using fish from Fox Holes Lake will allow the determination of the genes responsible for evolutionary change in wild populations of fish.

017**Biology****Kustan, Ed**

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File No: 12 402 709**Licence No:** 13630**Region:** DC**Location:** Along the Liard Pipeline**POST CONSTRUCTION REVEGETATION AND SOIL MONITORING FOR THE LIARD PIPELINE AND GATHERING PROJECT, FORT LIARD, NT**

In July 2004, field crews assessed the progress of natural revegetation and issues related to soil erosion on the Liard Pipeline. This was the final year of a five year assessment of revegetation success. The program evaluated eight transects extending across the pipeline right-of-way. Erosion concerns and overall revegetation success was assessed by flying the pipeline right-of-way in a helicopter, and recording and photographing representative areas. Bare areas, water ponding, erosion and weed encroachment were noted. The results of the 2004 monitoring surveys indicate that natural revegetation of native vegetation along the pipeline right-of-way is proceeding well with an increase in vegetation cover noted on all sample plots and over the majority of the right-of-way. The number of species of vegetation identified has increased each year, over the five years of the study. Bare areas are filling in by encroachment of surrounding vegetation. Some non-native plant species were noted. Only one area with heavier coverage of non-native species was a concern and mowing was recommended to mitigate the growth of weedy species. An exposed culvert and an erosion channel were noted. Mitigation was suggested to construct channels at these locations to divert water into the surrounding forest, off the right-of-way and to re-contour the channel and culvert. Slopes near the battery site showed evidence of erosion and seeding was recommended to provide stabilization.

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File No: 12 402 709**Licence No:** 13631**Region:** DC**Location:** N-01 Wellsite south-east of Fort Liard**SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE ASSESSMENT, N-01 WELLSITE**

The field program consisted of the drilling of 13 boreholes, the installation and monitoring of wells and the augering of 45 probe holes. The crew conducting the environmental work consisted of Alpine Environmental employees based out of Calgary and a Fort Liard community representative.

Hydrocarbon impacted soil was identified in the north-east portion of the lease and around the separator building. The impacted soil has been delineated laterally and vertically and has been found to extend beyond the lease boundaries to the north-east. Groundwater was found to contain elevated dissolved silver concentration and toluene. North-east of the vent stacks, the former sump was found to be still slightly subsided and to hold both spring melt and precipitation. Two trenches were still open in the north-west portion of the lease and served as diversion trenches. Construction materials were located to the south of the wellhead and along the access road. The assessment will continue in the 2005 field season.

019

Biology

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File No: 12 402 709

Licence No: 13725

Region: DC

Location: Cameron Hills Significant Discovery Area

POST-CONSTRUCTION REVEGETATION AND PERMAFROST MONITORING WITHIN PARAMOUNT'S CAMERON HILLS PROJECT AREA
Fieldwork cancelled.

020

Biology

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Licence No: 13687

Region: DC

Location: An area approximately 40 km north-east of Fort Providence, off Highway #3

COMMUNITY FIRE PROJECT

Experimental prescribed burns were used to evaluate the effectiveness of forest fuel treatments and sprinkler systems in protecting homes and communities from wildfires. The burn operation consisted of igniting the windward side of a plot with drip torches or a terratorch and the resultant fire behaviour was documented, including weather and fuel moisture conditions. Weather observations were made using a standard fire weather station capable of hourly or instantaneous observations. Fuel moisture measurements were done by oven drying samples taken from the burn plots (duff, moss, needles etc). Fire behaviour documentation was done using video cameras, helicopters, and data loggers. The house survival study used scaled-down models that included a door, window, siding, shingle roofing, and fascia. A "small" sprinkler system consisting of portatanks, portable pump, hose, and sprinkler heads was tested to determine its effectiveness in retarding fire spread and protecting houses from forest fire.

021

Biology

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Licence No: 13654

Region: GW

Location: Sites accessible from the Dempster Highway between Fort McPherson and Inuvik

AUTECOLOGY AND POPULATION ECOLOGY OF GREEN ALDER

The purpose of the alder population sampling is to assess the independent effects of temperature and fire on tall shrub expansion in the Mackenzie Delta region. The sampling for this project has only been partially completed but there are some interesting results to report nevertheless. Across the southern portion of the study area, alder clones tend to be made up of two or fewer interconnected stems, which are generally very closely grouped. This suggests that although vegetative reproduction may be an important strategy for long-term persistence in the region, it is unlikely that it represents a successful means of spread. On sites sampled

to date, green alder clone age was also significantly lower on upland tundra and lowland burned sites compared to lowland forest tundra sites. On both upland tundra and burned sites alder age distributions were dominated by clones less than 12 years old, compared with relatively uniform age distribution on lowland sites. Similarly, the age distribution of interconnected stems within a clone was dominated by young stems on both upland and burn sites. Overall this suggests that populations on upland and burned sites have recently experienced increased recruitment, compared with lowland sites where recruitment has remained episodic. These results are consistent with local observations that alder (red willow) dominance has increased in the Peel Plateau uplands and burned lowland areas in the southern portion of the delta.

022**Biology****MacNeill, Scott W.**

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File No: 12 402 701**Licence No:** 13713**Region:** NS**Location:** Matthews Lake, approximately 250 km NNE of Yellowknife**MATTHEWS LAKE AND AREA FISH HABITAT RESTORATION PROJECT (MLAFHRP)**

The Matthews Lake and Area Fisheries Habitat Restoration Project (MLFHRP) is a multi-year project that focuses on improving fish habitat conditions around Matthews Lake. Matthews Lake is in the immediate vicinity of two abandoned mines (the Salmita and Tundra Mill mines) whose activities impacted many nearby water bodies. The MLAFHRP is designed to: restore and/or enhance aquatic habitats in the area that were impacted by the development and operation of the Salmita and Tundra Mill mines; and document the fish habitat benefits of the techniques employed. In 2004, pre-construction fishery investigations were conducted in one site. Sampling at this site involved setting six gill net sets (12 nets in total) for one hour intervals in front of both the control and treatment sections. Nets were set over a three-day sampling period. No fish were captured at either site during sampling efforts. The post-construction monitoring program for the MLAFHRP will be conducted during 2005-2007.

023**Biology****McGurk, Michael**

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File No: 12 402 713**Licence No:** 13665**Region:** NS**Location:** North Pond, Unnamed Pond, and L-Shaped Lake at Colomac Gold Mine**BASELINE SURVEY OF ENVIRONMENTAL CONDITIONS IN NORTH POND AND L-SHAPED LAKE, COLOMAC MINE**

All three water bodies studied lie along the potential northern discharge route for treated water from Colomac's Tailings Containment Area. The survey was conducted during the early open-water season. June temperatures in the lakes ranged from 4.5 to 18.7°C. At that time, the water bodies were at different stages in their spring turnover because of differences in depth and surface area. L-Shaped Lake, the shallowest and largest water body, still showed a strong thermocline. L-Shaped Lake was well-oxygenated, but both North Pond and Unnamed Pond were still turning over and their oxygen concentrations were too low to support fish. No fish were captured in the three water bodies in June, despite considerable gillnetting and minnow trapping effort. No fish were observed, even though the water was clear and shallow in all three water bodies. High numbers of large aquatic invertebrates (i.e., leeches, aquatic insects, and freshwater shrimp) were observed, which is typical of both poor water quality and of fishless conditions. There are no surface inlets or outlets to North Pond and Unnamed Pond; hence there are no routes that would allow fish passage into those two ponds. The inlet stream to L-Shaped Lake contains a barrier to fish passage. Spanner Creek, the outlet of L-Shaped Lake, is large enough to allow fish migration during the freshet period. No fish were

captured or observed in either the inlet or outlet of L-Shaped Lake.

024

Biology

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Region: SA

Location: Silver Bear Properties

AQUATIC AND TERRESTRIAL SURVEYS AT SILVER BEAR PROPERTIES

Rescan Environmental Services Ltd. was retained by Indian and Northern Affairs Canada (INAC) to conduct aquatic baseline surveys of the Silver Bear area. The purpose was to assess the impact of Terra, Northrim, Norex/Graham Vein and Smallwood mines. Information was collected on bathymetry, sediment quality, physical limnology, benthic invertebrates and fish. Hermandy and Ho-Hum Lakes were impacted. Sediments contain metal concentrations above federal guidelines, benthos density was low and no large-bodied fish were caught. Little Ho-Hum Lake was less impacted than Ho-Hum Lake. Few sediment metal concentrations were above guidelines. Benthos density was low, but the number of sensitive groups was high. One species of large-bodied fish was caught. Smallwood Lake had few sediment metal concentrations above guidelines, but benthos density and the number of sensitive groups was very low. Many fish species were captured. For some metals, Smallwood Lake fish have significantly higher tissue levels than Camsell River fish. Two sites on the Camsell River were found to have few sediment metal concentrations above standards. Benthos density was high, as was the number of sensitive groups. The diversity and catch of fish were high. Fish tissue metal concentrations were low.

025

Biology

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Region: NS

Location: Lac de Gras

SHOAL HABITAT UTILIZATION STUDY

As stated in the Authorization for Works or Undertakings Affecting Fish and Fish Habitat (DFO File No. SC98001), Diavik Diamond Mines Inc. (DDMI) was responsible for conducting a Fish and Fish Habitat Utilization Study prior to in-lake dike construction. To meet the requirements outlined in the Fisheries Authorization, DDMI has been conducting a yearly Shoal Habitat Utilization Survey (hydroacoustic shoal surveys). Hydroacoustic shoal surveys for 2004 were conducted on September 26 and October 11 on nine transects, eight existing transects from the 2003 survey located east of the A154 dike and one additional transect located at the proposed A418 dike site. Each transect was surveyed twice by boat, based on previously mapped shoals. In addition to the hydroacoustic surveys, angling was utilized in an attempt to ground-truth the hydroacoustic data, and to capture, tag, and obtain life history data from fish utilizing the shoals. Results concluded that lake trout continue to utilize the shoals along the A154 dike. The fish were detected with the hydroacoustic equipment as well as caught or observed during angling. Fish presence was also noted at the other natural shoals in the survey area, with one lake trout caught during angling, and at the transect located by the proposed A418 dike, with one lake trout observed trailing a lure.

026**Biology****Muggli, Deborah**

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File No: 12 402 711**Licence No:** 13655**Region:** NS**Location:** 19 lakes and streams and the Panda Diversion Channel at Ekati Diamond Mine**2004 AQUATIC MONITORING PROGRAM**

The Aquatic Effects Monitoring Program's (AEMP) main objective is to identify potential effects that the mine is having on the surrounding bodies of water and/or aquatic life. Lakes and streams are monitored within two watersheds (the Koala Watershed and the King-Cujo Watershed) for water quality, hydrology, physical limnology, phytoplankton, zooplankton, lake benthos and stream benthos. Sediment quality and fish communities are monitored during some years. 2004 was the seventh year of monitoring within the Koala Watershed (in and around Main Camp) since the Main Camp was built. Monitoring also took place in this area before the Main Camp was built giving a baseline to which the results of current monitoring can be compared. In the Koala Watershed, some changes in water quality were observed within the lakes downstream of the Long Lake Containment Facility (LLCF). The LLCF is where processed kimberlite, mine water, and other substances are placed. The changes that were detectable in the Koala Watershed in 2004 included increased total dissolved solids, potassium, nitrate and molybdenum downstream to Slipper Lake, and increased pH and possibly sulphate downstream to Lac de Gras. There were no changes detected in biological communities as a result of the mine. For the King-Cujo Watershed (downstream of Misery Camp), 2004 was the fourth year of monitoring since Misery Camp was built. The main source of changes to the water quality in this area is discharge from the King Pond Settling Facility (KPSF). For 2004, water quality parameters changed downstream of the KPSF included increased pH, sulphate, total dissolved solids, potassium, total ammonia, nitrate and total copper. Changes were greater near the KPSF and decreased downstream so that changes detected at Christine-Lac du Sauvage Stream were very small. Lake benthos (small animals living in the lake bottom) continue to be enhanced in one lake likely due to historical nutrient input. In summary, the Ekati mine caused some changes to water quality downstream of the LLCF and KPSF, but did not cause changes to aquatic life for the most part.

Bearclaw Lake is a small lake (~8 ha) on the property of the Ekati Diamond Mine. Excess water from the lake is pumped around Beartooth Pit to North Panda Lake and the Panda Diversion Channel (PDC). During spring 2004, pumping was delayed three weeks because regulatory approval was required. During that time the lake rose 1.46m above its target level. Pumping began July 5 and inadvertently continued until August 3. The lake fell 0.6m below its target level. Ekati notified the Department of Fisheries and Oceans, who inspected the site and approved Ekati's proposal for an ecosystem survey. Rescan Environmental Services reported the following: 60 juvenile burbot died in isolated pools along the shoreline; phytoplankton biomass increased because of nitrogen seepage from a nearby waste rock pile and phosphorus introduced by flooding of exposed soil or re-suspension of sediments; the amount of fish habitat increased in the PDC; and, the effects of the water level fluctuations were short-term and reversible. As a result of summer rain, the water level in Bearclaw Lake returned to ~5cm of the target level by freeze-up. Recommendations were made for avoiding similar situations in the future.

027**Biology****Osawa, Akira**

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File No: 12 402 412
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Location: Wood Buffalo National Park along Highway 5

CARBON DYNAMICS IN CHRONOSEQUENCE OF BOREAL FOREST ECOSYSTEMS: A PRODUCTION ECOLOGICAL APPROACH

The flow of carbon in jack pine forests of various ages is the focus of this study. In 2004, the researchers continued to measure soil respiration (amount of CO₂ coming out of the soil) and above ground litter fall as parts of the carbon flow in the forests. This was an unusually dry year. There were many large forest fires in the Wood Buffalo National Park. The dryness of the soil had an effect of reducing the rate of soil respiration. The researchers have also accumulated a few years of litter fall data. With all this information, they are currently writing up an overview of carbon dynamics in their jack pine study areas. To fathom the year-to-year variation of the forests' carbon flow, it may be necessary to continue the various measurements.

028

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Location: Gahcho Kué study area

2004 NOISE SURVEY IN THE GAHCHO KUÉ (KENNADY LAKE) AREA

Local assistants from Lutsel K'e provided field support for technical specialists. Field studies expanded work previously conducted between 1995 and 2003 and included air quality and climate and noise surveys. No background noise information was previously available. A noise survey was conducted in summer 2004 to obtain background noise levels. Background noise levels were found to be consistent with undisturbed areas. Together with existing information, the new data were added to the database for the site and evaluated for a baseline report that will be submitted should the project enter the regulatory phase. Additional studies will be undertaken in 2005 to further expand the baseline information. No published reports have been generated to date.

029

Biology

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File No: 12 402 670
Region: IN

Licence No: 13539
Location: Selected streams and lakes along the proposed pipeline corridor in the
 Inuvialuit Settlement Region

2004 WINTER AND SPRING AQUATIC STUDIES IN THE INUVIALUIT SETTLEMENT REGION

The 2004 winter and spring aquatic studies in the Inuvialuit Settlement Region (ISR) included fisheries, hydrology, and water quality investigations. Aquatic studies within the ISR were conducted between March 19 and April 4. No spring surveys were conducted in 2004. The purpose of the winter survey was to assess watercourse freezing conditions and over-wintering conditions of selected water bodies (streams and lakes) along the proposed pipeline corridor and within the production area leases. Selection of sites was based on observations made during the 2003 spring, summer and fall surveys. Several sites in the Kendall Island Bird Sanctuary were sampled, including Kumak, Kuluarpak and Harry channels as well as a number of unnamed channels. Information collected during the surveys included: fish collections (setlines and under ice gill net sets); fish habitat assessments using remote videography; basic water quality parameters (water temperature, pH, conductivity, dissolved oxygen, and turbidity); discharge measurements; ice thickness and depth of water below the ice cover; and presence/absence of frazle ice. Ninespine stickleback was the only fish species

identified or captured during the winter surveys.

030	Biology
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File No: 12 402 670

Region: GW

Licence No: 13550

Location: Selected streams and lakes along the proposed pipeline corridor in the Gwich'in Settlement Area
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2004 WINTER AND SPRING AQUATIC STUDIES IN THE GWICH'IN SETTLEMENT AREA

The 2004 winter and spring aquatic studies in the Gwich'in Settlement Area (GSA) included fisheries, hydrology, and water quality investigations. Fish and fish habitat surveys in the GSA were conducted between March 17 and March 23 at four streams and from June 17-19 at 14 proposed road crossings. The purpose of the winter surveys was to assess watercourse freezing conditions and over-wintering conditions of selected water bodies (streams) along the proposed pipeline corridor. Spring surveys concentrated on assessing habitat conditions for fish and use by spring spawning species. Selection of sites was based on observations made during the 2003 surveys. Information collected during the surveys included: fish collections (setlines) and sampling (backpack electrofishing and angling) and fish habitat description; assessment of winter habitat use using remote videography; in-situ water quality measurements (temperature, dissolved oxygen, conductivity and pH); discharge and depth measurements; ice thickness and depth of water below the ice cover; presence/absence of frazzle ice; assessment of channel and flow characteristics; egg sampling (kick netting); and, photo documentation of each site. No fish were identified or captured during the winter/spring surveys.

031	Biology
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File No: 12 402 670

Region: DC

Licence No: 13579

Location: Selected streams and lakes along the proposed pipeline corridor
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2004 WINTER AND SPRING AQUATIC SURVEYS IN THE DEH CHO REGION

The 2004 winter and spring aquatic studies in the Deh Cho Region (DCR) included fisheries, hydrology, and water quality investigations. Winter aquatic studies were conducted in the DCR between April 6 and April 11. Spring aquatic studies within the DCR were conducted between May 26 and May 29 on 13 proposed road crossings. The purpose of the winter surveys was to assess watercourse freezing conditions and over-wintering conditions of selected water bodies (streams) along the proposed pipeline corridor. Fish sampling was not conducted during the winter surveys. Spring surveys concentrated primarily on assessing habitat conditions and use by spring spawning species, such as walleye and Arctic grayling. Information collected during the winter and spring surveys included: fish capture data and egg sampling (presence, age, length, and weight), when possible, with backpack electrofishing units, boat electrofishing units, minnow traps, beach seines, angling, gill or kick nets; fish habitat assessments; basic water quality parameters (water temperature, pH, conductivity, dissolved oxygen, and turbidity); photographs of representative habitat conditions at each site; assessment of channel and flow characteristics; discharge and depth measurements; ice thickness and depth of water below the ice cover; and presence/absence of frazzle ice. Of the eight locations sampled for fish during the spring surveys, only Arctic grayling were captured.

032**Biology****Povey, Andrew**

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File No: 12 402 670**Licence No:** 13583**Region:** SA**Location:** Selected streams and lakes along the proposed pipeline corridor**2004 WINTER AND SPRING AQUATIC SURVEYS IN THE SAHTU SETTLEMENT AREA**

The 2004 winter aquatic studies in the Sahtu Settlement Area (SSA) included fisheries, hydrology, and water quality investigations. Detailed aquatic studies within the SSA were conducted from April 8 to April 15. No spring surveys were conducted in 2004. The purpose of the winter surveys was to assess watercourse freezing conditions and over-wintering conditions of selected water bodies (streams and lakes) along the proposed pipeline corridor. Selection of sites was based on observations made during spring, summer, and fall surveys conducted in 2003. Information collected during the surveys included: fish capture data (presence, age, length, weight) using set lines and minnow traps; assessment of over-wintering habitat use using remote videography; in-situ water quality measurements (temperature, dissolved oxygen, conductivity and pH); discharge and depth measurements; ice thickness and depth of water below the ice cover; and presence/absence of frazzle ice. Thirty-one sites were surveyed, of which fish sampling was conducted at six locations. Arctic grayling and/or sculpin were captured or observed at four of these sites.

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File No: 12 402 670**Licence No:** 13639**Region:** IN**Location:** Along the pipeline study corridor, including locations for potential infrastructure sites, roads and borrow pits, within the Inuvialuit Settlement Region**2004 SUMMER AND FALL AQUATIC STUDIES IN THE INUVIALUIT SETTLEMENT REGION**

The 2004 summer and fall aquatic studies, including fisheries, hydrology, water quality, and hydrogeology investigations were conducted in the Inuvialuit Settlement Region (ISR). Studies were conducted at potential sites that may be affected by various project components. Detailed aquatic assessments within the ISR were conducted from July 17- 20 at five lakes, and from September 7-15 at six lakes and three proposed stream crossings. Information collected during the surveys included: fish capture data (presence, age, length, and weight), when possible, with backpack electrofishing units, boat electrofishing units, minnow traps, beach seines, angling or gill nets; fish habitat assessments and maps; substrate, depth, and velocity information; observations of slope and vegetation in the predicted flow path between infrastructure sites and receiving water bodies; depth profiles for large channels or rivers using a sonar system; fish habitat availability and habitat mapping; fish habitat suitability estimates for target species based on visual observations and knowledge of life history requirements; lake bathymetry data; basic water quality parameters (water temperature, pH, conductivity, dissolved oxygen, and turbidity); water and sediment sample collection at selected sites; and photographs of representative habitat conditions at each site. Fish caught during the summer included Arctic grayling, burbot, and ninespine stickleback.

From June 16-18, 2004, surveys were conducted by helicopter at borrow and infrastructure sites along the proposed gathering system and pipeline route within the ISR. The purpose of the study was to identify any groundwater-related features that might impact, or be impacted by, activities related to the borrow sites and infrastructure sites. Field personnel collected and described numerous shallow soil samples and one groundwater sample.

034**Biology****Povey, Andrew**

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File No: 12 402 670**Region:** IN**Licence No:** 13640

Location: Along the pipeline study corridor, including locations for potential infrastructure sites, roads and borrow pits, within the Inuvialuit Settlement Region

2004 TERRESTRIAL STUDIES IN THE INUVIALUIT SETTLEMENT REGION

During the summer of 2004, terrestrial surveys were conducted in the Inuvialuit Settlement Region (ISR) along the proposed Mackenzie Valley Pipeline gathering system and at selected infrastructure sites. Rare plant and Ecological Land Classification (ELC) data was collected from June 22 to July 4, July 12 -23, July 26-31 and from August 9-13. A total of 121 plots were completed during the ELC survey and 91 plots were conducted during the rare plant survey. Rare plant surveys involved identifying and surveying a variety of small patch communities and uncommon terrain features to characterize areas with higher potential to support rare plants. A complete list of plant species was compiled at each site using the random meander technique. The vegetation community was also characterized at each site. ELC surveys involved three types of data collection. Visual checks were conducted via helicopter to confirm vegetation types assigned during aerial photo interpretation. Groundwork was split into ground plots and detailed plots. Ground plots were surveyed to quantify main tree, shrub and groundcover plant species and snag and coarse woody debris cover. Detailed plots characterized vegetation types. Terrain and soil information were collected at both the ground and detailed plots. Information collected and used to classify soils included soil horizon morphology and chemical characteristics. Terrain classification involved the identification of parent material, drainage, surface expression, slope and aspect.

035**Biology****Povey, Andrew**

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File No: 12 402 670**Region:** GW**Licence No:** 13644

Location: Along the pipeline study corridor, including locations for potential infrastructure sites, roads and borrow pits, within the Gwich'in Settlement Area

2004 TERRESTRIAL STUDIES IN THE GWICH'IN SETTLEMENT AREA

During the summer of 2004, terrestrial surveys were conducted in the Gwich'in Settlement Area (GSA) along the proposed Mackenzie Valley pipeline route and at selected facility, infrastructure and borrow sites. Rare plant and Ecological Land Classification (ELC) data were collected from June 28 to July 2, July 12-23, and from August 1-8. A total of 71 plots were completed during the ELC program and four plots were completed during the rare plant survey. Rare plant surveys involved identifying and surveying a variety of small patch communities and uncommon terrain features to characterize areas with higher potential to support rare plants. A complete list of plant species was compiled at each site using the random meander technique. The vegetation community was also characterized at each site. ELC surveys involved three types of data collection. Visual checks were conducted via helicopter to confirm vegetation types assigned during aerial photo interpretation. Groundwork was split into ground plots and detailed plots. Ground plots were surveyed to quantify main tree, shrub and groundcover plant species and snag and coarse woody debris cover. Detailed plots characterized vegetation types. Additional information on dominant tree characteristics, snags and coarse woody debris were documented at both plots. Terrain and soil information were collected at both the ground and detailed plots. The information was used to classify soils, and included soil horizon morphology

and chemical characteristics. Terrain classification involved the identification of parent material, drainage, surface expression, slope and aspect. Additional information on dominant tree characteristics, snags and coarse woody debris were documented at both plots.

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Location: Along the pipeline study corridor, including locations for potential infrastructure sites, roads and borrow pits, within the Sahtu Settlement Area

2004 TERRESTRIAL STUDIES IN THE SAHTU SETTLEMENT AREA

During the summer of 2004, terrestrial surveys were conducted in the Sahtu Settlement Area (SSA) along the proposed Mackenzie Valley pipeline corridor and on selected infrastructure sites. Rare plant and Ecological Land Classification (ELC) data was collected from April 6-12, June 2-7, June 22-June 28, July 19-29 and from August 23-30. A total of 93 plots were completed during the rare plant survey. Rare plant surveys involved identifying and surveying a variety of small patch communities and uncommon terrain features to characterize areas with higher potential to support rare plants. A complete list of plant species was compiled at each site using random meander method. The vegetation community was also characterized at each site. Three rare plants were recorded during the summer survey. ELC surveys involved three types of data collection. Visual checks were conducted via helicopter to confirm vegetation types assigned during aerial photo interpretation. Groundwork was split into ground plots and detailed plots. Ground plots were surveyed to quantify main tree, shrub and groundcover plant species and snag and coarse woody debris cover. Detailed plots characterized vegetation types. Terrain and soil information were collected at both ground and detailed plots. Information collected and used to classify soils included soil horizon and morphology and chemical characteristics. Terrain classification involved the identification of parent material, drainage, surface expression, slope and aspect.

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Location: At water bodies along and around the proposed and alternate pipeline routes in the Gwich'in Settlement Area

2004 SUMMER AND FALL AQUATIC STUDIES IN THE GWICH'IN SETTLEMENT AREA

The 2004 summer and fall aquatic studies including fisheries, hydrology, water quality, and hydrogeology investigations were conducted in the Gwich'in Settlement Area (GSA). Fisheries studies were conducted at potential sites that may be affected by various project components. Detailed aquatic surveys in the GSA were conducted from July 21-23 at four lakes and on September 9 and 16, 2004 at two unnamed streams. Information collected during the detailed aquatic surveys included: fish capture data (presence, age, length, and weight), when possible, with backpack electrofishing units, boat electrofishing units, minnow traps, beach seines, angling or gill nets; fish habitat assessments and suitability estimates for target species based on visual observations and knowledge of life history requirements; substrate, depth, and velocity information (data supplemented other information collected during the hydrology survey); depth profiles for large channels or rivers using a sonar system; lake bathymetry data at selected sites; water quality sample collection and basic water quality parameters (water temperature, pH, conductivity, dissolved oxygen, and turbidity); observations

of slope and vegetation in the predicted flow path between infrastructure and facility sites and receiving water bodies; and, photographs of representative habitat conditions at each site. Fish were not encountered during the summer/fall GSA surveys. From June 19-20, 2004, surveys were conducted by helicopter at proposed borrow and infrastructure sites within the GSA. The purpose of the survey was to identify any groundwater-related features that might impact, or be impacted by, activities related to the borrow sites and infrastructure sites.

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Location: At water bodies along and around the proposed and alternate pipeline routes in the Sahtu Settlement Area

2004 SUMMER AND FALL AQUATIC STUDIES IN THE SAHTU SETTLEMENT AREA

The 2004 summer and fall aquatic studies, including fisheries, hydrology, water quality, and hydrogeology investigations were conducted in the Sahtu Settlement Area (SSA). Studies were conducted at potential sites that may be affected by various project components. Detailed aquatic surveys within the SSA were conducted from August 1-3 and August 5-8 at seven lakes, one proposed barge landing site and one stream near a proposed infrastructure site. From September 10-18, surveys were conducted on four stream or large river crossings and two proposed barge landing sites. Information collected during the surveys included: fish capture data (presence, age, length, and weight), when possible, with backpack electrofishing units, boat electrofishing units, minnow traps, beach seines, angling or gill nets; fish habitat assessments and maps; substrate, depth, and velocity information at lake inlets and outlets; habitat availability and habitat maps showing detailed shoreline characteristics; lake bathymetry data at selected sites and river bathymetry data near proposed barge landings; depth profiles for large channels or rivers using a sonar system; habitat suitability estimates for target species based on visual observations and knowledge of life history requirements; basic water quality parameters (water temperature, pH, conductivity, dissolved oxygen, and turbidity); observations of slope and vegetation in the predicted flow path between infrastructure/facility sites and receiving water bodies; water and sediment quality sample collection; and, photographs of representative habitat conditions at each site. Four fish species were identified during the summer/fall surveys in the SSA, including Arctic grayling, northern pike, lake chub, and brook stickleback.

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Location: Along the proposed and alternate pipeline corridor, including potential infrastructure sites, roads, and borrow pits within the Deh Cho Region

2004 TERRESTRIAL STUDIES IN THE DEH CHO REGION

During the summer of 2004, terrestrial surveys were conducted in the Deh Cho Region (DCR) along the proposed Mackenzie Valley pipeline corridor including in the Wrigley, Fort Simpson, Jean Marie and Trout Lake areas, and at selected facility, infrastructure and borrow sites. Rare plant and Ecological Land Classification (ELC) data were collected from May 27-31, July 13 to August 1, August 3-12, and from September 7-14. A total of 174 sites were surveyed during the ELC program and 93 sites were surveyed during the rare plant program. Rare plant surveys involved identifying and surveying a variety of small patch

communities and uncommon terrain features to characterize areas with higher potential to support rare plants. A complete list of plant species was compiled at each site using the random meander technique. The vegetation community was also characterized at each site. During the summer survey, 12 species of rare vascular plants were recorded at 37 sample sites. Rare plant surveys were not conducted in the Wrigley area. ELC surveys involved three types of data collection. Visual checks were conducted via helicopter to confirm vegetation types assigned during aerial photo interpretation. Groundwork was split into ground plots and detailed plots. Ground plots were surveyed to quantify main tree, shrub and groundcover plant species, and snag and coarse woody debris cover. Detailed plots characterized vegetation types. Terrain and soils information were collected at both ground and detailed plots. Information collected and used to classify soils included soil horizon morphology and chemical characteristics. Terrain classification involved the identification of parent material, drainage, surface expression, slope and aspect.

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Location: At water bodies along and around the proposed and alternate pipeline routes in the Deh Cho Region

2004 SUMMER AND FALL AQUATIC SURVEYS IN THE DEH CHO REGION

The 2004 summer and fall aquatic studies including fisheries, hydrology, water quality, and hydrogeology investigations, were conducted in the Deh Cho Region (DCR). Studies were conducted at potential sites that may be affected by various project components. Aquatic surveys within the DCR were conducted from August 16-17 and on September 13 at two vegetated channels, four stream crossings, one lake, and one proposed barge landing site. Information collected during the surveys included: fish capture data (presence, age, length, and weight), when possible, with backpack electrofishing units, boat electrofishing units, minnow traps, beach seines, angling, gill or kick nets; fish habitat assessments and suitability estimates for target species based on visual observations and knowledge of life history requirements; substrate, depth, and velocity information; habitat availability and fish habitat description; lake bathymetry data at selected sites; basic water quality parameters (water temperature, pH, conductivity, dissolved oxygen, and turbidity); water quality sample collection at selected sites; photographs of representative habitat conditions at each site; channel substrate, profile information and flow characteristics; and, observations of slope and vegetation in the predicted flow path between infrastructure/facility sites and receiving water bodies. Four fish species were identified during the summer/fall surveys, including walleye, longnose sucker, slimy sculpin, and trout-perch. Groundwater surveys were conducted by helicopter in an area extending from the Deh Cho Region boundary with the SSR Tulita District in the north, and to the Camsell Bend in the south. The crew was made up of two hydrogeologists and a local assistant. The purpose of the survey was to identify any groundwater-related features that might impact, or be impacted by, activities related to the borrow sites and infrastructure sites.

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Location: Four potential routes in the Mackenzie Delta for bringing a barge-based facility into the Niglintgak anchor field

2004 AQUATIC STUDIES RELATED TO OPTIONAL BARGE BASED FACILITIES IN THE INUVIALUIT SETTLEMENT REGION

The 2004 aquatic studies related to barge-based facilities included fisheries, hydrology and water quality investigations. A fisheries study was conducted in Little Kumak Channel and along a potential barge route referred to as the Garry Island-Kumak Channel option. The surveys, conducted from late July to late September, included: fish capture data (presence, age, length, and weight), when possible, with backpack electrofishing units, boat electrofishing units, minnow traps, beach seines, angling or gill nets; hydroacoustic assessment of fish density and substrate composition; fish habitat assessments and maps; basic water quality parameters (water temperature, pH, conductivity, dissolved oxygen, and turbidity); sediment sampling for determination of chemical and physical properties; and substrate, channel width, depth, velocity and discharge. Fish species identified during these surveys included Arctic cisco, broad whitefish, inconnu, lake-whitefish, least cisco, longnose sucker, ninespine stickleback, northern pike, rainbow smelt, slimy sculpin and trout-perch.

The spring hydrology studies included an ice breakup survey in the outer Mackenzie Delta along the Middle Channel, Kumak Channel and coastline. Ice conditions were documented with videos and photos, and a temporary water level station was installed to monitor the rise and fall of the spring flood water level. Near-peak and post-peak flow were taken to assess the amount of water flow in the channels near Niglingtak Island. The temporary water level station was decommissioned immediately following spring breakup. As a part of the summer hydrology studies, hydrometric stations were installed in the Niglitingak and coastal areas, from July 22 to 30, 2004. Three stations (wind and water) were installed in Shallow Bay, Niglitingak Island, and Kittigazuit Bay, and five water level stations were installed on Kumak Channel, Little Kumak Channel, Middle Channel (two stations) and East Channel. Discharge measurements were taken at the five river stations during installation and each station was surveyed to a local datum to compare water levels. The eight hydrometric stations were decommissioned between September 28 and 30, 2004.

Assessments were conducted on July 16 at two proposed barge landing sites in the Mackenzie Delta, and sediment quality surveys were conducted from September 2- 9 in the southern Beaufort Sea and in Mackenzie Delta channels, as part of a preliminary assessment of options for barge routes for the Niglitingak gas processing facility. Information collected during the surveys at proposed barge landing sites included: sediment quality sample collection; photographs of representative habitat conditions at each site; basic water quality parameters (water temperature, pH, conductivity, dissolved oxygen, and turbidity); and substrate, depth, and velocity information.

042

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Region: NS

Location: Tundra Mine

ENVIRONMENTAL INVESTIGATIONS FOR RECLAMATION PLANNING AT THE TUNDRA MINE

Aquatic surveys and terrestrial investigations took place at Tundra Mine during the summer of 2004. Aquatic surveys took place on seven lakes and included an assessment of bathymetry, benthic invertebrates, sediment quality, and fish health. Terrestrial investigations identified wildlife species that may come in contact with the mine, and included a survey of lichens and vascular plants in the area. The objective of the project was to provide data for use in the human, wildlife and aquatic life risk assessment (to determine the potential risks associated with the exposure to the former Tundra Mine Site). The results of the survey were reported to the Contaminants Division of Indian and Northern Affairs Canada (INAC). A number of aboriginal community assistants actively participated in both the terrestrial and aquatic field surveys. A community assistant was involved in every aspect of the field sampling and provided Traditional Knowledge where applicable.

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File No: 12 402 608**Licence No:** 13598**Region:** NS**Location:** 31 km radius of Snap Lake Diamond Project**DE BEERS SNAP LAKE DIAMOND PROJECT 2004 SITE ADDITIONAL BASELINE DATA COLLECTION**

The objective of this study was to continue baseline data pertaining to terrestrial and aquatic resources within and around the 31 km radius of the Snap Lake Diamond Mine. Sampling was conducted around sites between May to October, 2004. The aquatics program included water quality, benthic invertebrates, plankton, periphyton, and fish health monitoring. The wildlife program included caribou, grizzly bear, wolverine, wolf, and falcon surveys. Vegetation and air quality studies also occurred on site. The purpose of such monitoring studies was five-fold: to contribute to the baseline data available for assessing and managing future potential environmental effects during construction and operations; to determine the natural range of variability for a number of environmental parameters; to identify potential mitigation to reduce impacts to the surrounding environment; to aid in the development of the monitoring programs for measuring environmental effects associated with the Snap Lake Diamond Mine; and, to contribute to regional studies for assessing and managing potential cumulative effects. Members of many aboriginal groups took part in facets of these studies and provided input on fish habitat, fish health, fish palatability, aquatic sampling, and wildlife surveys.

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File No: 12 402 608**Licence No:** 13625**Region:** NS**Location:** Great Slave Lake in the vicinity of effluent discharge points from Miramar's Giant Mine and Con Mine sites and at reference locations**ENVIRONMENTAL EFFECTS MONITORING FOR MIRAMAR CON MINE LTD. AND MIRAMAR GIANT MINE LTD.**

Golder Associates Ltd. was contracted by Miramar Con Mine Ltd. and Miramar Giant Mine Ltd. to collect field environmental and fish data in 2004 for the Cycle 1 Environmental Effects Monitoring (EEM) programs for the Giant and Con mines as required under recently developed federal Metal Mining Effluent Regulations (MMER).

Sampling was conducted by Golder Associates Ltd. in and around Yellowknife Bay of Great Slave Lake, in August and September 2004. Two sites were sampled in areas exposed to treated mine effluent: Jackfish Bay (downstream of the outfall for Con Mine) and the mouth of Baker Creek (downstream of the outfall for Giant Mine). In addition, two sites were sampled at reference areas not exposed to mine effluent: a bay at Horseshoe Island (Con Mine program) and the lower section of the Yellowknife River (Giant Mine program).

The field surveys involved the sampling of fish and aquatic invertebrates, and characterization of fish habitat at each site. The fish studies consisted of both a population survey of small bodied fish at both sites, and a community survey of ninespine stickleback at Con Mine. Fish were sampled using a variety of gear (minnow traps, backpack electrofisher, seine net), and were processed for length, weight, age, liver weight and pathology, gonad weight and pathology, and viscera arsenic concentration. An Ekman grab was used at Jackfish Bay to sample benthic invertebrates. Hester-Dendy plates were used at Baker Creek and the

Yellowknife River to sample aquatic invertebrates from the water column. The invertebrate species abundance and richness, and the total biomass were evaluated for each study. Field water quality was measured and sediment and water samples were collected and analyzed for total metals and organic compounds.

Data collected for the field survey were reported in the Cycle 1 EEM final interpretative reports submitted to Miramar Con Mine Ltd., Miramar Giant Mine Ltd. and Environment Canada in June 2005 as required under the Metal Mining Effluent Regulations (MMER).

045 **Biology**

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Region: SA, NS, SS **Location:** Great Slave Lake, Great Bear Lake, Lac La Martre, Keller Lake, Chitty Lake, and Alexie Lake

THE BIOGEOGRAPHY AND ECOLOGY OF DEEPWATER SCULPIN (*Myoxocephalus thompsoni*): CONSERVATION OF A GLACIAL RELICT

Field research was conducted during a brief period in July 2004. Lakes sampled for deepwater sculpin included Great Slave Lake (east arm out of Lutsel K'e), Alexie Lake, and Chitty Lake. Deepwater sculpin were captured in both Great Slave Lake (nine individuals) and Alexie Lake (one individual). Sampling in Chitty Lake did not yield a single deepwater sculpin. Genetic, biological, and ecological research of specimens captured is ongoing and part of a broad-scale study on the phylogeography and ecology of deepwater sculpin throughout their range within Canada (Quebec to the NWT). Part of this research has resulted in a manuscript on the status of deepwater sculpin throughout Canada for the Committee on the Status of Endangered Wildlife in Canada.

046 **Biology**

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Region: NS **Location:** Gahcho Kué watershed and nearby "Control Lake"

2004 AQUATIC (FISH) SURVEYS IN THE GAHCHO KUÉ (KENNADY LAKE) AREA

This baseline information gathered through this project will be used to support a future environmental impact assessment and necessary permitting applications for development of the Gahcho Kué mine. Fisheries investigations were conducted and included late winter, spring, summer and fall sampling periods. Two AMEC biologists with assistance from technicians from Lutsel K'e First Nation conducted all sampling. A total of 1 249 fish, representing eight different species, were captured in Kennady Lake and the surrounding area in 2004. Of these, 301 fish were killed, 495 fish were Passive Integrated Transponder (PIT)-tagged and released, and 454 fish were live released without tags. Of the 495 fish PIT-tagged, 51 of these fish also received radio tags. These included 26 lake trout, 11 Arctic grayling, ten northern pike, and four round whitefish. Tissue samples were collected from 75 dead lake trout: 24 from Kennady Lake, 25 from the "Control Lake", and 26 from Lake 410.

047**Biology****Stabler, James Matt**

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File No: 12 402 721**Licence No:** 13723**Region:** IN**Location:** Beaufort Sea / Amundsen Gulf**INUVALUIT SETTLEMENT REGION MARINE EXPLORATORY FISHERY MARK RECAPTURE PROJECT**

The objectives of the mark-recovery project were to help facilitate population determination investigations of fish captured and released via the exploratory fishery; to help facilitate movement/migration pattern investigations and related habitat use of fish thus captured/released; and to further validate the effectiveness of the fishing gear employed in the exploratory fishery in minimizing the incidence of captured/released mortalities amongst both target and non-target species. The mark-recovery program is part of a larger experimental fishery investigation aimed at providing information required to assess the potential of initiating small-scale, community-based commercial fisheries within the Inuvialuit Settlement Region.

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File No: 12 402 724**Licence No:** 13709**Region:** SS**Location:** Northern Wood Buffalo National Park**DEVELOPMENT OF A MONITORING PROGRAM FOR THE WHOOPING CRANE BREEDING ENVIRONMENT**

The Whooping Crane Recovery Plan outlines several key activities to improve the status of this endangered species. Because those activities include monitoring the bird's habitat quality (including foods), the objective of the project was to research and test methods for sampling the crane's prey in the Wood Buffalo nesting ponds. Preliminary sampling in August 2004 focussed on the following questions: which methods are effective at sampling the variety of prey that is found in these ponds and how many samples are needed to efficiently describe the prey assemblages? To address the first question, six ponds were sampled and within each pond three gear types (minnow traps, "activity traps", and small dip nets) were used. As well, nine ponds (in three groups of three) were sampled and within one pond of each group, 24 units of a single gear type was used. Fish were identified and counted in the field and aquatic invertebrates were preserved for later analysis. Preliminary results of the invertebrate samples show that all three gear types collected approximately the same number and type of invertebrates and that 15 traps collected 90 % of the total diversity present. Sampling will continue in 2005.

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File No: 12 402 716**Licence No:** 13690**Region:** NS**Location:** Gahcho Kué watershed and nearby "Control Lake"**2004 VEGETATION AND SOIL SURVEYS IN THE GAHCHO KUÉ (KENNADY LAKE) AREA**

Terrestrial surveys, consisting of terrain, soils and vegetation investigations, were conducted within the

Gahcho Kué project local study area (LSA), regional study area (RSA) and along the proposed winter road route (WR) during the summer of 2004. Three levels of data were collected: visual (map polygon confirmation level); ground inspection (GIF) (intermediate reconnaissance level); and detailed (comprehensive level for terrain, soil and vegetation information). The methodology used for the project followed, for the most part, the British Columbia Terrestrial Ecosystem Mapping (TEM) approach to sampling design, data collection and mapping. The classification scheme for Ecological Land Classification (ELC) mapping within the LSA followed previous ELC mapping for the Ekati Diamond Mine and the Tibbitt to Contwoyto Winter Road projects. Mapping for the RSA and the winter road followed the broad ecosystem mapping approach used by the GNWT Department of Environment and Natural Resources. A total of 36 detailed plots, 107 GIFs and 287 visuals were completed within the LSA while five detailed plots, 20 GIFs and 192 visuals were completed within the RSA. A total of three full plots, 12 GIFs and 30 visuals were completed within the winter road corridor. Samples were pooled where the areas of the LSA, RSA and WR overlapped. Vegetation data collected at the detailed and GIFs plots included species percent cover by layer and tree mensuration data. Site information collected included slope, aspect, elevation, slope position, structural stage, successional stage, exposure, microtopography and coarse woody debris. Direct and indirect wildlife observations were recorded at each plot as well.

Rare plant surveys were undertaken specifically within the proposed mine disturbance footprint. Habitats considered unique due to the presence of uncommon terrain features or due to their limited distribution within the LSA were sampled as well. A complete list of plant species was compiled at each site using the timed random walk method. The presence of a rare plant at a sample location would trigger a more detailed search and the estimation of population size and abundance. The vegetation community was also described at each the site. The surveys were conducted in two stages to facilitate the identification of plants with different phenophases. The sampling periods ranged from July 13-20 and from August 1-13, 2004. The rare plant survey program was combined with the ELC sampling program to improve efficiency.

Terrain and soil data were collected at both the detailed and GIF plots. The information collected to classify soils included thickness, morphology and physical/chemical characteristics of soil horizons. Terrain classification involved the identification of soil parent material, drainage, surface expression, slope, aspect, stoniness and rockiness. Photographs of soil profiles and of landscape were taken at each site.

050

Biology

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Region: SS, NS

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Location: Taltson Hydro Project proposed transmission line routes and eight nearby waterways

TALTSON HYDRO PROJECT; EXPANSION BASELINE STUDIES AND WATER EFFECTS MONITORING PROGRAM

On behalf of the NWT Power Corporation (NTPC), Rescan Environmental Services Ltd. (Rescan) implemented the 2004 Water Effects Monitoring Program (WEMP) for NTPC's Taltson Hydro Project. The objective of the WEMP is to provide a means of efficient and effective identification of short-term, long-term, and cumulative changes in the water environment resulting from the project. Rescan completed a fish community sampling program of Nonacho Lake, Gagnon Lake, Rutledge Lake, Sparks Lake, Taltson Lake, Taltson River, and the Twin Gorges Forebay. Gagnon and Sparks lakes were added as reference water bodies. Fish were sampled with experimental gillnets and all captured fish were identified to species, counted, measured, and weighed. All fish were examined externally for deformities, erosions, lesions, and tumours. A sub-set of fish was sacrificed for ageing and mercury analysis. Non-fish variables were also sampled/collected, including physical limnology (transparency (Secchi depths), dissolved oxygen and

temperature), conductivity, total dissolved solids, turbidity, total nitrogen, total and dissolved phosphate, total and dissolved organic carbon, sediment mercury concentration, aquatic plants for mercury analysis, and benthic invertebrates. The 2004 program is the second full year of data collection for the Talton Hydro Project WEMP. No additional data collection is planned for the WEMP in 2005.

051**Biology****Van der Gugten, Neil**

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File No: 12 402 717**Licence No:** 13691**Region:** NS**Location:** Gahcho Kué watershed and nearby "Control Lake"**2004 HYDROLOGY AND WATER QUALITY SURVEYS IN THE GAHCHO KUÉ (KENNADY LAKE) AREA**

Local assistants from Lutsel K'e provided field support for technical specialists. Field studies expanded on work previously conducted between 1995 and 2003 including examining additional drainages in the Gahcho Kué area. The new data were added to the database for the site and evaluated for a baseline report that will be produced should the project enter the regulatory phase. Additional studies will be undertaken in 2005 to further expand the baseline information. No published reports have been generated to date.

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File No: 12 402 720**Licence No:** 13695**Region:** NS**Location:** Within a 20 km by 20 km square surrounding the Discovery Mine**BASELINE DATA COLLECTION, YELLOWKNIFE GOLD PROJECT, TYHEE DEVELOPMENT CORP.**

Baseline data was collected to support an anticipated application to the Mackenzie Valley Land and Water Board. The main components of the research were: assessment of air quality and climate (general air quality, particulate data, and noise measurements); installation of a weather station; examination of aquatic and groundwater resources (setting up of gauging stations and water elevation stations); preparation of bathymetric maps; collection of water quality data and aquatic sediments data; characterization of fish community and habitat in selected lakes; evaluation of fish mercury levels; collection of samples of benthic invertebrates; ground-truthing and refinement of land classifications from satellite imagery; and wildlife and wildlife habitat studies.

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File No: 12 402 720**Licence No:** 13696**Region:** NS**Location:** Within a 20 km by 20 km square surrounding the Salmita Mine**BASELINE DATA COLLECTION, COURAGEOUS LAKE GOLD PROJECT, SEABRIDGE GOLD INC.**

Seabridge Gold Inc. (Tyhee) retained EBA Engineering Consultants Ltd. (EBA) to undertake environmental baseline studies for the Courageous Lake Gold Project. The fieldwork completed encompassed surface water quality tests, fisheries and benthic sampling, wildlife studies and an archaeology evaluation. Upon completion

of the fieldwork, consultation meetings were held with the North Slave Métis Land and Resources Committee and the Dogrib Treaty 11 Council Land and Environment Committee, to discuss the fieldwork. The aboriginal communities have not raised any concerns to date. The technical reports, with detailed baseline data, are to be compiled into an Environmental Baseline Study Report, in January 2005, which will be made available to the aboriginal communities.

054

Biology

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Location: Lac de Gras

DIAVIK DIAMOND MINES INC. 2004 AQUATIC EFFECTS MONITORING PROGRAM

This is the fourth year of post-baseline aquatic effects monitoring and the third full year of monitoring (open-water and ice cover) since the Mackenzie Valley Land and Water Board approved the program in July 2001. Despite the very close (60m) proximity of Surveillance Network Program (SNP) Station 19 to the effluent diffuser, open-water and ice cover results remain below the Canadian Council of Ministers of the Environment (CCME) "Guidelines for the Protection of Aquatic Life". Ice cover concentrations at SNP Station 19 tend to be higher and more variable than open-water concentrations. This is likely a result of increased wind driven lake circulation in the open-water, resulting in better initial dilution or mixing. The results of the first step of the data analysis methods identified that there were changes in the concentrations of six parameters. Total arsenic and total nickel results were compared with original EA predictions (data analysis Step 3). Measured changes are within the levels predicted in the environmental assessment and are below levels that would cause environmental effects. The results for several of the parameters indicated a possible change when the actual reason for the positive results was a low baseline statistic.

There are also locations (LDG50) or parameters (nitrite at LDG46) where baseline data are not available and so the data analysis is not possible. Finally there are parameters where baseline detection limits have dominated the baseline statistic and could result in changes not being detected. It is therefore recommended that the Diavik Technical Committee, with Diavik Diamond Mines Inc. (DDMI), reset trigger values for the Step 1 analysis on a parameter-by-parameter basis. The objective will be to set trigger levels that are sufficient to detect change while reducing the number of false positive results. Open-water chlorophyll *a* concentrations at five of the seven mid-field and one of the three far field sites are the highest measured to date. The highest concentrations are at LDG45 and 42, which are closest to the effluent discharge. These results indicate at least a short-term increase in primary productivity and the gradient of increase indicates that the final effluent could be the source. Another year of open-water results will be needed to confirm these results. Eutrophication was predicted in the original Environmental Assessment (DDMI 1998) and additional mitigative measures (phosphorus treatment) are in place. Due to high variability in the zooplankton results, DDMI has contracted an independent review of the zooplankton sampling, analysis and data procedures. Results from the near-field monitoring location showed an increase in number of tax and density of benthic organisms. While too early to be conclusive, combined with the chlorophyll *a* results, there appears to be some effects of nutrient enrichment. A statistical analysis of all the Aquatic Effects Monitoring (AEM) benthic invertebrate data, as recommended in the 2003 AEM report, similarly identified possible nutrient enrichment in the near field. The statistical analysis was similarly inconclusive. The data analysis (Step 1) indicated changes at specific monitoring locations of eight sediment quality parameters. The Step 2 analysis determined that Diavik activities were not likely the cause of the indicated changes primarily because the concentration gradients were the reverse of what would be expected if Diavik was the source. A recommendation is made to evaluate using a 2 cm thick sediment sample instead of the current 5 cm thick

sample in order to address concerns raised by Diavik's Environmental Monitoring Advisory Board on the sensitivity of the sampling method.

055**Biology****Wytrychowski, Scott**

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File No: 12 402 682**Licence No:** 13721**Region:** NS**Location:** Lac de Gras**DAVIK DIAMOND MINES INC. BLASTING EFFECTS STUDY**

There is no evidence that lake trout egg survival is being decreased within the predicted blast zone due to blasting exposure. There is only evidence that South Dike had lower survival than the other sites and this likely resulted from differences in substrate type, since it was the only site whose substrate was composed of dike material. The current Department of Fisheries and Oceans Peak Particle Velocity (PPV) blasting guidelines, which were developed with limited information (Wright, personal communication), appear to provide ample protection. It remains unclear what level of PPV will increase mortality of developing lake trout eggs. No dead or injured fish were observed in the dike area. In fact, lake trout were captured and observed in close proximity to the dike, while monitoring spawning condition and collecting gametes. The only increases in mortality relative to the reference site, was at Tern Island early retrieval and South Dike final retrieval (100 % Escape Correction). At early retrieval, Tern Island averaged 3% lower survival than did Reference Island, but since both East Dike and South Dike had greater exposure to blasting (and higher survival), this lower survival at Tern Island must have arisen from factors other than blasting. At final retrieval, South Dike averaged 10% lower survival (100 % Escape Correction) than the reference site. South Dike did not have the highest single exposure and there was no relationship apparent to either mean estimated PPV or maximum blasting exposure across all four sites. The incubators at South Dike were placed in substrate composed of dike material rather than the natural spawning substrate that was present at the other sites, which may have accounted for the increased mortality. That survival at South Dike was not reduced at early retrieval (in fact, survival was higher than the reference site), when the eggs are most sensitive to mechanical disturbance, but only developed over the nine-month winter, also suggests poor incubation conditions. There was no increase in egg mortality that could be related to blasting exposure. There was no evidence of increased mortality due to blasting exposure after either three weeks or the entire incubation period.

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File No: 12 402 703**Licence No:** 13586**Region:** NS**Location:** Approximately 200 km north of Great Slave Lake (63°-65°N and 110°-115°W)**ANALYSIS OF BATHURST CARIBOU HERD DYNAMICS USING A PROXY INDICATOR**

Last year's field season was aimed at sampling the greatest number of sites for spruce stems in order to better understand the climate of the region. The first day of field work consisted of flying by helicopter to three sites (site 13: 65° 09.8 N, 115° 37.5 W; site 11: 64° 47.7 N, 115° 12.2 W; site 14: 65° 11.2 N, 114° 41.4 W). On August 12, 2004, the field team sampled black spruce stems at five sites (site 1: 64° 27.2 N, 112° 45.6 W; site 3: 64° 22.7 N, 113° 23.3 W; site 9: 64° 04.8 N, 112° 31.1 W; site 6: 63° 32.7 N, 112° 18.8 W; site 5: 63° 29.1 N, 112° 23.2 W). On the final sampling day (August 13, 2004), stems at two sites (site 7: 63° 21.9 N, 111° 46.2 W;

site 8: 63° 13.9 N, 110° 55.2 W) were collected. A few tree cores or cross-sections (discs) were taken at the base (near the ground) of black spruce trees (approximately 40 cores or cross-sections were taken per site). The purpose of this field season was to sample the greatest number of sites for the development of the tree-ring chronologies. Preliminary analyses have shown that the chronology of the residual demonstrated similar trends in the caribou abundance cycles as the scar frequency distribution. The major shifts in the caribou populations correspond to phase changes in the Arctic Oscillation.

CONTAMINANTS

057

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File No: 12 4402 503**Licence No:** 13704**Region:** IN,SS**Location:** Darnley Bay, Fish Lake, Great Slave Lake (east arm and west basin)

SPATIAL AND LONG TERM TRENDS IN PERSISTENT ORGANIC CONTAMINANTS AND METALS IN LAKE TROUT AND BURBOT IN GREAT SLAVE LAKE/TEMPORAL TRENDS AND SPATIAL VARIATION

In 2004, measurements of contaminant and mercury levels in lake trout and burbot from Great Slave Lake were continued. Contaminant levels were low with burbot liver having higher organic contaminant concentrations than lake trout fillet. Organic contaminant levels seem to be declining in lake trout but not in burbot. Newer analyses suggest that these declines may be related to the fact that lake trout have lower fat levels than in the early 1990s. Mercury levels were very low in burbot fillet. While levels were low in lake trout some large old fish were found to contain mercury levels that approached the 0.5 ppm commercial sale of fish guideline. There was no evidence that mercury levels in fish are changing. A community member from Fort Resolution spent a month at the National Water Research laboratory working with these data and preparing his own report.

058

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File No: 12 404 625**Licence No:** 13627**Region:** SS**Location:** Slave River delta near Fort Resolution

BIOAVAILABILITY AND TOXICITY OF HEAVY METALS IN THE SLAVE RIVER DELTA, NWT

This study examined the distribution and bioavailability of sediment-associated metals in three morphological zones of the Slave River delta. Total metal concentrations in porewater and sediment samples were analyzed and compared to sediment and water quality guidelines. Four-week bioaccumulation tests were conducted on cultured *Hyalella azteca* in a laboratory setting to determine metal bioavailability.

Metal concentrations in pore water and sediment were highly available across the delta. Arsenic levels were elevated with the sample mean (272.0 µg/g) and nickel (31.2 µg/g) in sediment exceeded the threshold effect level as defined by the “Canadian Interim Sediment Quality Guidelines” (CISQG). Comparison with studies of metal comparisons in sediment upstream of the delta and downstream in Great Slave Lake Show higher concentrations of metal in the Slave River delta, suggesting the delta sediments may be acting as a sink for the metals. Bioaccumulation of certain metals exceed the threshold for toxic affects for most samples (Cu, and Zn) and at some sites for Ni, as established by researchers at the National Water Research Institute, Environment Canada. This project has supported L. Hagreen’s M.Sc. thesis research.

ENGINEERING

059**Engineering****Callow, Lin**

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File No: 12 406 033**Licence No:** 13436**Region:** IN**Location:** Lucas Point to Parsons Lake Access Corridor**WINTER LOW GROUND PRESSURE VEHICLE TRIALS**

ConocoPhillips Canada (North) Limited (CPC) and its joint venture partner ExxonMobil Canada Properties (EMC) conducted a research program in the Parsons Lake Gas field area during late winter 2003/2004 that included a low ground pressure vehicle (LGPV) trial, a sump reclamation trial, and geotechnical and permafrost investigations. Snow, soil, vegetation, and wildlife monitoring was conducted as part of the trials.

The winter trial confirmed that CATCOs (50 to 60 ton capacity smooth-tired vehicles with very low ground pressure that can use overland routes with little or no surface preparation) can be used for winter hauling without surface preparation in the Mackenzie Delta. The trial also confirmed Alaskan monitoring results: one season of LGPV use did not change ground condition and caused little vegetation damage. Caribou remained in the area during the winter program; no behavioural response to the CATCOs was observed.

Geotechnical drilling in the Parsons Lake area found that ground ice was covered with a 1.5 m to 6m thick layer of soil. Gravel and rigid insulation were used to cover an old (1976) exploration sump to prevent runoff and ground water from contacting the sump contents, and to preserve a minimum of 0.5 m of frozen soil above the drilling waste throughout the year. Temperature monitoring equipment was installed through the sump and will continue to be monitored for at least three years to determine if the sump cap restoration technique used is successful.

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File No: 12 406 032**Licence No:** 13429**Region:** SA**Location:** Within the pipeline study corridor of the K'asho Got'ine District of the Sahtu Settlement Area**2004 WINTER FIELD GEOTECHNICAL INVESTIGATION PROGRAM - K'ASHO GOT'INE DISTRICT, SAHTU SETTLEMENT AREA**

The 2004 Winter Field Geotechnical Program in the Sahtu Settlement Area was conducted between January 19 and April 14, 2004. The objective of the program was to obtain information with respect to sub-surface conditions in the area within potential borrow sources, frost heave sites and river crossings. This information is required in order to assess the feasibility of a Mackenzie Valley Pipeline and for the preparation of subsequent regulatory applications. Information was collected from 20 proposed borrow sources, four frost heave sites, and two river crossing locations.

Implementation of the program commenced on January 29, 2004 with an office set up in Norman Wells. Site investigations commenced on February 12, 2004 and continued throughout the duration of the program until

its completion on April 14, 2004. The program was executed over 63 days during this period. A total of 90 boreholes were drilled at 20 proposed borrow sources, ten boreholes at four frost heave sites, and ten boreholes at two river crossings.

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File No: 12 406 032**Licence No:** 13533**Region:** SA**Location:** Within the pipeline study corridor of the Gwich'in Settlement Area**2004 WINTER FIELD GEOTECHNICAL INVESTIGATION PROGRAM IN THE GWICH'IN SETTLEMENT AREA**

The 2004 Winter Field Geotechnical Investigation Program in the Gwich'in Settlement Area was conducted between January 21 and April 15, 2004. The objective of the program was to obtain information with respect to sub-surface conditions in the GSA within potential borrow sources, overland borehole sites and at the Thunder River Crossing. This information is required in order to assess the feasibility of a Mackenzie Valley Pipeline and for the preparation of subsequent regulatory applications. Information was collected from 14 proposed borrow sources, four overland borehole sites and from the Thunder River Crossing.

Implementation of the program commenced on January 21, 2004 with construction of a staging area at Campbell Creek adjacent to the Dempster Highway. Access construction commenced south along the CNT trail on January 22, 2004. On February 5, 2004 the sleigh camp was hauled from the staging area at Campbell Creek to Kp 28.5 and was occupied from February 13 to April 5, 2004. Site investigations commenced on February 11, 2004 and were completed on April 4, 2004. The program was executed over 72 days during this time period. A total of 65 boreholes were drilled at 14 proposed borrow sources. A total of four boreholes were drilled at four overland borehole sites, and a total of six boreholes were drilled at the Thunder River Crossing.

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File No: 12 406 032**Licence No:** 13578**Region:** SA**Location:** All major watercourse crossings located on the proposed pipeline right-of-way in the Deh Cho region**2004 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM - DEH CHO REGION**

The 2004 Spring Break-up Reconnaissance Program was helicopter-based and planned for the early spring. All work was limited to selected watercourse crossings along a proposed pipeline corridor. It was a single-purpose program, conducted on a timetable to meet seasonal requirements and operated under its own independent Scientific Research Licence.

This program was planned in two parts: a pre-break-up phase and a break-up phase. The objectives were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed crossing points. The purpose of the program was to acquire information necessary for the engineering design and operation of the proposed pipeline at each of the crossing points and as input to the project cost estimate.

The start of the program was delayed. The first phase was cancelled as the winter conditions were missed in the Sahtu Settlement Area (SSA) and the Deh Cho Region (DCR). The second phase was completed in the SSA, DCR and in part of the Inuvialuit Settlement Region (ISR) according to the original plan. It was not possible to operate in the Gwich'in Settlement Area (GSA) due to difficulties with the contract for the Community Monitors. By the time the reconnaissance crews arrived in the DCR and SSA, only ice remnants were observed as spring break-up was essentially complete. Spring flow conditions were observed. Reconnaissance was not conducted in the GSA and frozen winter conditions were observed in the ISR. As the complete break-up cycle was not observed at all selected watercourse crossings, this program will need to be conducted in a subsequent year(s).

There was no known interaction with any wildlife, during the ground portion of this program.

Helicopters were contracted with Imperial Oil-designated companies, based on Access and Benefits considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The operating plan was developed to assign a helicopter company and community monitors to each program and to each community area within the respective regions.

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File No: 12 406 032

Licence No: 13588

Region: SA

Location: All major watercourse crossings located on the proposed pipeline right-of-way in the Inuvialuit Settlement Region

2004 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM – INUVIALUIT SETTLEMENT REGION

The 2004 Spring Break-up Reconnaissance Program was helicopter-based and planned for the early spring. All work was limited to selected watercourse crossings along a proposed pipeline corridor. It was a single-purpose program, conducted on a timetable to meet seasonal requirements and operated under its own independent Scientific Research Licence.

This program was planned in two parts: a pre-break-up phase and a break-up phase. The objectives were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed crossing points. The purpose of the program was to acquire information necessary for the engineering design and operation of the proposed pipeline at each of the crossing points and as input to the project cost estimate.

The start of the program was delayed. The first phase was cancelled as the winter conditions were missed in the Sahtu Settlement Area (SSA) and the Deh Cho Region (DCR). The second phase was completed in the SSA, DCR and in part of the Inuvialuit Settlement Region (ISR) according to the original plan. It was not possible to operate in the Gwich'in Settlement Area (GSA) due to difficulties with the contract for the Community Monitors. By the time the reconnaissance crews arrived in the DCR and SSA, only ice remnants were observed as spring break-up was essentially complete. Spring flow conditions were observed. Reconnaissance was not conducted in the GSA and frozen winter conditions were observed in the ISR. As the complete break-up cycle was not observed at all selected watercourse crossings, this program will need to be conducted in a subsequent year(s).

There was no known interaction with any wildlife, during the ground portion of this program.

Helicopters were contracted with Imperial Oil-designated companies, based on Access and Benefits

considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The operating plan was developed to assign a helicopter company and community monitors to each program and to each community area within the respective regions.

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Region: GW

Location: All major watercourse crossings located on the proposed pipeline right-of-way in the Gwich'in Settlement Area

2004 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM – GWICH’IN SETTLEMENT AREA

The 2004 Spring Break-up Reconnaissance Program was helicopter-based and planned for the early spring. All work was limited to selected watercourse crossings along a proposed pipeline corridor. It was a single-purpose program, conducted on a timetable to meet seasonal requirements and operated under its own independent Scientific Research Licence.

This program was planned in two parts: a pre-break-up phase and a break-up phase. The objectives were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed crossing points. The purpose of the program was to acquire information necessary for the engineering design and operation of the proposed pipeline at each of the crossing points and as input to the project cost estimate.

The start of the program was delayed. The first phase was cancelled as the winter conditions were missed in the Sahtu Settlement Area (SSA) and the Deh Cho Region (DCR). The second phase was completed in the SSA, DCR and in part of the Inuvialuit Settlement Region (ISR) according to the original plan. It was not possible to operate in the Gwich'in Settlement Area (GSA) due to difficulties with the contract for the Community Monitors. By the time the reconnaissance crews arrived in the DCR and SSA, only ice remnants were observed as spring break-up was essentially complete. Spring flow conditions were observed. Reconnaissance was not conducted in the GSA and frozen winter conditions were observed in the ISR. As the complete break-up cycle was not observed at all selected watercourse crossings, this program will need to be conducted in a subsequent year(s).

There was no known interaction with any wildlife, during the ground portion of this program.

Helicopters were contracted with Imperial Oil-designated companies, based on Access and Benefits considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The operating plan was developed to assign a helicopter company and community monitors to each program and to each community area within the respective regions.

The total expenditures amounted to approximately \$84 000.00. This amount includes four days of helicopter time and associated fuel, four days of community monitor time and expenses, transportation of crews to the field and crew accommodation. The amount excludes the wages of ColtKBR personnel and incidental expenses. The distribution of allocated costs is approximately 39 % in the Deh Cho Region, 40 % in the Sahtu Settlement Area and 21 % in the Inuvialuit Settlement Region.

065 **Engineering****Graburn, Larry**

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File No: 12 406 032**Licence No:** 13592**Region:** SA**Location:** All major watercourse crossings located on the proposed pipeline right-of-way in the Sahtu Settlement Area**2004 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM – SAHTU SETTLEMENT AREA**

The 2004 Spring Break-up Reconnaissance Program was helicopter-based and planned for the early spring. All work was limited to selected watercourse crossings along a proposed pipeline corridor. It was a single-purpose program, conducted on a timetable to meet seasonal requirements and operated under its own independent Scientific Research Licence.

This program was planned in two parts: a pre-break-up phase and a break-up phase. The objectives were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed crossing points. The purpose of the program was to acquire information necessary for the engineering design and operation of the proposed pipeline at each of the crossing points and as input to the project cost estimate.

The start of the program was delayed. The first phase was cancelled as the winter conditions were missed in the Sahtu Settlement Area (SSA) and the Deh Cho Region (DCR). The second phase was completed in the SSA, DCR and in part of the Inuvialuit Settlement Region (ISR) according to the original plan. It was not possible to operate in the Gwich'in Settlement Area (GSA) due to difficulties with the contract for the Community Monitors. By the time the reconnaissance crews arrived in the DCR and SSA, only ice remnants were observed as spring break-up was essentially complete. Spring flow conditions were observed. Reconnaissance was not conducted in the GSA and frozen winter conditions were observed in the ISR. As the complete break-up cycle was not observed at all selected watercourse crossings, this program will need to be conducted in a subsequent year(s).

There was no known interaction with any wildlife, during the ground portion of this program.

Helicopters were contracted with Imperial Oil-designated companies, based on Access and Benefits considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The operating plan was developed to assign a helicopter company and community monitors to each program and to each community area within the respective regions.

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File No: 12 406 032**Licence No:** 13609**Region:** GW**Location:** Along the proposed pipeline right-of-way and facility, infrastructure, construction support, granular, and trenching trial sites in the Gwich'in Settlement Area**2004 SUMMER RECONNAISSANCE PROGRAM IN THE GWICH'IN SETTLEMENT AREA**

The 2004 Summer Reconnaissance Program was a helicopter-based multi-component survey in the Mackenzie Valley. The objective of the program was to gather geographic, engineering and operational information to support the planning, permitting, and cost estimating for a potential pipeline in the Mackenzie

Valley and Mackenzie Delta. The program took 47 days to complete between July 18 and September 15, 2004.

Ten technical programs were conducted. The scope of work of these programs included investigating the primary and alternative sites of proposed facilities, establishing the bathymetry of lakes for potential water usage, investigating possible borrow sources, determining access routes, identifying critical construction slopes, mapping the terrain types along the proposed pipeline right-of-way and conducting additional aerial mapping and laser-based surface profiling along the proposed pipeline corridor. Data was collected by conducting direct observations, hand-held and aerial photography, LiDAR system, ground surveys and shovel tests and hand coring of the soils. For the ground based work, there was no known interaction with any wildlife.

067**Engineering**

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File No: 12 406 032

Region: GW

Licence No: 13633

Location: Along the proposed pipeline right-of-way in the Tulita District of the Sahtu Settlement Area

2004 SUMMER RECONNAISSANCE PROGRAM IN THE SAHTU SETTLEMENT AREA

The 2004 Summer Reconnaissance Program was a helicopter-based multi-component survey in the Mackenzie Valley. The objective of the program was to gather geographic, engineering and operational information to support the planning, permitting, and cost estimating for a potential pipeline in the Mackenzie Valley and Mackenzie Delta. The program took 36 days to complete between July 11 and September 13, 2004.

Nine technical programs were conducted. The scope of work of these programs included investigating the primary and alternative sites of proposed facilities, establishing the bathymetry of lakes for potential water usage, investigating possible borrow sources, determining access routes, identifying critical construction slopes, mapping the terrain types along the proposed pipeline right-of-way and conducting additional aerial mapping and laser-based surface profiling along the proposed pipeline corridor. Data was collected by conducting direct observations, hand-held and aerial photography, LiDAR system, ground surveys and shovel tests and hand coring of the soils. For the ground based work, there was no known interaction with any wildlife.

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File No: 12 406 032

Region: IN

Licence No: 13634

Location: Along the pipeline right-of-way and access routes and at proposed facility, infrastructure, construction support, and granular sites in the Inuvialuit Settlement Region

2004 SUMMER RECONNAISSANCE PROGRAM IN THE INUVIALUIT SETTLEMENT REGION

The 2004 Summer Reconnaissance Program was a helicopter-based multi-component survey in the Mackenzie Valley. The objective of the program was to gather geographic, engineering and operational information to support the planning, permitting, and cost estimating for a potential pipeline in the Mackenzie

Valley and Mackenzie Delta. The program took 45 days to complete between July 12 and September 16, 2004.

Eight technical programs were conducted. The scope of work of these programs included investigating the primary and alternative sites of proposed facilities, establishing the bathymetry of lakes for potential water usage, investigating possible borrow sources, determining access routes, identifying critical construction slopes, mapping the terrain types along the proposed pipeline right-of-way and conducting additional aerial mapping and laser-based surface profiling along the proposed pipeline corridor. Data was collected by conducting direct observations, hand-held and aerial photography, LiDAR system, ground surveys and shovel tests and hand coring of the soils. For the ground based work, there was no known interaction with any wildlife.

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File No: 12 406 032**Licence No:** 13664**Region:** DC**Location:** Along the proposed pipeline right-of-way in the Deh Cho Region**2004 SUMMER RECONNAISSANCE PROGRAM IN THE DEH CHO REGION**

The 2004 Summer Reconnaissance Program was a helicopter-based multi-component survey in the Mackenzie Valley. The objective of the program was to gather geographic, engineering and operational information to support the planning, permitting, and cost estimating for a potential pipeline in the Mackenzie Valley and Mackenzie Delta. The program took 61 days to complete between July 9 and September 29, 2004.

Nine technical programs were conducted. The scope of work of these programs included investigating the primary and alternative sites of proposed facilities, establishing the bathymetry of lakes for potential water usage, investigating possible borrow sources, determining access routes, identifying critical construction slopes, mapping the terrain types along the proposed pipeline right-of-way and conducting additional aerial mapping and laser-based surface profiling along the proposed pipeline corridor. Data was collected by conducting direct observations, hand-held and aerial photography, LiDAR system, ground surveys and shovel tests and hand coring of the soils. For the ground based work, there was no known interaction with any wildlife.

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File No: 12 406 032**Licence No:** 13664**Region:** DC**Location:** Along the proposed pipeline right-of-way in the K'asho Gotine District of the Sahtu Settlement Area**2004 SUMMER RECONNAISSANCE PROGRAM IN THE SAHTU SETTLEMENT AREA**

The 2004 Summer Reconnaissance Program was a helicopter-based multi-component survey in the Mackenzie Valley. The objective of the program was to gather geographic, engineering and operational information to support the planning, permitting, and cost estimating for a potential pipeline in the Mackenzie Valley and Mackenzie Delta. The program took 49 days to complete between August 2 and August 31, 2004.

Eleven technical programs were conducted. The scope of work of these programs included investigating the

primary and alternative sites of proposed facilities, establishing the bathymetry of lakes for potential water usage, investigating possible borrow sources, determining access routes, identifying critical construction slopes, mapping the terrain types along the proposed pipeline right-of-way and conducting additional aerial mapping and laser-based surface profiling along the proposed pipeline corridor. Data was collected by conducting direct observations, hand-held and aerial photography, LiDAR system, ground surveys and shovel tests and hand coring of the soils. For the ground based work, there was no known interaction with any wildlife.

071 **Engineering**

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Region: IN

Licence No: 13703

Location: Shell, Imperial Oil, Conoco Phillips and orphan sump sites in the Inuvialuit Settlement Region

ENVIRONMENTAL STUDIES RESEARCH FUNDS REGIONAL SUMP STUDY PROJECT

In 2004, a collaborative effort to assess environmental conditions at abandoned drilling mud sums in the Inuvialuit Settlement Region (ISR) was initiated amongst government, the Inuvialuit, and industry. The objectives of the study were to conduct an inventory of all known sump locations in the ISR; to develop a protocol based on site assessment and risk ranking process; and to conduct site assessments at a limited number of orphan sites, as well as company specific sites.

Work was conducted in the summer. The sump inventory revealed the following information: there are a total of 310 wells drilled in the ISR; the presence of 210 wells onshore and 94 wells offshore; and, the absence of orphan wells. Using the protocol, environmental information was collected from a total of 101 abandoned sump sites. Ten sites were assessed by the Environmental Studies Research Fund (ESRF), 46 sites by Imperial Oil, 21 sites by ConocoPhillips, 2 sites by ChevronTexaco, and 22 sites by Shell. Preliminary results include: over half of the sums assessed exhibit subsidence of the sump cover; elevated electromagnetic (EM) levels were observed at a majority of the sump sites, indicative of elevated salt concentrations (although this was generally restricted to the immediate sump area); and approximately 20 % of the sites had ponded water with elevated salt concentrations. Future work is planned in 2005 by some industry groups to use the ESRF Protocol for the assessment of their remaining sump sites in the ISR. The data collected through these various initiatives is being compiled in a Department of Indian Affairs and Northern Development (DIAND) database and this information will be analyzed to investigate factors which have led to the range of contemporary site conditions described by the surveys.

072 **Engineering**

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File No: 12 402 709

Region: DC

Licence No: 13725

Location: Cameron Hills Significant Discovery Area

POST-CONSTRUCTION REVEGETATION AND PERMAFROST MONITORING WITHIN PARAMOUNT'S CAMERON HILLS PROJECT AREA

Revegetation, permafrost and access monitoring has occurred annually since 2002, along Paramount Resources Ltd.'s Cameron Hills Gathering System and Transborder Pipeline in the NWT. This monitoring program was designed to comply with measures and conditions required by the Mackenzie Valley

Environmental Impact Review Board and the National Energy Board. Permanent transects and plots along the pipeline right-of-way (ROW) were used to compare vegetation on reseeded slopes to slopes revegetated through natural encroachment, and to document physical changes in discontinuous permafrost areas. The following main conclusions resulted from the study: natural revegetation is occurring, but seems slow to establish, likely due to the short growing season; heavy slash roll-back is inhibiting both natural and seeded revegetation in some areas; no significant permafrost degradation was noted (e.g., slumping, subsidence or pooled water); trench subsidence does not appear to be increasing; and, third party access appears to be minimal, and restricted to winter road use. Main recommendations include: re-route ATV traffic off ROW areas where regeneration is required for erosion control; maintain planking over wetland areas traversed by ATV; monitor seeded areas to determine requirement for reseeding and/or fertilizer application; and, conduct future monitoring earlier in the season (end of August).

073**Engineering****Millman, Pete**

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File No: 12 406 031**Licence No:** 13672**Region:** IN**Location:** Aerially between Tuktoyaktuk and Parsons Lake**PIPELINE ROUTE AERIAL PHOTOGRAPHY PROFILING (LiDAR)**

During the summer of 2004 a LiDAR survey was conducted on behalf of Devon Canada Corporation along a potential pipeline corridor between Parsons Lake and Devon's M-18 gas discovery. The M-18 gas discovery is located approximately 15 km south-east of Tuktoyaktuk. Collecting this data is a first step in selecting the most environmentally sensitive pipeline route. The 2004 project was for data collection and was a project of opportunity. Equipment and contractors were available in the Inuvialuit Settlement Region. In subsequent years and contingent upon the progress of the Mackenzie Gas Project, Devon will allocate funding for the processing and interpretation of the raw LiDAR data.

074**Engineering****Povey, Andrew**

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File No: 12 402 670**Licence No:** 13637**Region:** IN**Location:** Existing infrastructure locations, including decommissioned well-heads, cased boreholes, permanent survey benchmarks, and gravel pads in the Inuvialuit Settlement Region**2004 VERTICAL CONTROL SURVEY IN THE INUVIALUIT SETTLEMENT REGION**

In early August 2004 MPEG conducted accurate positioning at a number of locations in the Mackenzie Delta with GPS and traditional survey methods. This allowed for the establishment of a common survey control network spanning the outer delta that is robust, reliable and accurate, especially for heights or elevations. The Mackenzie Gas Project will take advantage of this network in the future when accurate positioning is needed on sites or features of interest. In 2004 it supported bathymetry work, marine environmental work, and water level measurements, plus geotechnical work and engineering design. The datum for all positioning was Canadian Geodetic Vertical Datum of 1928 (CGVD28), equal to Mean Sea Level (MSL), for vertical, and North American Datum of 1983 (NAD83) for horizontal. Measurements were made to obtain accurate elevations on: five wellsites in the Taglu area; two deep (permanent) benchmarks; a Geological Survey of Canada (GSC) borehole; six existing Water Survey of Canada (WSC) stations in the Mackenzie Delta;

previously used temporary water level monitoring sites in the Niglintgak area (three sites), the Middle Channel above and below Camp Farewell (one site each), the East Channel at Lousy Pt (one site), the west side of Shallow Bay (one site), and on an island in the south-west part of Kittigazuit Bay (one site); Canadian Hydrographic Service (CHS) control points at harbours (on docks) in Tuktoyaktuk and Inuvik; and, a small number of other locations, primarily existing control points or benchmarks maintained by the Geodetic Survey Division (GSD) of Natural Resources Canada. Wooden stakes and markers were used for positioning at four temporary control points set up for real-time GPS positioning during bathymetry work, which were removed at the end of the field period. Work undertaken at existing control points or benchmarks conformed to current industry practice, as did all other work, and no survey impact was evident at any location.

075 **Engineering**

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File No: 12 402 670

Region: IN

Licence No: 13638

Location: Along the pipeline study corridor, including locations for potential infrastructure sites, roads, borrow pits, and alternate routes within the Inuvialuit Settlement Region

2004 ROUTE AND SITE SELECTION IN THE INUVIALUIT SETTLEMENT REGION

Fieldwork cancelled.

076 **Engineering**

Povey, Andrew

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File No: 12 402 670

Region: GW

Licence No: 13648

Location: Along the pipeline study corridor, including locations for potential infrastructure sites, roads, borrow pits, and alternate routes within the Gwich'in Settlement Area

2004 ROUTE AND SITE SELECTION IN THE GWICH'IN SETTLEMENT AREA

Fieldwork cancelled.

077 **Engineering**

Povey, Andrew

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File No: 12 402 670

Region: SA

Licence No: 13649

Location: Along the pipeline study corridor, including locations for potential infrastructure sites, roads, borrow pits, and alternate routes within the Sahtu Settlement Area

2004 ROUTE AND SITE SELECTION IN THE SAHTU SETTLEMENT AREA

Fieldwork cancelled.

078**Engineering****Povey, Andrew**

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File No: 12 402 670**Region:** DC**Licence No:** 13676

Location: Along the pipeline study corridor, including locations for potential infrastructure sites, roads, borrow pits, and alternate routes within the Deh Cho Region

2004 ROUTE AND SITE SELECTION IN THE DEH CHO REGION

Fieldwork cancelled.

079**Engineering****Pyc, Cynthia**

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File No: 12 406 034**Region:** IN**Licence No:** 13603

Location: Four potential sump sites near Tuktoyatuk 3D seismic and Ellice I-48 drilling areas

CHEVRONTEXACO 2005 DRILLING OPERATIONS - PROJECT DESCRIPTION DATA COLLECTION

Soil samples were taken from potential sump sites under consideration for the 2004/2005 drilling programs. These sites were evaluated for active layer depth, soil type, salinity levels, permeability, and moisture content to help identify a suitable sump site. These samples were also used to compare the drilling wastes to be contained within the sup to background levels as a baseline for future monitoring as required by the project Water Licence. These samples were taken in the Tuktuk and Ellice areas, and results confirmed by a qualified third party prior to sump construction that the soil conditions and chemistry of the chosen sites were suitable for a sump site.

080**Engineering****Pyc, Cynthia**

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File No: 12 406 034**Region:** IN**Licence No:** 13699

Location: Reindeer Channel, Ellice Island area, and Ya Ya Lake

CHEVRONTEXACO 2004/2005 SEISMIC OPERATIONS - PROJECT DESCRIPTION DATA COLLECTION

Chevron completed lake and river bathymetry to determine water depth information along Reindeer Channel, the Ellice Island area, and Ya Ya Lake area in support of the proposed seismic and drilling programs. Understanding the water depth within these areas was a key requirement for determining suitable barge landing sites, barge access areas, ice road construction routes, and appropriate sources for water withdrawal in support of the operations. The bathymetry information was utilized to identify an acceptable barging route and landing site. Lake bathymetry was completed on Pullen Lake, Mid Lake, unnamed Lake "A", Wolf Lake, Ya Ya Lake, and Seal Lake. These water bodies were assessed for surface area, maximum depth (m), total lake volume (m), lake volume under 2 m of ice, and percentage of total lake volume under 2 m of ice, and submitted to the Department of Fisheries and Oceans (DFO) and Indian and Northern Affairs Canada

(INAC) to determine appropriate sources for water withdrawal.

081 **Engineering**

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File No: 12 406 034

Licence No: 13700

Region: IN

Location: West Ellice Island

CHEVRONTEXACO DRILLING OPERATIONS - PROJECT DESCRIPTION DATA COLLECTION

In support of the project description submitted, soil samples were taken from potential sump sites under consideration for the 2004/2005 drilling programs. These sites were evaluated for active layer depth, soil type, salinity levels, permeability, and moisture content to help identify a suitable sump sites. These samples were also used to compare the drilling wastes to be contained within the sump to background levels as a baseline for future drilling wastes to be contained within the sump to background levels as a baseline for future monitoring as required by the project Water Licence. These samples were taken in the Ellice/Olivier Island areas, and results confirmed by a qualified third party prior to sump construction that the soil conditions and chemistry of the chosen sites were suitable for a sump site.

082 **Engineering**

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File No: 12 402 726

Licence No: 13730

Region: DC

Location: Pointed Mountain Plant site, north-west of Fort Liard

PHASE 2 ENVIRONMENTAL SITE ASSESSMENT AT POINTED MOUNTAIN GAS PLANT AND ASSOCIATED FACILITIES

Alpine Environmental, through Nehendeh Land and Environmental Services LP conducted field work in August and September of 2004 on various locations within the Pointed Mountain Gas Field north-west of Fort Liard. The field work carried out included surface and groundwater monitoring and sampling, as well as subsurface soil investigations on two wellsites. The work conducted in 2004 is part of an on-going surface water, ground water and soils investigations in the field associated with the decommissioning of the gas field. The sites that were monitored and sampled for ground water included A1, A2, A3, A4, the Plant site and the air strip. Surface water samples were collected from Fisherman Lake, unnamed creeks located near the A-2 wellsite and airstrip, the A-2 spring and an unnamed creek at Fisherman Lake. The surface water and ground water results are consistent with results from previous years. Soil sampling was conducted with a drill rig on the B-1 and B-2 well-sites. Subsurface hydrocarbon impacts were noted on the B-1 site. On B-2, buried beneath an approximately 2.5 m clay cover a sump was discovered. The sump is delineated vertically and laterally and appears to be contained within stable ground. Groundwater monitoring wells were not installed on the B-1 or B-2 wellsites.

FOSSILS

083**Fossils****Eberle, Jaelyn**

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File No: 12 412 048**Licence No:** 13652**Region:** IN**Location:** Within the boundaries of Aulavik National Park, northern Banks Island**SEARCH FOR EOCENE VERTEBRATE FOSSILS ON BANKS ISLAND, NWT**

In an effort to find Eocene-aged fossil vertebrates in Eureka Sound Group (ESG) strata on northern Banks Island this summer, the researchers made some intriguing field discoveries. While most of the ESG strata were traditionally interpreted as primarily non-marine, more recent discoveries suggest that on northern Banks Island there are considerable shallow marine strata. The team found some 10 000 shark teeth belonging to several kinds of shark, as well as rarer fossils of a tropical ray, ratfish, and bony fishes. The fossil-bearing sandstones also contained locally abundant burrows (probably belonging to shrimp) coined *Ophiomorpha*, which indicate shallow-water, near shore marine and inter-tidal environments. Importantly, the first fossils of Tertiary-aged land vertebrates from Banks Island, including two kinds of turtle and a mammal, were discovered in the same beds as the shark teeth, probably washed in by rivers. The pond turtle implies an early Eocene age. Fossils of turtles and a tropical ray indicate that Banks Island was considerably milder and warmer than today. Abundant tree stumps in some strata implies that extensive forests grew on northern Banks, a far cry from today's treeless tundra. Study of the fish fauna should refine the age of the Banks Island ESG strata, and give valuable insight into the ancient coastal marine environment that covered much of this region millions of years ago.

084**Fossils****MacPhee, Ross**

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File No: 12 412 049**Licence No:** 13623**Region:** IN**Location:** The coast around Peddie Point, Melville Island and the western half of Banks Island**AT THE LIMIT: WOOLLY MAMMOTH AND OTHER PLEISTOCENE MEGAFAUNA OF THE CANADIAN ARCTIC ARCHIPELAGO**

In order to properly evaluate the refugium and late survival hypotheses, there was a need to acquire and date a much larger number of fossils than previous investigators were able to do. Depending on results, it would potentially be possible to determine whether megafaunal mammals survived on these islands not only through the last glacial maximum but up to and perhaps even past the continental die-off around 10 000 years ago. The research team spent mid-July to mid-August 2004 in the field. Because of weather and other constraints, the activities were limited to Banks Island; however, the team was able to visit three major collecting areas (Mary Sachs Creek, Bernard River, and Raddi Lake) for periods of roughly one week each, and collected 163 fossil samples. In addition to submitting a selection of these for radiocarbon dating, others will be utilized for ancient DNA investigations. The most interesting find was an example of a species of Pleistocene musk-ox, (*Ovibos pallantis*), which was previously unknown from the New World. The significance of this find is that this is yet another example of an Asian mammal crossing the "Beringean Highway" into North America when the Bering Land Bridge was in existence. No other completely extinct species were recovered on this trip, although the researchers collected ancient remains of several mammals that are still extant, including polar

bear (*Ursus maritimus*), Arctic fox (*Alopex lagopus*), caribou (*Rangifer tarandus*), and ringed seal (*Phoca hispida*). The researchers now have a much better idea of places where they should look in future. All of the best and most interesting fossils were found on point bars where the fossils had been deposited during the spring run-off. Especially good places are the smaller streams that feed the island's numerous lakes, which have not been previously exploited. Six fossils were submitted for radiocarbon dating. At present, there are only a half dozen dates for Quaternary fossils from Banks Island. The oldest musk-ox date from the island is currently 34 000 years before present (for a musk-ox specimen from Thesiger Bay). The trouble with this date is that it is not "finite": researchers cannot say how old the specimen is, other than that it is older than 34 000 years. One of the specimens, from Duck Hawk Bluff, provides the next oldest date, which is finite: $10\ 070 \pm 40$ years before present. This is extremely interesting because it means that musk oxen were present for certain on Banks Island at a time when the Innuitan ice cap covered most of the rest of the archipelago. Other dates were of course much younger (all within the last 3 000 years), but they do establish continuous musk-ox presence on Banks up to the present.

GEOLOGY

085**Geology****Buse, Sarah**

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File No: 12 404 624**Licence No:** 13615**Region:** NS**Location:** Wecho River Area, approximately 100 km NNW of Yellowknife**GRANITES OF THE WECO RIVER AREA: A GEOCHEMICAL AND PETROLOGIC PERSPECTIVE**

Field mapping in 2004 helped to define new granitoid and mafic volcanic suites in the southern portion of the map sheet allowed for further constraints on the granitoid field relations throughout the map area. Further sampling of the granitoids and mafic volcanics for geochemical and geochronological analysis was also undertaken in order to have a better sample suite representing the entirety of the map sheet. This allowed for more data, which aids in the understanding of the crust and mantle beneath the Wecho River area and the south-western Slave Province.

086**Geology****Duk-Rodkin, Alejandra**

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File No: 12 404 606**Licence No:** 13666**Region:** SA, DC**Location:** Blackwater Lake, Wrigley Lake, and Dahadini River mapping areas**SURFICIAL GEOLOGY OF THE MACKENZIE CORRIDOR**

The geologic activities below are part of two main GSC programs: the Northern Energy Development (EDA) and the Northern Research Development (NRD) Mackenzie Corridor project. Main geologic research activities during the past summer included surficial geology mapping of NTS numbers 95 B, C and F. Field checking of the three areas included stratigraphy, landslides identification and aggregate. Creation of a database was done for 96 C. Preparation of two digital maps at 1:250 000 has been accomplished: a surficial geology map of Fort Norman (96 C) was published as hard copy and included in a CD-ROM; a map of landslides was published as hard copy with accompanying CD-ROM including the database; and a map of aggregate was published as hard copy. 96 B is being produced and will be published by March 2006 at a 1:250 000 scale.

087**Geology****England, John**

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File No: 12 404 141**Licence No:** 13658**Region:** IN**Location:** Blackwater Melville Island (Liddon Gulf, Cape Russell, Comfort Cove, Purchase Bay, Ibett Bay and Marie Bay) and Prince Patrick Island (Satellite Bay, Green Bay)**ENVIRONMENTAL AND SEA LEVEL CHANGE IN THE NORTH-WESTERN ARCTIC ARCHIPELAGO**

During 2004, three field parties were located in the Western Arctic islands investigating the nature of past

glaciations and sea level changes. The first camp was along Liddon Gulf, Melville Island. This group mapped the former extent of glaciers from a local ice cap centered on western Melville Island. This ice cap expanded outward to meet the larger Laurentide Ice Sheet from mainline Canada that advanced westward through McClure Strait. Fossil shells were collected from shorelines above modern sea level that lived when the local ice cap separated from the Laurentide Ice Sheet (11 500 years ago). Similar studies were conducted at two other camps: one nearby on western Melville Island and another located west on Prince Patrick Island. Throughout the Western Arctic, the land first came out of the sea after deglaciation but more recently has begun to sink (submerge) affecting the shores of many communities. These studies will be continued in 2005 to improve understanding of the past.

088**Geology****Falck, Hendrik**

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File No: 12 404 593**Licence No:** 13659**Region:** SA, DC

Location: South-western part of Sahtu Settlement Area and north-western Deh Cho
Region

NAHANNI MINERAL AND ENERGY RESOURCE ASSESSMENT (MERA) 2

A proposal has been drawn up to expand the existing Nahanni National Park Reserve. Federal government policy requires that a Mineral and Energy Resource Assessment (MERA) study be carried out. This past summer, three components of the study were started. In one part of the study, a team of field workers used a helicopter to collect samples of stream and river sands and mud. Over 570 samples were collected from the eastern part of the Nahanni area. In each case a spot was found every 13km² where they would wade into the creek and they would take a couple of shovelfuls of stream sediments. The sediments have been eroded from the valley walls. If there are metals in the valley they would show up as some of the sand and silt grains. The chemistry of the sample when it has been analyzed can give a summary of the rocks in the valley.

For the second part a geologist collected water spring samples from 29 sites to help understand the geology. Ground water moves through the rocks on its way to the surface and reacts with minerals contained in the rocks to give the water a unique trace chemical composition. This composition carries clues as to what minerals the water dissolved along its path.

The third part of the study consisted of an airborne geophysical survey. Three small portions of the greater Nahanni ecosystem were selected to be surveyed: Prairie Creek area, Caribou River Area and the Cantung deposit area. The whole greater Nahanni ecosystem was not surveyed because it would have been too expensive. One of three airborne geophysics surveys, the Prairie Creek area, was completed this past summer in order to map the geology of the area. Rocks hosting metal deposits often have minerals that can be recognized because they are magnetic, can conduct electricity, or are radioactive. By flying a geophysical instrument over the ground, these properties can be measured and shown in a map.

Next summer the other two surveys will be flown. The first area, near the Cantung deposit, would help to show if there are other tungsten deposits. The same region also hosts the Howard's Pass deposit, a large deposit of lead and zinc as well as emeralds at Lened. The second survey would be near the Caribou River where there are placer gold-mercury deposits, and there may be more gold or emeralds. The results of these studies will be published in by the Geological Survey of Canada as an Open File scheduled for completion by March 2006.

089 **Geology****Grasby, Stephen**

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File No: 12 404 634**Region:** NS**Licence No:** 13724**Location:** Northern shore of Great Slave Lake near Windy Point**SEARCH FOR SPRINGS REPORTED BY McCONNELL IN 1890**

Fieldwork cancelled.

090 **Geology****Hayes, Sharon**

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File No: 12 404 628**Region:** DC**Licence No:** 13656**Location:** North Karst, in the south-eastern portion of the Mackenzie Mountains, north of Nahanni National Park Reserve**DETERMINING SENSITIVE AREAS AND APPROPRIATE MANAGEMENT PRACTICES FOR THE NORTH KARST**

Karst features were documented utilizing both aerial and ground surveys. Handheld GPS and photos were used in these surveys. Four days were spent on the ground exploring from Bubbling Springs to the South Col. Terrain type and vegetation was documented as well as significant karst features. Numerous caves were explored, three of which were surveyed. All of these caves have been previously documented in earlier research efforts, albeit with little detail. Five days were spent in the Death Lake area. Many previously explored karst features were located and documented as well as some new areas. Three large caves and numerous small caves were discovered and documented within this area. Many wildlife trails existed with abundant signs of moose and grizzly bear. This was recorded as well as the vegetation types for future considerations in regards to visitor use. Advisers and research assistants provided a lot of valuable information and experience for managing these types of areas as well as providing some good reference resources.

091 **Geology****Jackson, Valerie**

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File No: 12 404 554**Region:** NS**Licence No:** 13617**Location:** 240 km NNW of Yellowknife**SOUTHERN BEAR REGIONAL MAPPING PROJECT**

The Southern Bear Geological Mapping Project focuses on an area ~240 km north of the city of Yellowknife. The goal of the project is to map, in three to four years, most of the ground within NTS map sheets 085B/4 and 5 and 086C/1-8. In 2004, field mapping was focussed in the southern third of this area. This mapping was completed out of two main base camps located on a lake due east of Koropchuk Lake and on Mattberry Lake. The project was conducted in conjunction with two geophysical surveys, which collected data to characterize the subsurface of the area. The surveys included a magnetotelluric study and a teleseismic study

(under the direction of Dr. David Snyder), which placed seismic stations at Castor Lake and in Gameti. The Southern Bear project supported a B.Sc. thesis study (A. Stoffer, Carleton University) and is supporting a post-doctoral study (V. Bennett, Memorial University) aimed at examining the geochemical and isotopic characteristics of the rocks in the area, and determining their ages. A complete summary of 2004 mapping results can be found on the NWT Geoscience Centre website.

092**Geology****Kershaw, Peter**

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File No: 12 404 116**Region:** SA**Licence No:** 13711**Location:** Between Macmillan Pass (Mile 231) and Mile 208 of the Canol Heritage Trail, approximately 150 km west of Tulita and Norman Wells**LONG-TERM ECOLOGICAL AND GEOMORPHOLOGICAL INVESTIGATIONS IN THE ALPINE TUNDRA OF THE MACKENZIE MOUNTAINS, NWT**

Approximately five days were spent in the field in 2004. The main activities in the vicinity of Macmillan Pass and Camp 222 on the Tsichu River were to retrieve stored information from the automated microclimate stations established in 1990, and check the depth of thaw on selected features. Attempts to conduct GPR surveys on these same permafrost landforms were unsuccessful since the unit failed to operate properly. Based on these studies it is evident that the permafrost is warming ($\approx 0.8^{\circ}\text{C}$) and melting. However, no trends can be seen in the 13 years of air temperatures. This suggests that the permafrost thaw is due to climatic events prior to 1990 with the period of monitoring taking place after the bulk of the warming had occurred.

093**Geology****Kokelj, Steven**

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File No: 12 404 545**Region:** IN, GW**Licence No:** 13563**Location:** Central and outer Mackenzie Delta**PERMAFROST AND SUMP INVESTIGATIONS IN THE MACKENZIE DELTA REGION**

The objectives of this study are to investigate permafrost and ecological conditions in the Mackenzie Delta region, and to examine the effects of ecological change on the thermal regime of drilling-mud sumps. Information on environmental conditions across the treeline was collected at several sites between Inuvik and Richards Island. Data collected on soil, permafrost, ecological and snow conditions will provide context within which to evaluate future environmental change at these sites. Michael Palmer (M.Sc. student, Carleton University) instrumented air and ground temperature cables at the six sites to examine the relation between air and ground temperatures across the treeline. Douglas Esagok was hired to assist with the instrumentation of these sites.

Water samples were also collected from numerous lakes across the treeline to investigate the effect of thermokarst slumping on the water quality of small tundra lakes. The data indicate that water quality in lakes affected by slumping is significantly different than in undisturbed lakes. A total of eight sites were visited in Mackenzie Delta and tree cores from white spruce were obtained by Dr. Michael Pisaric to examine if tree growth has responded to recent changes in air and ground temperatures. Preliminary results indicate that the trees are climate-sensitive.

Ongoing data collection was sustained at permafrost monitoring sites in the Inuvik area. Les Kutny and Douglas Esagok visited the sites on a monthly basis to collect data and maintain equipment.

Ground-temperature and active-layer data were collected across abandoned drilling sums in the Taglu Island area. Snow distribution was determined during winter surveys. Field data demonstrate that perennial snow accumulation associated with sump topography and colonization of tall shrubs on top of and around abandoned sums can warm permafrost temperatures and cause the active layer to deepen. Reporting of research results to the community has been ongoing.

094**Geology****Martel, Edith**

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File No: 12 404 582**Licence No:** 13618**Region:** SS**Location:** Approximately 700 km south-east of Yellowknife and 150 km north of Stony Rapids, Saskatchewan**SNOWBIRD LAKE MAPPING PROJECT**

Due to a delayed spring, the researchers accessed field sites later than anticipated. The work consisted of walking on the land to make observations about the rocks encountered and collecting a limited amount of small samples for analysis in a laboratory. From the observations and the results of these analyses the principal researcher produced a geological map of the area of research to document the history of the rocks. The study included the Wholodaia Lake, Sherwood Lake, and Obre Lake areas.

095**Geology****Ootes, Luke**

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File No: 12 404 564**Licence No:** 13614**Region:** NS**Location:** Wecho River Project Area, approximately 100 km NNW of Yellowknife**WECHO RIVER GEOLOGICAL MAPPING PROJECT**

The Wecho River Bedrock Mapping Project is a two-year bedrock mapping assignment taking place approximately 100 km north of the City of Yellowknife. Previous geological mapping from the 1940s indicated that the area is underlain by heterogeneous Archean granitoid and supracrustal packages; however, the units were not delineated. This project was able to divide the Archean intrusive rocks into numerous phases based on physical attributes and cross-cutting relationships. Further to this, a large, supracrustal package of Archean sedimentary rocks was subdivided by metamorphic grade; these sedimentary rocks locally host gold showings. Areas of known base metal showings associated with mafic volcanic rocks were also delineated. The project is also supporting a Master's-level study (Sarah Buse, Carleton University), which is aimed at determining the nature of the late Archean crust and mantle of the area. This in turn may be useful in determining if the area is prospective for future diamond exploration.

096**Geology****Prost, Gary**

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File No: 12 404 592
Region: IN, GW

Licence No: 13671
Location: Seven sites in the Richardson Mountains

EXAMINATION OF SELECTED KAMIK AND DEVONIAN FORMATION OUTCROPPINGS IN THE RICHARDSON MOUNTAINS

The purpose of the research was to observe and sample faults and fractures in the Kamik Formation sandstone outcrops in the Richardson Mountains. This was done in order to assist ConocoPhillips technical staff understand and model the distribution of faults within the Kamik Formation at the Parsons Lake gas field (development of which is planned by ConocoPhillips Canada and Exxon Mobil Canada Properties) at depths of 2600 m below the surface. On the two days that the research team was able to fly, they were accompanied by a wildlife monitor arranged by the Gwich'in Tribal Council. Travel to the outcrops from Inuvik was by helicopter. Sites visited during the program were Grizzly Gorge, Willow River, Martin Creek, Gilbert Anticline, and Rat River.

097 **Geology**

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File No: 12 404 548 **Licence No:** 13626
Region: NS **Location:** Lac de Gras region

TELESEISMIC STUDIES IN THE CENTRAL SLAVE CRATON

At the end of 2004, the Portable Observatories for Lithospheric Analysis and Research Investigating Seismicity (POLARIS) consortium was successful in archiving seismic wave records from 24 remote sites in the NWT. Two of these sites were installed in 2004 at Castor Lake and at Gameti airport. These seismic data from distant earthquakes were analyzed along with absolute eruption ages from kimberlites near the Ekati and Diavik diamond mines to show that the kimberlite eruptions in the Lac de Gras area originated deeper than 250 km and the diamonds and magma travelled to the surface as vertical sheets, here oriented (striking) at about 045 degrees (NE-SW). Many of these eruptive sheets probably do not penetrate a rock layer boundary at about 120 km depth. This orientation is related to the overall motion of the North America plate and can thus be used to guide diamond exploration from a known diamond location if the age of the kimberlite is known. These results were presented at the Yellowknife Geosciences Forum in November. The teleseismic stations are planned to operate until the summer of 2006.

098 **Geology**

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File No: 12 404 626 **Licence No:** 13628
Region: NS **Location:** 300 km long north-west to south-east profile centred at Zinto Lake

SOUTHERN BEAR PROVINCE GEOLOGICAL MAPPING PROJECT: MT COMPONENT

The Slave to Bear magnetotelluric (MT) profile is a component of the Southern Bear Province Geological Mapping Project run by the C.S. Lord Northern Geoscience Centre. One of the main objectives of this project is to understand the nature of the Paleoproterozoic western boundary of the Slave craton in the NWT. The field component of this project took place in July of 2004. MT data were collected, using float planes, at 21 stations along a 300 km-long north-west/south-east profile, centred at Zinto Lake, from the south-central Slave craton to the Bear Province crossing the Wop May Orogen. Initial processing and preliminary models have been completed to date and these reveal a mildly conductive upper mantle. The Central Slave mantle conductor imaged by earlier MT studies is not present in these data limiting its lateral

extent within the Slave craton. Localized conductive regions within the crust of the Slave have been identified but their cause is still undetermined. Further processing, analysis, and modelling of this data will be undertaken by the researcher under the guidance of Alan Jones, in an attempt to determine the lithospheric-scale geometry beneath the profile.

HEALTH

099**Health****Fletcher, Christopher**

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File No: 12 408 128**Licence No:** 13430**Region:** SA**Location:** Deline and district**CULTURAL MODELS, CONCEPTS, AND PRACTICES IN DENE HEALTH AND HEALING, DELINE, NWT**

This was the first of a three-year collaborative project funded by the Institute for Aboriginal Peoples Health, part of the Canadian Institutes of Health Research. This community-university research partnership was initiated by the Deline Uranium Team. The Deline Land and Financial Corporation, Deline First Nation and Pehtséo Ayha School are partners and supporters. The project involves working together to understand Sahtúot'ine concepts of health, healing traditions, and how they can be better integrated into community planning, education and policy. In Year 1, the researchers focused on building research relationships, establishing objectives and methods pertinent to the community. Through interviews and workshops they examined the role of stories in health from a Dene perspective. Stories are a fundamental part of how people learn to live well, understand the world around them, maintain and benefit from a Dene identity and history. There is considerable concern about the loss of storytellers and the knowledge embedded in stories. Two workshops and several individual interviews were undertaken on the question of ownership of stories. A working document – “The Importance of Stories: Sahtúgot'ine Perspectives on Ownership, Sharing and Using Stories Within and Beyond the Community” has been produced and circulated in Deline.

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File No: 12 408 131**Licence No:** 13706**Region:** NS**Location:** N'dilo and Dettah**FACTORS AFFECTING THE COMMUNICATION AND UNDERSTANDING OF KNOWN AND POTENTIAL/THEORETICAL RISKS TO HEALTH IN NORTHERN ABORIGINAL COMMUNITIES**

The research is intended to develop a better understanding of how people view different types of risks to their health, and how they can improve communication about these risks. The communities of N'dilo and Dettah in the NWT, and the communities of Nain and Hopedale in northern Labrador are participating in the research. The project began with the training of local community fieldworkers to help them collect the data. The first phase of the data collection involved conducting interviews with 50 people from each of the two sets of communities. The second phase of the data collection will begin in the summer of 2005. The team plans to return all results to the communities in the winter of 2005, and complete the final report by April 2006. The information will be used to make recommendations to Health Canada on how to talk to communities better about the health risks that concern them.

101 **Health****Mill, Judy**

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File No: 12 408 129**Licence No:** 13662**Region:** IN, GW**Location:** Inuvik**THE DIAGNOSIS AND CARE OF HIV INFECTION IN CANADIAN ABORIGINAL YOUTH**

In 2002, researchers from the University of Alberta, University of Toronto and University of Calgary partnered with researchers from the Canadian Aboriginal AIDS Network and Health Canada to explore preferences for, experiences of, and factors associated with HIV testing and care among Canadian aboriginal youth. A community-based, collaborative research design was used for this study involving both a self-completed survey and in-depth interviews. Youth were recruited with the assistance of ten agencies, including AIDS service organizations, health centers, community organizations and friendship centers, in nine locations across the country. Four hundred and thirteen aboriginal youth completed the survey and 28 youth participated in in-depth interviews. Care was taken to include youth who had not received an HIV test, those who had received an HIV test and those who had tested HIV positive and HIV negative. This study provides important information about aboriginal youth testing experiences and behaviours, although research findings cannot be generalized beyond the present sample. A final report is expected by December 2005.

102 **Health****Moffitt, Pertice**

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File No: 12 408 117**Licence No:** 13434**Region:** NS**Location:** Rae-Edzo and Yellowknife**THE RELATIONSHIP BETWEEN HEALTH BELIEFS AND HEALTH PROMOTION PRACTICES OF PREGNANT TLICHO (DOGRIB) WOMEN: A FOCUSED ETHNOGRAPHIC STUDY**

Data collection for this study has been completed. The researcher is presently in the analysis phase of the report. The study findings are expected to provide foundational knowledge required to develop clinical guidelines, inform health and health promotion policy, and effect change in a way that is both emancipating and empowering to the pregnant women involved. Study results will be shared with the women who participated in the study, the Dogrib Community Services Board and the Stanton Territorial Health Authority when the analysis is complete. Dissemination of research findings is also planned at professional nursing conferences and in publications.

103 **Health****Stockton, Pam**

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File No: 12 408 130**Licence No:** 13670**Region:** NS**Location:** Stanton Hospital, Yellowknife**THE TRANSITION INTO NURSING FOR NEW GRADUATE NURSES IN THE NWT: A GROUNDED THEORY STUDY**

The purpose of the study was to provide explanation as to how new graduate nurses begin practice in the NWT. Practising graduates of the Northern Nursing Program at Aurora College, Yellowknife Campus were interviewed. At present, the data is in the process of being transcribed, coded and analyzed. The final data will

be gathered by confirming and reviewing the initial findings with participants. It is estimated that data collection will be finalized by the early fall of 2005 with thesis completion planned for the spring of 2006.

PHYSICAL SCIENCES

104**Physical Sciences****Barber, David**

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File No: 12 404 371**Region:** IN**Licence No:** 13 574**Location:** Aerial survey lines flown north of the Tuktoyaktuk Peninsula and into Amundsen Gulf**TWIN OTTER AERIAL SURVEYS OF SEA ICE DURING SPRING MELT**

Many scientists have observed a dramatic decrease in Arctic sea ice during the past several decades. This reduction has profoundly impacted life in Northern communities and the marine ecosystem. Scientists believe this reduction is closely related to global climate change and have been investigating the causes of this reduction in the Arctic. To understand what is really going on in terms of sea ice concentration and climate change, a scientific experiment, including aerial surveys and ship-based measurements, was conducted during May and June of 2004. A twin-otter, rented from Aklak Air, with radiation sensors and a digital camera was equipped for the aerial surveys. Onboard the icebreaker, passive microwave characteristics and sea ice microstructure were measured. This data is very important to improve the satellite algorithms that inform as to where and what type of sea ice is present in the Arctic.

105**Physical Sciences****Blasco, Steve**

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File No: 12 404 576**Region:** IN**Licence No:** 13 714**Location:** Beaufort Shelf, in a survey area bounded by 131°W to 141°W and 69°30'N to 71°N**BEAUFORT SHELF SEABED MAPPING PROJECT**

In August and September 2004, the Geological Survey of Canada in collaboration with the Canadian Hydrographic Service conducted a seabed mapping program from the Canadian Coastguard ship, *Nahidik*. Conventional bottom sediment sampling, side-scan sonar and sub-bottom profilers and new multibeam sonar technologies were used to investigate environmental and engineering issues related to offshore hydrocarbon exploration and transportation. These issues included seabed scouring by ice keels, seabed ecosystems, gas seeps, mud volcanoes, abandoned artificial islands and seafloor foundation conditions. An extreme three metre deep ice scour was tracked for a distance 24 km across the seabed from 42 to 37 m water depth. It has been found that the abundance and diversity of bottom dwelling fauna increases in water depths greater than 50 m. These depths are beyond the zone of active seabed scouring by ice keels. Gas vents observed in 2001 and 2003 were destroyed by ice scouring or partially infilled with fluvial sediments on 2004 data. Ninety-seven mud volcanoes were observed along a 16 km track in the Mackenzie Bay area. Abandoned artificial islands have been eroded by wind and current action to more than 4 m below sea surface over the past 20 years. Normal sediment property profiles with depth below seabed are significantly scattered by the networking action of ice keels. A highlight of the marine mammal monitoring program was the sighting of 20-30 bowhead whales east of Herschel Island.

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File No: 12 404 618**Licence No:** 13590**Region:** SA**Location:** Flybye Springs**MINERAL PRECIPITATES AT FLYBYE SPRINGS, NWT**

Fieldwork was conducted in July 2004. Difficulty was experienced in finding the springs due to the fact that their coordinates were misprinted in a 1984 publication.* They were finally located with assistance from the outfitters at Palmer/Shale Lake who knew the local terrain. The research team managed to obtain aerial photographs of the site, and to collect water samples from four spring vents, approximately 30 samples of barite tufa, and 15 microbial samples. The springs' biology is limited by the high sulphur content of the spring water, such that the microbial community is dominated by fungi and a sulphur oxidizing bacterium, *Beggiatoa*, in contrast to the cyanobacteria and algae common to other springs. These microbes exert direct control on the texture of minerals that precipitate on them, and are commonly impregnated with barite, forming "microfossils" five to ten microns wide. The samples of barite tufa also contain macroscopic textures analogous to those generated by microbiota in calcium carbonate and silica spring deposits. Rock samples have, to date, been examined by light, petrographic and scanning electron microscopy, as well as ion microprobe, at the University of Alberta. To fully understand the context of these mineral precipitates and the role of microbes in their formation, the team plans to revisit the Flybye Springs in summer 2005 to complete field measurements. Notably, there was no time to map the barite deposit or to assess the dissolved oxygen content of the water. Oxygen controls the speciation and reactivity of sulphur; thus, it is important to measure if the influence of microbes on barite precipitation is to be elucidated.

107**Physical Sciences****Bostock, Michael**

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File No: 12 404 601**Licence No:** 13643**Region:** DC**Location:** Highways 1 and 3, 20 km intervals between Fort Liard, Fort Simpson, Fort Providence, and Yellowknife**CANADIAN NORTH-WEST EXPERIMENT (CANOE)**

In June 2004, the researchers began the second stage of the CANOE project by deploying 40 earthquake recording instruments (seismometers) on an array spanning the Alaska and Mackenzie- Liard Highways between Whitehorse, Fort Nelson, Yellowknife and Edmonton. These 40 instruments complement another 11 instruments previously deployed in 2003. Two servicing runs were performed later in the year: in August 2004, to ensure that the seismometer vaults had not flooded as a result of heavy summer rains; and in October 2004, to ready the instrumentation for winter recording. Data from these two service runs have been downloaded, checked for quality control and are now being archived at the IRIS (Incorporated Research Institutions for Seismology) Data Management Center in Seattle, Washington. Because earthquakes occur infrequently, the researchers procured sufficient data to begin analysis in July 2005. A summary of results will be forthcoming in the next report.

108**Physical Sciences**

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File No: 12 404 325
Region: IN

Licence No: 13 585
Location: Garry Island, Illisarvik, Richards Island and near Inuvik

PERMAFROST INVESTIGATIONS IN WESTERN ARCTIC CANADA

In 2004 investigations were concentrated in three areas— Garry Island, Herschel Island and near Inuvik. At both Garry and Herschel islands a series of sites along hill slopes were established so that the annual temperature in permafrost at places where the snow depth is different could be measured. The snow depths are usually low at the top of these slopes and much deeper at the foot of the slopes. It is expected that under climate change the snow depth will increase in the Western Arctic; so by collecting data this way it may be possible to predict how much warmer the ground will become. Results from one year of monitoring on Herschel Island indicate that there is a clear relation between late winter snow depth and annual ground temperatures in permafrost.

The research team continues to work at a site in the Dempster Highway near Inuvik airport, where the movement of the ground as it warms and cools over the year is studied. In June 2004 a ground temperature monitoring cable at the site was established. This will also assist in monitoring changes in ground temperature as the climate changes. Similarly, a ground temperature monitoring site was established in the delta near Inuvik, so that changes in the uplands can be compared with changes in the delta environment.

109**Physical Sciences**

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File No: 12 404 631
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Licence No: 13678
Location: 35 sites within a 1 km buffer of the Dempster Highway from the Yukon/NWT border to Inuvik

SAMPLING VEGETATION ALONG A 700 KM FOREST-TUNDRA TRANSECT IN YUKON AND NWT

An eleven-person team from CCRS and industry spent two weeks documenting, measuring, and sampling northern vegetation along the Dempster Highway in the Yukon and NWT. This field campaign was conducted in support of the “Biological and Geological Carbon Sequestration” project within the Natural Resources Canada ESS program “Reducing Canada’s Vulnerability to Climate Change”. It was funded partially by a Canadian Space Agency Government Related Initiatives Program (GRIP) project, entitled “EO-based View of Our Landmass in Support of Northern Development and Climate Change”. A special emphasis of this Earth Science Sector (ESS) project is to fill critical knowledge gaps on the past and future magnitude of greenhouse gas fluxes in Canada’s northern ecosystems. The main purpose of the trip was to collect a wide range of information on northern vegetation types to help develop methods for monitoring and assessing terrestrial carbon fluxes in Canada’s North. The 736 km Dempster Highway, stretching from near Dawson City to Inuvik, provided a unique and practical means of sampling a wide range of northern ecosystems. The highway is the only one in North America to traverse the Arctic Circle, and passes through 11 terrestrial ecoregions that encompass open transitional forest, spruce peatland, alpine tundra, and arctic tundra over an elevation of 15-1 250 m. The group visited 133 sites located within one kilometre of the gravel highway, where a diverse suite of measurements were collected: precise GPS coordinates; digital photographs of the landscape in recorded directions; close-up digital photographs of major plant species;

downward digital hemispherical photographs of understory and tundra vegetation; upward digital hemispherical photographs for deriving tree crown closure*; digital 360-degree movie from the centre of each site; plant species (trees, shrubs, herbs, mosses, and lichens) composition and percent cover; leaf Area Index (LAI) measured using the LAI-2000, upward digital hemispherical photographs, and destructive sampling*; biomass (leaf and stem) of tundra or understory vegetation for representative 1m² quadrates* ; tree measurements where forest cover was present (i.e. DBH, height, basal area, age, closure, tree biomass estimation, regeneration stem count, and green weight of average size seedlings)*; photosynthesis capacity*; and spectrometer measurements of major vegetation components*.

This extensive database is being compiled for use as ground-truth information in support of remote sensing and carbon modeling activities within the “Carbon Sequestration” project. The remote sensing component will lead to the production of a 30-m resolution, regional land cover product based on multiple Landsat ETM+ images; long-term land cover/land use change detection products; and new remote sensing methods for mapping crown closure, LAI, biomass, and wetlands in northern environments. This will support the development of high-resolution models that estimate carbon flux changes in Canada’s arctic and subarctic ecosystems in response to climate warming. All data will be made available on an ESS Forest-Tundra Vegetation Transect web site.

*Measurements taken at a subset of the 135 sites

110

Physical Sciences

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Region: GW, SA, DC

Licence No: 13 575

Location: Mackenzie River at Fort Simpson, Liard River Crossing, Mackenzie

River at Tsiigehtchic, Mackenzie River at Norman Wells

EXTREME FLOODING EVENTS IN THE MACKENZIE RIVER BASIN

The objective of the fieldwork was to obtain river cross-section measurements at four sites in the Mackenzie River basin. The sites, selected due to their proximity to Water Survey of Canada hydrometric stations, included the Mackenzie River at Fort Simpson, the Liard River ferry crossing, the Mackenzie River at Tsiigehtchic, and the Mackenzie River at Norman Wells. River cross-section measurements were to be used to model “equilibrium jam” conditions which predict the maximum water levels possible at a river site according to specified hydrologic and climatological parameters. Logistical conflicts did not allow for the cross-section work to be performed. However, field reconnaissance during spring river ice break-up 2004 was performed at the Mackenzie River at Fort Simpson and the Liard Ferry River Crossing. Qualitative descriptions along with digital video and photographs were used to document the break-up conditions. Furthermore, post break-up field reconnaissance was performed at Mackenzie River at Tsiigehtchic and the Mackenzie River at Norman Wells.

In the assessment of extreme flooding events at the research sites, descriptions obtained during the 2004 field season will be invaluable. They will aid in determining the physical controls of extreme flooding events, explain floodplain morphology, and provide an understanding of the scale of flooding events on cold region river systems.

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File No: 12 402 722**Licence No:** 13719**Region:** SA**Location:** Nine streams that empty into the Mackenzie River between Norman Wells and Tulita**BIOLOGICAL AND PHYSICAL CHARACTERIZATION OF SMALL TRIBUTARIES TO THE MACKENZIE RIVER IN THE SAHTU SETTLEMENT AREA**

The fieldwork for the study along the Mackenzie River occurred between September 21 and September 27, 2004. A total of ten sites were sampled for fish. The sites were Canyon Creek, Bosworth Creek, Big Smith Creek, Little Smith Creek, Saline River and Billy Creek. Not all sites in the licence application were visited. The abundance of each species collected at the sampling locations are as follows: Oscar Creek (Arctic grayling=10, northern pike=0, slimy sculpin=18, spoonhead sculpin=28, burbot=0, emerald shiner=20); Bosworth Creek (Arctic grayling=5, northern pike=0, slimy sculpin=30, spoonhead sculpin=30, burbot=2, emerald shiner=6); Canyon Creek (Arctic grayling=8, northern pike=0, slimy sculpin=30, spoonhead sculpin=17, burbot=0, emerald shiner=30); Big Smith Creek (Arctic grayling=5, northern pike=3, slimy sculpin=16, spoonhead sculpin=30, burbot=1, emerald shiner=10); Little Smith Creek (Arctic grayling=6, northern pike=2, slimy sculpin=30, spoonhead sculpin=25, burbot=0, emerald shiner=17); Saline River (Arctic grayling=4, northern pike=0, slimy sculpin=20, spoonhead sculpin=30, burbot=8, emerald shiner=10); Billy Creek (Arctic grayling=10, northern pike=1, slimy sculpin=22, spoonhead sculpin=15, burbot=1, emerald shiner=14).

Billy Creek was a supplementary site that was sampled because of time constraints that did not permit sampling of Francis, Blue Fish and Four Mile creeks. No animals were killed unintentionally as all species that were harvested were targeted and no incidental catches were made. All fish that were captured in the field were frozen whole and brought back to the University of Manitoba for examination. Each fish will be weighed, measured and sexed, and otoliths will be removed for aging. Food items will be recorded and tissue samples taken for stable isotopes. A sub-sample of fish will be examined for parasites.

112**Physical Sciences****English, Michael**

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File No: 12 404 555**Licence No:** 13606**Region:** NS**Location:** Exeter-Daring-Yamba Lake catchment, Coppermine River basin**ASSESSING SNOW PACK WATER EQUIVALENT DISTRIBUTION USING IN-SITU SNOW SURVEYS AND VARIOUS SCALES OF PASSIVE MICROWAVE REMOTE SENSING DATA**

Research activities during the 2004 field season focussed on obtaining snow and ice cover data in the Exeter-Yamba-Daring Lake water shed. Snow depths and density were measured at regular intervals close to the Tundra Ecosystem Research Station (TERS) using a systematic snowmobile based survey. Snow data in the far reaches of the basin were obtained using a helicopter based survey. The 2004 snow survey was successful and very productive as over 200 sample sites were visited. Snow surveys at both scales were planned to spatially and temporally correspond with resolution passive microwave satellite data. Snow data from the 2004 field season were crucial for reporting on Tundra snow cover properties and spatial distribution. This represents important data for further regional hydrologic, ecologic and climate modeling. As well, this data set, combined with data from the 2003 field season, is one of the most comprehensive and valuable Canadian

open tundra snow cover data sets available for remote sensing microwave snow cover algorithm development.

Lake ice data were obtained as a better understanding of lake ice cover properties and distribution is crucial to the development of passive microwave snow cover algorithm development. Lake snow cover, ice thickness and snow depth were measured on lakes of various sizes and surrounding topography. Over 100 sample sites were visited on Lakes in the areas of TERS. Lake data were used for determining the distribution and properties of ice cover both within and between individual lakes in the study area.

Field activities and data collected in 2004 are also instrumental for the planning and success of the 2005 field season. In 2005, there will be the inclusion of high resolution ground based and airborne radiometers. The data acquired from 2004 will be used to outline representative areas and features that can be sampled in 2005 with higher resolution radiometer equipment. Higher resolution data will allow for a better understanding of the effect of different snow and lake cover properties on microwave remote sensing data. The 2004 survey allowed for the identification and surveying of snow and lake features that are currently limiting the development of a regional remote sensing tundra snow cover monitoring algorithm.

113

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File No: 12 404 399

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Location: Mackenzie Delta region

SPRING SEASON COASTAL RESEARCH IN THE BEAUFORT REGION

The primary objective of the winter survey was to collect data on the extent of bottom-fast sea ice in Kugmallit Bay and the Olivier Islands. The data were compared with satellite and GPRs to help confirm their utility for mapping bottom-fast and floating ice. The information is being used by industry and regulators to help manage the impacts of seismic exploration.

114

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Region: IN

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Location: Western Arctic coastline, including the mainland coast and Mackenzie Delta, Banks Island, Victoria Island, Prince Patrick Island, and Melville Island

HAZARDS, SEA LEVEL RISE AND CLIMATE CHANGE IMPACTS ON ARCTIC COASTS

During the summer, coastal surveys were undertaken in Sachs Harbour, Paulatuk, Holman, and Tuktoyaktuk, at several locations along the Mackenzie Delta, Key Point and at Shingle Point. Side scan and bathymetry surveys were undertaken at Tuktoyaktuk and in the Pingo Canadian Landmark (PCL). These measurements provide input to ongoing monitoring of coastal change for assessment of human and climate change impacts and management of infrastructure. Core samples and aerial photography were obtained to investigate the causes of extensive vegetation die-offs in outer delta area. Finally, high resolution elevation data was collected using Light Detection and Ranging (Li DAR) in Tuktoyaktuk, PCL, Northhead, several locations on the delta, Aklavik and Shingle Point. These data provide a basis for assessment of flooding risks now and under future climates.

115**Physical Sciences****Fortier, Louis**

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File No: 12 404 586**Licence No:** 13568**Region:** IN**Location:** Oceanic region of Mackenzie Shelf / shelf break / Amundson Gulf / Franklin Bay**CANADIAN ARCTIC SHELF EXCHANGE STUDY (CASES)**

The objective of the 2003-2004 CASES expedition of the research icebreaker *Amundsen* was to monitor a full annual cycle of the ocean-ice-atmosphere ecosystem in the Mackenzie Shelf/Amundsen Gulf region. From September 2003 to August 2004, 225 researchers from eight countries took six-week rotations on the ship to study the physics, chemistry, biology and biogeochemistry of the ecosystem, from viruses to fish and from the ocean sediment to the high atmosphere. The colossal amount of data collected over the one year cycle will keep the scientists busy for years. Following a data workshop in October 2004, some preliminary discoveries can be summarized as follows: 1) the sea ice cover on the ocean was believed to be impermeable to atmospheric gases, but the results of the present investigation indicate that significant amounts of carbon dioxide are drawn down from the atmosphere by the ice during the winter months; 2) extremely dense aggregations of zooplankton and Arctic cod form in winter in the layer above the ocean bottom and the animals are active; 3) the first detailed mapping of the ocean bottom in the study area reveals many interesting geological features, including glacial scouring in Amundsen Gulf and high-resolution images of the major slump at the edge of the Shelf.

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File No: 12 404 586**Licence No:** 13717**Region:** IN**Location:** Mackenzie Shelf, Amundsen Gulf area**ARCTICNET THEME 1: CLIMATE CHANGE IMPACTS IN THE CANADIAN HIGH ARCTIC: A COMPREHENSIVE STUDY ALONG THE EAST-WEST GRADIENT IN PHYSICAL CONDITIONS**

The objective is to initiate long-term marine observatories of variability and change in ocean currents, temperature, salinity, and carbon/contaminant fluxes in the coastal Arctic Ocean in response to climate warming. As planned, six moorings of instruments were successfully deployed from 20 to 80 nautical miles off the Inuvialuit coast in September of 2004. These six moorings had first been deployed in September 2002 and redeployed in September 2003 as part of the Canadian Arctic Shelf Exchange Study (CASES). Four of the six moorings will be redeployed in September 2005 and, hopefully, each year afterward. The results of the 2004-2005 deployments will be known after recovery in September 2005. However, the data from the 2002-2004 deployments (CASES) are partially analyzed. They indicate that events such as storms, the ice break-up, the Mackenzie River runoff and the summer bloom of micro-algae strongly influence the offshore fluxes of carbon and contaminants from the atmosphere to the deep ocean. The time series is still too short (2002-2004) to detect any trend that could be associated with the decadal decrease in sea ice concentration in the Beaufort Sea. However, the data is providing precious insights into how the storm, sea ice and river regimes affect biology and fluxes of carbon in the area.

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File No: 12 404 569**Licence No:** 13621**Region:** IN**Location:** Lidden Gulf, Melville Island**HOLOCENE PALEOECOLOGY AND PALEOCLIMATOLOGY OF THE CENTRAL CANADIAN ARCTIC ISLANDS**

The research program is centred on the study of climate change across the Canadian Arctic during the past 10 000 years. In the summer of 2004, a lake ($75^{\circ} 11.04'N$, $111^{\circ} 55.73'W$) in the region of Lidden Gulf, Melville Island was sampled. The lake water was found to be acidic (pH=5.1) with only low amounts of nutrients. In particular, the remains of organisms in lake sediments were of interest given that material from the lake constantly accumulates in the lake bottom, suggesting that the deeper sediment layers represent older time periods. By analyzing the pollen in the sediment core, for instance, it can be determined how the vegetation has changed through time in the region surrounding the lake. A series of cores across the lake from the ice surface were collected. It was found that 2–3 m of sediment have accumulated in the lake bottom. Analysis of the sediment in the laboratory will be attempted during the coming year.

118**Physical Sciences****Guo, Laodong**

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File No: 12 404 629**Licence No:** 13661**Region:** IN, GW**Location:** East channel of Mackenzie River at Inuvik**CLIMATE GEOCHEMISTRY**

The objective of the research project, supported by the International Arctic Research Center at the University of Alaska Fairbanks, is to determine the abundance of chemical species such as organic and inorganic carbon, nutrients and isotopes in arctic river waters and to examine the relationship between climate/environmental change and biogeochemical tracers. During 2004, two river water samples were collected from the Mackenzie River near the Arctic Red River site. River waters were size-fractionated into dissolved, colloidal and particulate phases and then measured for organic and inorganic carbon, nutrients (N, P, and Si), stable isotopes including C-13, N-15 and O-18, and radiocarbon (C-14). Sampling will continue through 2005 in the Mackenzie River to examine the seasonal variation pattern and to compare with other arctic rivers such as the Yukon, Sag, and Colville rivers. Most of the samples will be analyzed along with other arctic river samples. It is expected that analyses will be completed by the end of the 2005 sampling season. Results from this research, along with other data, will be published in peer-reviewed articles in scientific journals. Participants in this research project include postdoctoral investigators, Drs. Claude Belzile and Yihua Cai, graduate student, Pieter deHard, and student technician, Melinda Juliana.

119**Physical Sciences****Hicks, Faye**

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File No: 12 404 619
Region: SS, DC

Licence No: 13594
Location: Hay River from Enterprise to Town of Hay River

HAY RIVER ICE JAM STUDY

The research program in 2004 involved field observations along the Hay River, in and around the town of Hay River during the period of river ice breakup (~April 30 to May 4). Water levels were measured along the river bank at key sites, an instrument was set up at the town firehall for measuring the intensity of solar radiation occurring in Hay River (important to the nature of river ice breakup), and video and photographic documentation of the breakup progression were obtained from the ground and from a small plane (chartered locally).

River breakup in 2004 was unusually uneventful, and consequently, no significant data on ice jam formation or ice jam release could be obtained. However, this is a multi-year study and the field program in 2004 facilitated developing a familiarity with the site and an opportunity to meet and work with the local Town Flood Watch Committee.

120

Physical Sciences

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File No: 12 404 603
Region: NS

Licence No: 13726
Location: Ryan Lake, Pontoon Lake, Cameron River and Tibbett Lake

THE EFFECTS OF GREAT SLAVE LAKE ON AIR AND SURFACE TEMPERATURES IN PEATLANDS NEAR YELLOWKNIFE

The objective of this project is to model permafrost growth, or aggradation, in processed kimberlite tailings in the Ekati Diamond Mine™, NT. The mine began production in August 1998, and since then tailings have been deposited in enclosed basins and allowed to settle before permafrost aggradation begins. Permafrost aggradation in the tailings at the Ekati Diamond Mine™ has been ongoing since winter 1998. To model permafrost aggradation in the tailings, information about the current thermal regime and properties of the tailings is required.

In summer 2004, thermistors and data loggers were installed in the terrain surrounding the tailings to establish baseline conditions. Preliminary results indicate that soil moisture content controls the near-surface thermal regime. Where the moisture content is high, ground temperatures in the tailings decrease more gradually during freeze-back, have thinner active layers, and are approximately 5°C warmer in winter than where the moisture content is low. The field component of this project will be completed in August 2006 with a brief field season to take a final reading of the thermistors.

121

Physical Sciences

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File No: 12 404 515
Region: IN

Licence No: 13571
Location: Melville Island Icecap

MASS BALANCE OF ARCTIC GLACIERS

This study monitors glacier health and climatic change in the High Arctic and is part of an ongoing program that began in the early 1960s. It is also part of a larger program studying climate change. Poles drilled into the ice are measured to detect the changing level of the ice. If ice melts, the pole will measure longer than the

previous year but shorter if snow melts and refreezes as ice. There is an automatic weather station on the ice cap, which provides a three-hour record of temperature and snow accumulation or melt, year round. About 20 1 000 g snow samples are collected each year from different locations on the ice cap to measure the amount of pollutants that have accumulated over the year.

Records dating back to more than 30 years ago show that all the glaciers are getting smaller. The smaller they get, the faster they diminish in size. Of the ice caps measured, Melville South Ice Cap has shown the greatest losses (measurements started in 1964). Contaminants studies have shown that the snow has become much cleaner, starting around 1980. The snow is as clean now (in terms of sulphates) as it was in the late 1930s. This work is presently being written up and a paper is in press at the time of this writing.

122**Physical Sciences****Lafleur, Peter**

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File No: 12 404 621**Licence No:** 13597**Region:** NS**Location:** Within 2 km of the Terrestrial Environmental Research Station at
Daring Lake**CANADIAN TUNDRA CLIMATE EXCHANGE PROJECT**

The meteorology and eddy covariance flux towers and instruments were set up May 10, 2004 and ran continuously until September 14, 2004. The flux measurements indicate a total net carbon uptake of 17 g C m⁻² and a total evaporation of 126 mm during this 127 day period. Soda lime traps were set up mid-September and will be collected early in May, 2005 in order to estimate the winter loss of carbon dioxide from the tundra. Relationships between these fluxes, micrometeorological variables and surface characteristics are currently being investigated in order to quantify the factors that influence carbon dioxide exchange process such as photosynthesis and respiration. Chamber measurements of carbon dioxide exchange were also made every week over three different tundra types (wet sedge, dry and wet heath) to investigate the spatial variations of carbon dioxide exchange within the tower footprint (the area sampled by the flux tower).

123**Physical Sciences****Lesack, Lance**

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File No: 12 404 485**Licence No:** 13612**Region:** IN, GW**Location:** Mackenzie Delta in the vicinity of Inuvik**BIOGEOCHEMISTRY OF LAKES IN THE MACKENZIE DELTA**

This project is on-going and the long-term goal is to develop a biogeochemical model for lakes in the Mackenzie Delta, and ultimately, a more general ecosystem model for lakes on the floodplain and deltas of major world rivers that could help assess the effects of multiple stresses on rivers as a result of global change. Specific goals for the 2004 season included: 1) assessing the stripping of nutrients from Mackenzie River water during its flow through the Mackenzie Delta; 2) directly measuring underwater levels of ultraviolet radiation among lakes of the delta; and 3) assessing the effects of dissolved organic carbon levels and degree of photo-bleaching on production hydrogen peroxide among lakes of the delta. In June through August, water samples were collected weekly from the Mackenzie River at Arctic Red River and the Peel River inflow

of the delta. Additional sampling was done further downstream at Inuvik. Results generally show a loss of nutrients as river water moved into and through the delta. Underwater radiation measurements in six lakes (near Inuvik) showed major differences in penetration of ultraviolet radiation, depending on the mixture of coloured and non-coloured dissolved organic carbon in the lake water. Lake water samples collected for experimental analysis (at the Inuvik Research Centre laboratory) of hydrogen peroxide formation showed peroxide formation was higher when photo bleaching of the water was stronger. Results from earlier work in the delta (Squires and Lesack – Bacterial production) were submitted for publication in the *Canadian Journal of Fisheries and Aquatic Sciences*.

124**Physical Sciences****Lintern, David Gwyn**

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File No: 12 404 612**Licence No:** 13531**Region:** IN**Location:** Tuktoyaktuk to 20 km NNW in Kugmallit Bay**COLLECTION OF OCEANOGRAPHIC MOORING AND SEAWATER SAMPLES (CASES SUB-PROJECT)**

Researchers set up a base outside of Tuktoyaktuk in February 2004, during hostile weather conditions (-69°C to -30°C). Measurements of suspended sediment, and tests of conductivity, temperature and depth (CTD) were taken through ice holes. Suspended sediment concentrations were extremely low. Water temperatures ranged from 0 – 2 degrees, whereas salinities were around 0 PPT throughout the water column. Ice thickness varied from 1.1m to 1.4m.

Weather field exercise was set up in July and August 2004. Two specific purposes of this exercise were to observe and measure storm re-suspension events and to determine the sediment properties in Kugmallit Bay. Suspended Particulate Matter (SPM) concentrations are significantly different in between stormy and quiet sea states, emphasizing the importance of re-suspension in transport. Push Cores were taken in Kugmallit Bay and in the Mackenzie East channel. It is found that there is a loose or mobile layer of sediment, approximately 5 – 15cm deep, overlying much more consolidated sediment. It is thought that this upper layer is constantly reworked by the frequent open water storms in the area. Overall the sediment surface becomes weaker with distance from the river mouth, at least partially related to decreasing grain size.

125**Physical Sciences****Maloof, Adam**

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File No: 12 404 620**Licence No:** 13596**Region:** IN**Location:** Killian Lake area, East Minto Inlet area, and Natkusiak Peninsula**TESTING THE INERTIAL INTERCHANGE HYPOTHESIS, SHALER SUBGROUP, VICTORIA ISLAND, CANADA**

The purpose of this fieldwork was to collect rock samples for paleomagnetic and light-stable-isotopic studies of the Neoproterozoic Shaler Group, exposed on Victoria Island. Three researchers (Adam C. Maloof, Matthew T. Hurtgen and David S. Jones) from the Massachusetts Institute of Technology and Harvard University flew to Killian Lake on Victoria Island by Twin Otter from Resolute on July 3. They were subsequently moved by helicopter to a second camp and from there back to Resolute by helicopter on July 20.

Samples were transported to Cambridge, Massachusetts by air freight. Carbon and oxygen isotope pairs have

been run on about 25 % of the samples and this work continues. Sulphur isotope measurements have been made on perhaps 30 % of the samples. Rock magnetism experiments will be run on selected samples in order to evaluate the problem of secondary re-magnetization of the samples during intrusion of younger diabase dikes and sills.

126**Physical Sciences****Marsh, Phillip**

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File No: 12 404 378**Region:** IN**Licence No:** 13619**Location:** Trail Valley Creek and Havikpak Creek near the AES Upper Air Station near the Inuvik airport**SNOW ACCUMULATION/RUNOFF IN HIGH LATITUDE PERMAFROST BASINS**

Field studies were conducted in the Inuvik area during 2004. These studies considered the factors controlling the movement of energy and water between the land surface and the atmosphere during both the spring snowmelt period and the entire summer period. These factors control both the supply of energy and water to the atmosphere, as well as snow melt and run-off to streams, rivers and lakes. The long term objective of these studies is to improve the ability to predict weather, climate and water resources. With future uncertainties with climate, and with the proposed Mackenzie Gas Project, such improved predictive ability is essential in order to properly manage future environmental change and to adapt to such changes. Work in 2004 concentrated primarily on measuring total basin snowfall (by mid-April), as well as on usual automated measurements of solar radiation, air and ground temperatures and summer rainfall. Ongoing work will compare results from a number of different years so that the variation from year to year can be understood, and will compare results from areas on either side of the treeline. This work provides important data needed to test computer models, which are used to predict the impact of climate warming of these environments. In addition, the research team selected new sites to study and to apply the computer models.

127**Physical Sciences****McDowell, Donald**

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File No: 12 404 615**Region:** IN**Licence No:** 13577**Location:** Near Garry and Niglitingak islands within and near the north-west corner of the Kendall Island Bird Sanctuary**GARRY ISLAND ICE PROFILE RESEARCH PLAN**

Chevron Canada Resources assessed the ice thickness in an area of a proposed 2005 seismic program (Chevron Garry 3D seismic program) by conducting ice profiling within the research area. Equipment included two plough trucks, one loader, two Nodwells, one snow machine, one Noggin 500 GPR system, two handheld GPS units, gas powered ice auger, and two pickup trucks. Personnel included three equipment operators, one environmental monitor and one wildlife monitor. All work occurred exclusively on waterways and channels. The survey was conducted from a temporary staging area. One Nodwell pulled the GPR system, while the other Nodwell followed. Field personnel drilled select holes to measure water depths along the route. A total of 172.2 km of ice was profiled from March 28 to April 6, 2004.

Regulatory approval required to complete the work as described was obtained through Canadian Wildlife Service Permit to Conduct Activities in a Migratory Bird Sanctuary #NWT-MBS-04-05.

128**Physical Sciences****Mielko, Corrine**

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File No: 12 404 617**Region:** NS**Licence No:** 13587**Location:** Lakes, streams and experimental plots within the 1.3 km sq. catchment containing Shadow Lake**HYDROLOGIC PROCESSES OF A CANADIAN SHIELD BASIN**

This research had two objectives: 1) to understand the processes and timing of snowmelt runoff and delivery in basins containing small lakes; and 2) to assess the stream flow connections between a chain of four lakes. At the end of winter, the amount of snow in the basin was determined, and the rate and pattern of snowmelt was measured. Runoff processes from bedrock outcrop, valley, wetland and upper lakes were studied and water delivery from these areas to lower lakes was examined. The amount of stream flow generated from Shadow Lake totalled near 40 % of the snowmelt with the remainder stored on the land or evaporated. Lake levels and the amount of stream flow between lakes were measured. By mid-July stream flow from all lakes stopped. The lowest lake continued to have water entering it from an additional stream which slowed the lowering of the lake level. Only this lake generated stream flow following a relatively large rainstorm.

The relatively large and rapid input of water from the snowmelt is credited for initially raising the lake levels high enough for outflow to occur. The small rainfall inputs during the summer and high evaporation in the area are the primary cause of the loss of stream flow connections.

129**Physical Sciences****Nixon, Mark**

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File No: 12 404 398**Region:** DC, IN, SA**Licence No:** 13589**Location:** Approximately 60 sites between Fort Simpson and the Beaufort Sea Coast**ACTIVE LAYER MONITORING NETWORK IN THE MACKENZIE VALLEY**

During early August 2004, the fourteenth annual survey of the active layer monitoring system in the Mackenzie Valley was completed from Fort Simpson to the Arctic coast. Sites now number 53, about half located in the Mackenzie Delta. Ten have been selected for the Circumpolar Active Layer Monitoring program of the International Permafrost Association.

Along this 1400 km transect, active layer thickness varies more as a result of local factors related to situation, than to regional climate associated with latitude. Though both air and ground thawing degree days increase from arctic through subarctic to boreal environments, active layer development is surprisingly similar, except where factors override regional patterns. The thaw of 1998 was the greatest yet recorded, in keeping with record warm temperatures, while thaw in 1996 north of Norman Wells and in the current century at many sites was notably less than during the late 1990s, also associated with temperature and season length significantly less than normally. The widespread response to these events builds confidence in the utility of the instrumentation for measuring response in the ground to atmospheric change. In the longer term, measurements from this transect will be used to help model climate change impact on near surface permafrost in this fragile environment.

130**Physical Sciences****Plug, Laurence**

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File No: 12 404 633**Region:** IN**Licence No:** 13710**Location:** Southern Tuktoyaktuk Peninsula**FIELD MEASUREMENTS TO CONSTRAIN DATA FOR USE IN A NUMERICAL MODEL WHICH WILL QUANTIFY THE GROWTH, MAINTENANCE AND DISAPPEARANCE OF THAW LAKES OVER TIME SCALES OF TENS TO THOUSANDS OF YEARS**

Fieldwork cancelled.

131**Physical Sciences****Pollard, Wayne**

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File No: 12 404 321**Region:** NS, IN**Licence No:** 13560**Location:** Richards Island, Tuktoyaktuk granular sources, Parsons Lake and Lac de Gras area**MASSIVE ICE STUDY IN GRANULAR DEPOSITS**

The focus of the study is on the nature and occurrence of massive ice in sands and gravels. Many theories of massive ice formation suggest that massive ice should not be present in these materials. However, there are several places in the NWT where there is massive ice in sand and gravels. The research will try to provide an explanation for the origins of the massive ice in sands and gravels in order to be able to predict ice in the future. In March 2004 some of the sites were visited using the winter roads and skidoo trails, including sites on Richards Island and on the eastern side of the East Channel of the Mackenzie River. Based on available borehole data, two different types of geophysical surveys were conducted on sites with known massive ice. The geophysical data is being used to map and explain the origins of the ice and why the ice is in some locations and not in others. Preliminary results suggest that both buried glacier ice as well as intra-sedimental massive ice is found in some of the granular deposits of the Mackenzie Delta region. This project supported G. Pascale's M.Sc. thesis project.

132**Physical Sciences****Prowse, Terry**

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File No: 12 404 635**Region:** GW**Licence No:** 13732**Location:** East channel of the Mackenzie River between Tsigehtchic and 10 km downstream from Swimming Point**EVALUATION OF DEEP SCOUR HOLES ON THE BED OF MACKENZIE DELTA CHANNELS**

The objective of the fall 2004 fieldwork was to identify the locations of deep scour holes in the river bed of the East Channel of the Mackenzie Delta. A number of scour holes have been previously documented by Lapointe (1986), and Fassnacht and Conly (1992). Unusual bathymetric features such as these deep holes (up

to 30 m deep, five to six times the average channel depth) are of great practical concern in designing pipeline crossings and may have significant impacts on fisheries (e.g., over-wintering areas).

Comprehensive bathymetric mapping was conducted along the East Channel during the period September 6-9, 2004. Using a multi-beam sonar (Aquatics Inc. boat subcontracted by a Natural Resources Canada project headed by Steve Solomon), approximately 150 river kilometres on the East Channel was mapped. Preliminary analysis of the bathymetric data reveals 18 features of interest (scour holes). Georeferencing of these sites is underway and will allow for comparison with previous surveys at key historic sites (e.g., Scour Hole #10). Select sites will be revisited during the summer of 2005 to gather more detailed bed and substrate survey data using GPR and traditional survey methods.

133

Physical Sciences

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Region: DC

Location: Drainage area of Scotty Creek (61° 18' N, 121° 18' W)

MODELLING THE FLOW AND STORAGE COMPONENTS IN THE LOWER LIARD RIVER VALLEY

The central Mackenzie River basin, near the confluence of the Liard and Mackenzie rivers, is a wetland-dominated zone of discontinuous permafrost. Little is known about the factors controlling the flux and storage of surface water in this environment. As a result, models used to estimate runoff from drainage basins of this region have performed very poorly. How the climate and hydrology of this region will respond to continued climate warming is therefore poorly understood, which results in considerable uncertainty to the future availability of the fresh surface water resource in the region.

The research has begun the process of improving model prediction, through field studies, that have resulted in a new conceptualization of how runoff is generated in wetland dominated permafrost regions. In these regions, there are three major land-cover units: peat plateaus, channel fens, and flat bogs. Peat plateaus are wooded uplands that generate runoff during snowmelt and heavy rain storms, and channel fens and flat bogs are wetlands that store and transmit water to the creek. Peat plateaus represent areas of saturated permafrost that rise above the surrounding terrain. This enables them to effectively impound water in bogs, while redirecting flow in the fens. Owing to their relatively high topographic position and limited water storage capacity within their thawed soil layer, peat plateaus also shed water to the surrounding wetlands. The flow path then followed by this drainage water depends upon the type of wetland that receives it. Water entering channel fens is more likely to be conveyed toward the basin outlet than water entering bogs. This conceptual model contributes to resolving some of the difficult issues in the hydrological modelling of northern basins, in particular the storage and routing functions of wetlands. Channel fens and bogs have been found to have distinctively different hydrologic functions, and they must be treated accordingly in hydrological models.

In order to characterize the runoff processes at the peat plateau, multiple methods were used to evaluate the hydraulic conductivity of peat at several different scales. For this purpose, a new method was developed to use a portable constant-head well permeameter (the Guelph permeameter) in active (i.e. seasonally thawed) layer (Hayashi and Quinton, 2004). Also, numerous core samples were analyzed for water retention characteristics. Progress has also been made toward understanding how water and energy flows between peatland types. Isotopic and chemical tracers of surface and subsurface water were used for this purpose (Hayashi et al., 2004). Current research is focussed on representing the storage and routing processes in the WatClass, the basin-scale hydrological model coupled to models used to predict weather and climate.

134**Physical Sciences****Rouse, Wayne**McMaster University
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rouse@mcmaster.ca**File No:** 12 404 563**Region:** SA**Licence No:** 13622**Location:** Lionel Island or one of the George Islands at Keith Arm, Great Bear Lake**MODELLING THE EVAPORATION AND HEAT BALANCE OF GREAT BEAR LAKE**

The objectives of this study are: 1) to pursue temperature and energy balance studies on Great Bear Lake; 2) to determine if the climate of Great Bear Lake behaves like that of Great Slave Lake's or if its unique geographical position and physical attributes make it distinctive; and 3) to explore the temperature structure of the atmosphere above Great Bear Lake and link this with heat and moisture exchanges between lake and atmosphere.

Water temperatures in mid-July in the central Keith Arm of Great Bear Lake were found to be 3.2 °C at all depths. The surface warmed to a maximum temperature in mid-August of 5.8 °C and 5.2 °C at the surface and 40 m depth, respectively. This indicates deep convective mixing between top and bottom waters. For Great Slave Lake, water temperatures at all depths are substantially warmer and surface temperatures are more than twice as warm as for Great Bear Lake. The total evaporation from Great Bear Lake during the summer appears to be as large as from Great Slave Lake in spite of colder lake temperatures. This is unexpected and the reasons are being actively investigated. Great Bear Lake exerts a strong influence on its lower atmospheric environment and gives temperatures that are often substantially different from the official meteorological measurements at Norman Wells.

These results were discussed with Deline community members during a workshop held February 22-24, 2005.

135**Physical Sciences****Soare, Richard**Concordia University
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rsoare@colba.net**File No:** 12 404 623**Region:** IN**Licence No:** 13616**Location:** Tuktoyaktuk Peninsula**USING THE COLD CLIMATE LANDSCAPE OF THE TUKTOYAKTUK PENINSULA TO UNDERSTAND LANDSCAPE****DEVELOPMENT ON MARS**

The research team has identified an assemblage of crater-based features in north-west Utopia Planitia, Mars, that is suggestive of the drained-lake and pingo-based landscape of the Tuktoyaktuk Peninsula. In May 2004 a number of pingos in the area of Tuktoyaktuk were visited. Observations of pingo morphology, size, and state of evolution, dilation/thermal contraction cracking and collapse features were noted. Field observations were compared with high resolution images of Utopia Planitia and with laser altimetric tracks superposed on these images. By invoking high obliquity and assumptions concerning Mars having been slightly warmer than it is today, the researchers pose the argument that the periglacial processes that formed the Tuktoyaktuk landscape also contributed to the formation of crater-based landscapes in north-west Utopia Planitia.

136**Physical Sciences****Sofko, George**

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File No: 12 404 636**Licence No:** 13734**Region:** IN, GW**Location:** Lot 8, Plan 50540, Group 1355, Town of Inuvik**POLARDARN (DUAL AURORAL RADAR NETWORK)**

No scientific research has been conducted over the past year, up to June 30, 2005. The building and power at the Inuvik site have been installed, and the instruments for the site are being constructed. The major instrument planned for the site (7 km north of the Inuvik town site) will be the PolarDARN Inuvik radar. However, only partial funding has been obtained so far. A new round of Canada Foundation for Innovation funding competition has been announced, and the researcher will apply for the remaining funds through this program. Those funds will not be awarded until 2006, so the Inuvik radar will not be operational until the summer of 2007 at the earliest. Meanwhile, the Inuvik site will be used for two smaller Canadian scientific instruments to be installed during the summer of 2005: 1) an optical camera which is a part of the Canadian contribution to the US THEMIS satellite project to study the beginning stage of "magnetic storms"; and 2) a radio instrument for "sounding" the ionosphere (the electrically charged particle layer about 100 – 300 km above the ground). This instrument is called CADI, the Canadian Advanced Digital Ionosonde.

137**Physical Sciences****Soppet, Dayle**

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File No: 12 404 630**Licence No:** 13663**Region:** IN**Location:** North end of Langley Island**CHEVRON NORTH LANGLEY SUMP REVEGETATION PROJECT**

Chevron Canada Resources, representing its joint venture funding partners, conducted a drilling program on Langley Island in winter 2003. Restoration of the salvaged top layer of material on the sump was completed at the close of the drilling program. The Langley K-30 remote sump was revegetated on an experimental basis during the spring/summer season of 2004. Other information collected at the site include dimensions of the completed sump, surrounding vegetation types, permafrost active layer on and off the sump as well as on ground and aerial photography to document the site. The Langley sums were divided into eight sections each receiving a different combination of treatments. These treatments included: 1) seeding with native grass species local to the area (e.g., *Puccinellia borealis* and *Arctagrostis latifolia*); 2) transplants of sedge plugs and ground cover that comes along with the sedge plugs; 3) natural revegetation; and 4) fertilization. Monitoring and documentation of the revegetation process will be primarily conducted in future seasons by recording the species and the percentage of cover on the treatment areas, and on a natural revegetation control section in the surrounding areas as a reference. All sites will be photo-documented.

138**Physical Sciences****Tait, Matthew**

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Region: IN

Licence No: 13669
Location: 1 km east of Reindeer Station

MEASURING PERMAFROST DEFORMATION IN THE MACKENZIE DELTA

The aim of this study is to determine if satellite radar measurement can be used to monitor the natural trend in surface movement in the Mackenzie Delta and the effects of gas extraction in the production leases in that area. Currently the natural movement of the surface is unknown but must be established before the effects of gas extraction can be measured. In addition, environmental monitoring of any subsidence due to gas production must be undertaken. This study has researched the ways in which deformation can be monitored in the Mackenzie Delta, and will lead to a practical approach to assessing the impact on the area during gas production.

139

Physical Sciences

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File No: 12 404 627
Region: IN

Licence No: 13629
Location: Area between Richards Island and Tuktoyaktuk and three sites near Inuvik

ARDEX: RESPONSES TO CLIMATE CHANGE IN NORTHERN AQUATIC ECOSYSTEMS

For work on small ponds, two sites on Richards Island and one site west of Tuktoyaktuk were visited in July 2004. Altogether eight ponds were sampled from these sites for the purpose of studying how northern ponds in different climate regimes and temperatures function. The ponds in the Mackenzie Delta complete the pond data set that had been previously collected from the subarctic and arctic regions of eastern Canada.

Each pond was visited for approximately an hour to obtain a detailed description of the site (i.e., size, depth, and surrounding vegetation), and water column measurements (i.e., temperature, pH, and conductivity) and for sample collection (i.e., nutrients, dissolved organic carbon, phytoplankton, benthic algal mats, and zooplankton). Some water and algal mats were brought to the laboratory in Inuvik for primary production and bacterial production measurements, and several samples have been brought to Quebec for more detailed taxonomic analysis, stable isotope information of the food web structure, and concentration of melanin pigment in zooplankton as protection to ultraviolet radiation.

140

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File No: 12 404 622
Region: IN

Licence No: 13604
Location: Mould Bay on Prince Patrick Island, Green Cabin on Banks Island, and Isachsen, Ellef Ringnes Island

BIOCOMPLEXITY OF FROST-BOIL ECOSYSTEMS

The main objective of the research is to investigate the properties of frost-boil ecosystems along a climate gradient from the coldest parts of the arctic to the northern boreal forest. The project is examining how small patterned-ground features and their associated ecosystems vary within the five sub-zones of the circumpolar Arctic. This year the team worked at Mould Bay and Inuvik. The research team also revisited Green Cabin to

collect data from research plots established in 2003. The team is investigating the complex interactions between climate, permafrost, geomorphology, soils, vegetation, and soil invertebrates within these unique ecosystems.

141**Physical Sciences****Walker, Tony**

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File No: 12 404 613**Licence No:** 13572**Region:** IN**Location:** Nine sites over 120 nautical miles on the Mackenzie River and Delta, from Inuvik into the Beaufort Sea**PARTICLE DYNAMICS ON THE MACKENZIE SHELF (CASES SUB PROJECT) AND ARCTIC RIVER DELTA EXPERIMENT (ARDEX)**

The interactions of the Mackenzie River plume with salt water, and the effect on particle flocculation were investigated. Settling rates and particle size distributions were captured by digital video camera and were analyzed by image analysis software. Water samples collected for carbon-hydrogen-nitrogen (CHN) have been analyzed, and have been found to have high carbon contents and C:N ratios. Data collected from conductivity, temperature and depth of the water column (CTD) moorings deployed along the transect are still to be analyzed. Results from the transect surveys across the delta show significant gradients in salinity and turbidity, evidenced by the towed sensors which detected these horizontal gradients. In addition, it was discovered that there are vertical gradients of salinity in the deltas, where the bottom 30 cm of water column had much higher salinities than the overlying freshwater. There were also studies of sediment erosion of sediment cores collected from sites during Leg 1 of the stratification in salinity, temperatures and suspended sediment concentration. Sedimentation rates vary between 3 710 and 5 386 g/m² per day along the transect towards inshore. Fine particles easily eroded at low erosion thresholds. Physical characteristics of sediment are highly variable.

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File No: 12 404 632**Licence No:** 13682**Region:** IN, GW**Location:** Within the channels and the near shore environment of the Mackenzie Delta**NIGLINTGAK FIELD DEVELOPMENT BATHYMETRY RESEARCH STUDY**

In the summer of 2004, Shell Canada conducted a bathymetric study to determine the feasibility of manoeuvring a large barge through the delta and stream systems of the Mackenzie River. This barge will contain the gas conditioning facility for the Niglintgak gas field, and is planned to be brought to the Niglntgak site in 2010. The Niglntgak gas field is one of three anchor gas fields proposed to be developed as part of the Mackenzie Gas Project.

Swath bathymetry was used to identify areas along the proposed routes that present constraints due to insufficient depths, widths, and tight turns in the river channels. The locations where bottom preparation of the river channels was required to enable barge passage were identified, and volumes of material to be removed were calculated. Areas surveyed included Kittigazuit Bay, East Channel, Neklek Channel, Middle Channel, Kumak Channel, Little Kumak Channel, Aklak Channel, and the south-west side of Garry Island.

An analysis of sediment, including cone penetration tests under the site where the barge is proposed to be stationed, was conducted to determine the engineering requirements for stationing the barge in the proposed location.

143**Physical Sciences****Wolfe, Brent**

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File No: 12 404 599**Licence No:** 13605**Region:** SS**Location:** Slave River delta, in the vicinity of Fort Resolution**PALEOHYDROLOGICAL AND PALEOECOLOGICAL RECONSTRUCTION OF THE MACKENZIE BASIN DELTAS**

This project focuses on high-resolution reconstruction of past hydrology, ecology and climate of the Mackenzie Basin deltas from natural archives, including lake sediments and tree rings, supported by comprehensive field-based studies of modern hydrology, limnology and aquatic ecology.

Summer 2004 field activities focused on continuing multi-year studies of the modern hydroecology of the Slave River delta, with parallel studies ongoing in the Peace-Athabasca Delta. The aim of this research is to improve knowledge of changes in lake water balance and chemistry and the subsequent responses of aquatic communities and habitat over seasonal and inter-annual timescales under varying climatic and hydroecological conditions.

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File No: 12 404 614**Licence No:** 13573**Region:** IN**Location:** North-eastern part of the Mackenzie Delta bounded by Langley Island to the west, Richards Island to the east, and the Beaufort Sea to the north-west**INTEGRATED GEOSCIENCES STUDIES OF THE MACKENZIE DELTA AND NEARBY COASTAL ENVIRONMENTS**

A team of three GSC researchers spent approximately 10 days in the Mackenzie Delta and Richards Island areas during August 2004. Field activities involved the deployment and recovery of automated data loggers for measuring lake-bottom water temperatures, collection of soil and water samples, and characterization of natural gas seeps located in isolated stream channels and shallow lake beds. Accommodations in a seasonal hunt camp were arranged by a local provider under contract with the GSC. Individual field sites were accessed mainly by helicopter. Analysis of the field data provides insight into the role of shallow lakes in modifying the deep geothermal regime in this region, and new information about natural gas fluxes and possible associations with existing hydrocarbon reservoirs targeted for production. This research contributes to the scientific knowledge base for a region that is expected to undergo intensive development in the next decade, assisting both the engineering community and local stakeholder groups to ensure sound and sustainable regional development over the medium to longer term.

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File No: 12 404 682**Licence No:** 13722**Region:** NS**Location:** Lac de Gras mine site**DAIVIK DIAMOND MINES INC. 418 BASELINE MONITORING PROGRAM**

Results of the baseline water quality surveys indicate that water quality is generally similar along Lines 6 and 7, and in the control areas. Concentrations of total suspended solids (TSS), nutrients and a number of metals were slightly higher in the control areas compared to Lines 6 and 7. The data collected in 2004 indicate that the control areas are appropriate for use in subsequent monitoring of dike-related affects.

Sediment particle size was variable among the sites and areas sampled. Sand content was highest in control area B, highly variable in control area A, intermediate at Line 7 and lowest at Line 6. Sediment and content was weakly related to water depth, with deeper sites having lower sand content. Concentrations of nutrients were similar in all areas. Maximum arsenic, barium and iron concentrations measured in the control area were considerably higher at Lines 6 and 7. However, differences among areas in median concentration were usually small and concentration ranges overlapped among areas. The higher sand content at some of the control sites located in shallower water is of concern regarding suitability of control sites because sediment particle size influences sediment chemistry and is an important determinant of benthic invertebrate habitat.

Benthic invertebrate community structure was similar near the A418 dike and in the control areas, although water depth and sand particle size were found to influence invertebrate abundance. Total invertebrate abundance was low and variable among sites. Deeper sites along Line 6 had lower total abundance compared to sites in other areas. Richness was less variable than abundance and the range in richness was generally similar in all areas. Composition of the benthic community at the level of major invertebrate group was variable in all areas except Line 6, which was more homogeneous in terms of water depth. Statistical comparisons of benthic community variable between Lines 6 and 7, and the control areas suggest that, with the exception of nematode abundance, there were no substantial differences in the benthic community between the transects located near the A418 dike and the reference areas sampled in 2004. Therefore, the baseline data collected for the A418 dike were appropriate for use in future analysis of dike-related effects.

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File No: 12 404 611**Licence No:** 13569**Region:** IN, SA, GW**Location:** Inuvik and Norman Wells**ASSESSING IMPACTS OF PERMAFROST DEGRADATION ON COMMUNITY INFRASTRUCTURE DUE TO CLIMATE CHANGE: MODELING, SIMULATION, AND ADAPTATION COSTING**

This study focuses on the assessment of community infrastructure sensitivity to climate change in the coming 20 years (to year 2025), based on the current trend of climate change, potential thermal and physical response to the change, and typical foundation systems available in the NWT communities. A multiple accounts analysis approach was used to assess the sensitivity of community building infrastructure to climate change impacts. The multiple accounts are composed of Thermal Sensitivity, Physical Sensitivity and Infrastructure Sensitivity, each containing a number of indicators quantified based on existing data or the field experiences

of the northern geotechnical consulting company, EBA Engineering.

The study classifies the NWT communities into three groups based on their sensitivity to the adverse impacts of climate change on building foundation systems. In general, the foundation sensitivity to climate change is found to be lower in the south and higher in the north. The building foundations in communities in the Inuvik region are, as a group, the most sensitive to climate change impacts. This is an area characterized by continuous but warm permafrost with prevalence of ground ice. The additional important factor is the high proportion of adfreeze piles used for the building foundations in these communities, which are sensitive to permafrost degradation. The small communities in the southern portion of the NWT generally exhibit relatively low sensitivity, due mainly to their low physical and infrastructure sensitivities, which make the high thermal sensitivity less a risk.

SOCIAL SCIENCES

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File No: 12 410 620**Region:** IN, GW**Licence No:** 13641**Location:** Inuvik**EVALUATING PARTICIPATION IN THE INUVIK, NT RECYCLING PROGRAM**

Residents of Inuvik were surveyed in the summer of 2004 to identify the determinants of recycling behaviour in what appears to be a successful community recycling program. There is a gap in the recycling literature where northern communities are concerned, and the unique context of the North presents a set of challenges previously unknown to those with the responsibility of implementing recycling programs. Seventy-three randomly selected households participated in the close-ended survey, which was conducted face-to-face at respondents' homes. Forty-three of the respondents (59%) participated in the recycling program. Results indicate that southern-born residents (born south of 60°N latitude) are more likely to participate in recycling programs than northern-born residents, and those that hear about recycling information from other people are also likely to participate in the program. Contrary to the existing literature, age and income are not significant predictors of recycling behaviour in Inuvik. Environmental conservation is the most common reason given for participation in the program, while the idea that recycling requires too much effort is the most common reason given for non-participation.

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File No: 12 410 548**Region:** SA**Licence No:** 13657**Location:** Tulita, Norman Wells, Colville Lake, Fort Good Hope, and Deline**SAHTU SETTLEMENT HARVEST STUDY**

The Sahtu Settlement Harvest Study began as a five-year project (1998-2003) in the five Sahtu communities of Tulita, Norman Wells, Colville Lake, Fort Good Hope, and Deline. The goal of this study was to produce information that would aid in establishing the minimum needs of Sahtu Dene and Metis, and serve as a tool in natural resource management in the Sahtu Settlement Area. This study was continued in 2004 with the recording of numbers and general locations of all fish and wildlife species harvested. Quarterly interviews were conducted by household rather than with every eligible harvester as was done in previous years.

With the increase in oil and gas development in the region and the proposed construction of the Mackenzie Valley Pipeline, Sahtu communities believe that it is essential that Harvest Study data collection continue during pipeline construction and hydrocarbon development to capture information about subsistence harvesting. Information collected will be a powerful tool for the Sahtu communities, Sahtu Renewable Resource Board, other Sahtu co-management boards and government agencies to use in regard to assessment, mitigation and monitoring through all stages of hydrocarbon development and pipeline construction.

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File No: 12 410 626**Licence No:** 13686**Region:** NS,**Location:** Yellowknife**A STATE OF PRACTICE SURVEY OF HEALTH AND ENVIRONMENTAL ASSESSMENT IN THE CANADIAN NORTH**

The purpose of this research was to evaluate the scope of health within Environmental Assessment (EA), and to assess the state of EA practice with regard to the incorporation of human health impacts within Canada's northern natural resource sector. Consideration of human health impacts in EA is guided by several pieces of Canadian federal, provincial and territorial legislation, including the current *Canadian Environmental Assessment Act*, which defines an "environmental effect" as including any change that a project may cause in the environment, including any effect of any such change on human health (CEAA, 203a. c/37 s2(1)). The inception of the *Mackenzie Valley Resource Management Act*, *Yukon Environmental and Socioeconomic Act* and the Nunavut Land Claims Agreement, in the three northern territories have made significant strides towards overcoming these challenges, due to their holistic approach in determining health and well-being. However, human health inclusion in northern EA practice, as reflected by the views of study participants (who consisted of government representatives, environmental and health consultants and community leaders) and based on comprehensive study and panel review assessments, remains inconsistent and poorly conducted.

The findings of the study reflect that most study participants were in favour of human health issues being fully integrated into the EA process, believing that a greater degree of integration would allow human health impacts to be addressed more effectively. This perspective complements the general understanding among EA practitioners and administrators who regard health as peripheral to a resource development project's scope as the EA process for the projects are generally already too complicated without the inclusion of human health considerations.

The study also found that if EA processes do presume human health issues, they typically tend to focus on physical health and health impacts due to changes in the physical environmental rather than on the broader social health impacts. Social, economic and other "human environmental" effects were found to be examined where relevant but their inclusion in EA processes was found to be often indirect. Additionally, it was found that human health impacts tend to be incorporated more often during the screening and scoping stages of EA rather than during follow-up and monitoring, which leaves the actual health effects largely unknown and unaddressed.

Study results have enabled the formulation of a framework to identify specific health determinants appropriate for the North for incorporation into EAs. These determinants include cultural activities (including traditional land use), Traditional Knowledge, traditional health care practices, country food in the daily diet, and gender and social problems (e.g., alcohol or substance abuse, family violence, etc.).

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ETHICS IN PARTICIPATORY RESEARCH IN ABORIGINAL COMMUNITIES USING THE INTERNET

This Master's-level Human Ecology research project is intended to contribute to the ongoing development of Network North, a health and research information-sharing network being formed by both institutional and northern community partners. Within this larger framework, this research began a discussion on ethical issues with participants at all levels of Network North, including community members, technical service providers, and outside researchers. The questions that guided this research were: 1) what types(s) of information do participants feel is appropriate for sharing through digital communication? 2) who should or should not have access to that information? 3) how should this information be used? 4) what process(es) should be used to make these decisions? Participant observation and interviews have been conducted, and data analysis is in progress.

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File No: 12 410 6140**Licence No:** 13559**Region:** NS**Location:** Yellowknife**BRIDGING THE GAP BETWEEN PROJECT ASSESSMENT AND REGIONAL DEVELOPMENT DYNAMICS IN THE CANADIAN ARCTIC**

The research project developed a methodology to estimate the cumulative effects of large-scale development projects for the unique circumstances of the Canadian Arctic. The research was prompted by the following considerations: a lack of baseline data, high uncertainty in future conditions, and the need to link project level assessments to regional planning. In developing this methodology, 25 experts in environmental assessment and northern development issues were interviewed to understand standard environmental practices and areas for improvement. Recommendations for further interviewing were obtained from these solicitations, and consequently, 11 more individuals in Yellowknife (from government and regulatory agencies, consulting firms and non-governmental organizations) were interviewed during the week of April 7-14, 2004. General comments were incorporated anonymously in the final report but specific ideas accredited to individuals were properly referenced with permission. In early September 2004, all participants were sent a draft report for their comments. The final report was submitted to the Canadian Environmental Assessment Agency in December 2004.

152**Social Sciences****Edward, Christine**

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File No: 12 404 586**Licence No:** 13735**Region:** NS**Location:** Wha Ti**DOCUMENTING SUSTAINABLE INITIATIVES IN FIRST NATIONS**

The objectives of this CIER project are: 1) to provide First Nations with examples of sustainable initiatives and the processes and conditions that resulted in (or hindered) the initiatives; 2) to provide First Nations that have initiatives with an opportunity to share their experiences; and 3) to help Indian and Northern Affairs Canada (INAC) and other organizations to better meet the needs of First Nations when developing and implementing priorities, policies, programs, and plans. The project is national in scope; in the NWT, the research team worked with the Wha Ti community in documenting needs specific to the Wha Ti Community Energy Plan. Interviews were carried out with the Chief, Community Coordinator, members of the Wha Ti First Nation Council and the Community Charter Council, and community members. A six-page draft report

was completed, outlining the various aspects of the Community Energy Plan including requirements, purpose, community contributions and future plans. A copy of this draft report was provided to the community for review and comment. The final draft will be submitted to the project Advisory Committee and the client, INAC.

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File No: 12 410 621**Licence No:** 13650**Region:** NS**Location:** Deline**COOPERATIVE MEMBERSHIP AND GLOBALIZATION: CREATING SOCIAL COHESION THROUGH MARKET RELATIONS**

The purpose of this research is to explore the nature of co-operative enterprises in northern communities and how notions of membership, identity, community engagement and co-operative membership influence, and are influenced by, the unique characteristics and experiences of Inuit, First Nations and Métis cultures. This research hopes to contribute to co-operative and government policy, as well as the future success of co-operatives in aboriginal communities across Canada.

In the NWT, the study is being carried out with the Great Bear Cooperative, located in Deline. The first round of interviews has been completed. Preliminary findings have been shared with the community through the first issue of the project newsletter. It is planned that by August 2005, the following activities will have been completed: community review and verification of transcribed interviews; feedback on community research interests and questions; and preliminary reports written and shared with communities.

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File No: 12 410 625**Licence No:** 13680**Region:** NS**Location:** Yellowknife**ORGANIZATIONAL LEARNING THROUGH PARTICIPATION IN ENVIRONMENTAL ASSESSMENT**

This project explored opportunities for organizational learning available to participants of the EA of Snap Lake project. Research methods included a document review of literature surrounding the EA found in the public registries and local media sources, and semi-structured interviews with assessment participants. Findings show that organizations can learn through participation in EA. Participants were unanimous in acknowledging the importance of learning for a successful EA. When asked what aspects of the EA process allow for learning, a majority of participants identified activities that focus on interaction, in particular the technical sessions and hearings. Participants acknowledged a range of learning outcomes associated with the Snap Lake project. For example, involvement in diamond development has meant that people are more familiar with specific technical issues, such as the environmental impact of diamond mining, and the technology required to minimize those impacts. Participants have also become familiar with how to be involved in an EA, and where to focus their limited resources to achieve the highest return. Learning outcomes also related to organizations. For example, organizations suggested that project specific EAs can be used to encourage the government to deal with outstanding policy issues, such as developing a regional based cumulative effects monitoring. Notwithstanding these strengths, more inroads must be made to address broader policy questions, such as how to manage the current pattern of diamond development in the North, and how to make the assessment process more accessible to First Nation communities. These findings

suggest that the EA contributes to individual and organizational learning that ultimately contributes to sustainable development.

155 **Social Sciences**

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UNDERSTANDING THE NEED FOR NOVEL FORMS OF ENVIRONMENTAL GOVERNANCE

From May 14 to July 21, the researcher reviewed public registries at the Mackenzie Valley Environmental Impact Review Board, Indian and Northern Affairs Canada (INAC), Independent Environmental Monitoring Agency, and the Government of the Northwest Territories (GNWT). The researcher also interviewed a number of individuals involved with Environmental Assessments (EA), Impact and Benefit Agreements, Environmental Agreements, and/or Socioeconomic agreements. After an analysis of these documents and interview data, a number of trends were observed. Firstly, the EA process in the Mackenzie Valley is considerably more advanced than other such processes in Canada for several reasons: it is more relevant, more inclusive, and fits the “best practices” as discussed in academic literature. Secondly, general problems with EA are apparent: unequal capacity, lack of follow-up, and lack of trust among participants. Thirdly, the agreements mentioned above appear to result from the problems observed in EA. The agreements provide funding for monitoring and management, and provide improved follow-up. While Impact and Benefit Agreements aim to gain trust among aboriginal participants, they do not entirely respond to the problems observed in EA. Instead, these agreements are more a function of aboriginal groups wanting to secure certain economic benefits associated with mining developments.

156 **Social Sciences**

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Location: Inuvik

WE DON'T LIVE IN IGLOOS: INUVIK YOUTH SPEAK OUT

Youth in the Canadian North are portrayed in the media as teens struggling with suicide and solvent abuse. The questions that prompted the study were: 1) what is the true experience of youth living in Inuvik, Canada's largest town north of the Arctic Circle? and 2) what are the health concerns of these youth? The purpose of this study was to produce a short documentary video that offers an intimate portrait of youth living in Inuvik with the aim of helping health care providers gain a better understanding of youth in order to provide more comprehensive health care. The documentary-making was based on the following objectives: 1) to assist Inuvik youth in expressing their own realities; 2) to sensitize health professionals to the feelings, ideas, needs and desires of youth; 3) to raise awareness of the issues and concerns identified by youth; and 3) to inform the public who may be misled by stereotypes of northern youth. The photo novella technique was used in the study. Disposable cameras were distributed to 35 youth, and interviews structured around the photographs were filmed with 14 youth. Thematic analysis of the interview transcripts was completed and the identified themes (i.e., “mothers”, “culture”, “the land”, “boredom”, “health concerns”) formed the basis of a nineteen-minute video featuring four of these youth.

157**Social Sciences**

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LONG-TERM COPPER INUIT – EUROPEAN INTER-SOCIETAL INTERACTIONS

Socio-cultural investigations (in conjunction with archaeological investigations in the Minto Inlet area of Victoria Island.) were initiated between July 22 and August 11, 2004, in the Hamlet of Holman. A series of oral interviews with elders were conducted and are now being analyzed according to project plans and schedule. A formal presentation of project activities and findings to date was delivered to the community. The presentation included an opportunity for community members to view a range of artefacts, documents, photographs and slides. The presentation was organized by both the Holman Community Corporation and the Olokhaktomiut Hunters and Trappers Committee. Both of these organizations have provided outstanding support to the project and have expressed interest in further collaborative efforts. A summary of the archaeological investigations undertaken as part of this project can be obtained through the Prince of Wales Northern Heritage Centre website.

The archaeological investigations in the Minto Inlet area were initiated according to plans and were successfully carried out, thanks in large part to the efforts of field assistants, Aaron Kimiksana and Jack Kataoyak of Holman. Other invaluable support was provided by Donald Inuktalik, also of Holman.

158**Social Sciences**

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GENDER AND DECISION-MAKING IN ARCTIC FISHERIES

The goal of the study is to document and analyze Inuit women's roles in Arctic fisheries in order to promote and support their participation in decision-making processes in this sector. This initiative seeks to identify and remove barriers to Inuit women's full participation in Arctic fisheries. The specific objectives are: 1) to document the distribution of Inuit women in decision-making processes in Arctic fisheries; 2) to document Inuit women's contributions to Arctic fisheries and identify barriers to a more significant participation in all aspects of the industry; and 3) to develop a strategic action plan to mobilize Inuit women and to increase Inuit women's access to and participation in decision-making processes related to Arctic fisheries. Despite the active involvement of Inuit women in fisheries at the community level, they remain largely invisible on the boards of Hunters and Trappers Organizations and Committees and co-management boards including the Nunavut Wildlife Management Board (Nunavut) and the Fisheries Joint Management Committee (NWT). Women's representations at the staff level of the Department of Fisheries and Oceans is similar to that of other federal departments but the implementation of a gender-based analysis would assist in promoting the effectiveness of the department. Increased representation of women in decision-making roles in fisheries at the territorial level should be supported. It is expected that the results of this project will promote gender equality in decision-making processes of the marine sector throughout the Arctic region.

159**Social Sciences**

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CHARACTERISTICS OF SUCCESSFUL NORTHERN STUDENTS IN COMMUNITY LEARNING CENTRES IN THE NWT

The workplace project was undertaken as a starting point in addressing the criticisms about success level which are directed towards community learning centres in the NWT. It examined the records of successful completion of courses started by students in the Adult Literacy and Basic Education program in the community learning centres and campuses of Aurora College which delivers all adult basic education in the NWT. Interviews were held with 14 former students of community learning centres and six adult educators, representative of all five administrative regions of the NWT. These interviews were designed to determine the opinions of successful former students from community learning centres as to what determined success for them and what problems they encountered. These findings were compared with the results of a similar set of interviews with adult educators to see if there was a correlation between the opinions expressed by the instructors in the field. A profile of successful students emerged from the interviews, which was closely corroborated by the adult educators. Following the analysis of the opinions which were expressed, the interviewer made some recommendations and suggestions regarding further research in the area of adult education in the small communities of the NWT.

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Region: All

Location: All communities in the NWT

CONTINUING STRONG TRADITIONS: ABORIGINAL PARTICIPATION IN THE NWT'S VOLUNTARY SECTOR

The objectives of this study were to gain an understanding of aboriginal volunteers and volunteerism, and to identify ways to increase the participation of aboriginal volunteers in the NWT's voluntary sector, particularly in leadership, governance and decision-making. Three voluntary sector organizations—the NWT Literacy Council, the Native Women's Association of the NWT and the YWCA of Yellowknife—sponsored the research, which involved approximately 180 individuals who completed questionnaires, participated in interviews and focus groups, and served as role models for a storybook on aboriginal volunteers. Although the ethnicity of 94 persons who completed questionnaires is unknown, most of the other individuals who participated were of aboriginal ancestry.

The study found that of the 620 registered nonprofit societies (119 of this total being registered charities) located mostly in the Yellowknife, Fort Smith, Hay River and Inuvik; volunteers of aboriginal are estimated to make up an average of 35 % of the organizations' total volunteer complement, contributing to 39 % of all volunteer hours. Like other NWT volunteers, aboriginal volunteers mainly spend their time delivering programs or services, serving on boards and committees, raising funds and organizing special events. However, volunteerism among aboriginal people mainly tends to exist in informal ways, with many individuals preferring to participate in less structured volunteer activities that are people-oriented rather than goal-oriented, and which involve non-confrontational or aggressive leadership styles. Barriers to aboriginal volunteering consist of people not being invited to participate in volunteer activities, feelings of awkwardness, volunteer causes that are too narrow in focus, lack of volunteer support and recognition, and issues related to payment and power.

Through these findings, five best practices for the meaningful engagement of aboriginal volunteers and volunteer leaders were drafted, based on the idea that the strong cultural traditions of helping and sharing, and the aspiration to regain control of their own lives and destiny characterize aboriginal volunteers in the NWT: 1) link concepts of informal “helping out” and formal volunteering, 2) promote both informal and formal volunteering, 3) build relationships, 4) build capacity and 5) focus on one leader at a time.

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File No: 12 410 624**Region:** IN, GW**Licence No:** 13667**Location:** Inuvik**LANDSCAPES OF POWER: NATIVE PEOPLES AND NATIONAL PARKS IN ALASKA AND NORTHERN CANADA, 1940-1990**

During the summer and fall of 2004, archival research on this project was conducted in Inuvik with materials administered by the Inuvialuit Regional Corporation (IRC). With the aid of two local records managers and IRC officers, the researcher compiled and analyzed historical records pertaining to the creation and management of Ivvavik National Park, a protected area located on traditional Inuvialuit territory in northern Yukon. Many of the materials that the researcher examined during this period pertained to discussions held in the late 1970s and early 1980s as part of the Inuvialuit land claim negotiations. The research revealed the role that national park discussions played in the larger negotiating process and highlighted the political interests of both Inuvialuit and federal government stakeholders in debates over the protected area. In addition, the research was critical for identifying relevant archival materials held at branches of the National Archives in Ottawa and Burnaby, British Columbia. Information gathered in Inuvik during 2004 will be used in a comparative analysis of national park establishment and management that draws on studies conducted in the south-west Yukon and northern Alaska.

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File No: 12 410 622**Region:** IN, GW**Licence No:** 13544**Location:** Aklavik**DONALD MARSH'S IMPACT ON THE DEVELOPMENT AND IMPLEMENTATION OF NORTHERN SOCIAL POLICIES**

The purpose of the Master's-level thesis research was to examine the role that Donald Marsh, the second Anglican Bishop of the Arctic, had on development of northern social policies specifically regarding wildlife management, education, health care, and family welfare. With the analysis of his published material, archival documents from the National and Church archives, and interviews with elders from Aklavik and Inuvik, the research examined the degree to which Donald Marsh advocated for Inuvialuit and Gwich'in interests. This research attempted to record the interpretations Inuvialuit and Gwich'in elders have regarding this period of their communities' development. The methodology involved interviews and photo-solicitation. Archival photos were shown in a public forum to allow people to gather together to view the photographs, meet the researcher, and volunteer for interviews.

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File No: 12 410 611 **Licence No:** 13551
Region: IN, GW**Location:** Inuvik**A COMMUNITY-BASED PARTICIPATORY ACTION RESEARCH VIDEO-MAKING PROJECT TO CELEBRATE AND PROMOTE FAMILY LITERACY**

The main goal of this project is to create a locally produced video featuring local people. The open-ended interview format is designed to allow community members to have the chance to tell their stories and express their views about how education and learning are an important part of their families. This project is ongoing. Interviewing continues with the second phase of community feedback commencing in winter 2005.

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File No: 12 410 618 **Licence No:** 13613
Region: IN, GW**Location:** Inuvik and Tuktoyaktuk**SUSTAINABLE DEVELOPMENT IN THE MACKENZIE GAS PROJECT; VIEWS OF YOUNG INUVIALUIT ADULTS IN THE INUVIALUIT SETTLEMENT REGION**

The study examined Inuvialuit views on sustainable development with regards to the Mackenzie Gas Project. The communities of Inuvik, Tuktoyaktuk and Holman were included in the study, which was based on a survey (n=193) and semi-directed interviews (n=13). Study results were compared to the Inuvialuit views on the sustainability of the project during the Mackenzie Valley Pipeline Inquiry in the 1970s.

This study shows that the Inuvialuit opinion about the project has changed from strong opposition to support in 30 years. The main reasons for this are: 1) the settlement of the Inuvialuit land claim; 2) the possibility for the Inuvialuit to influence decision-making in the project; 3) the restored trust between the Inuvialuit and the governments, and the Inuvialuit and oil and gas companies; 4) less dependence on the part of the Inuvialuit on wildlife for subsistence in 2004 than 30 years ago; and 5) a changed project proposal. In 2004, the main hope of the Inuvialuit rests in the opportunities for employment, education and training that the Mackenzie Gas Project can offer to their membership. The Inuvialuit still have concerns related to the project's possible negative cultural, environmental and socio-economic impacts.

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Region: NS**Location:** Rae-Edzo, Wha Ti, Gameti, Wekweti, and Yellowknife

DOGRIB TEXTUAL STUDIES

This research project aims to produce a book and CD of Dogrib stories and English translations for Dogrib people and others interested in Dogrib culture and language. Another major goal is research training in the area of language. The research in 2004 was done at the University of Victoria and in the Tlicho region. The project supported the work of two students (A. Marinakis' Master's-level thesis and J. Martel's Bachelor's-level thesis) on elements of the Tlicho language.

166**Social Sciences****Stephen, Bob**

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File No: 12 410 613**Licence No:** 13 570**Region:** All**Location:** Inuvik, Fort Resolution, Fort Simpson, N'dilo, Yellowknife, Aklavik, Holman, Tsuigehtchic, Norman Wells and Gameti**STRENGTHENING LITERACY SUPPORTS FOR SENIORS**

The objectives of this NWT Literacy Council-sponsored study were to better understand the literacy needs and preferences of NWT senior citizens, and to make recommendations for more effective literacy supports and services for this target group. Seventy-five senior citizens, from primarily Inuvik, Yellowknife, Fort Simpson, Fort Resolution and Wekweetil, were interviewed as part of this research. The findings of the research indicate that senior citizens are more likely to be engaged in a literacy learning activity if there are supports in place such as seniors' participation in the development of the activity, familiar and accessible learning locations, and learning activities that are culturally-relevant, less structured (e.g., a mix of individualized instruction and group activities, short-duration classroom sessions, etc.) and applicable to seniors (e.g., learning topics that address issues that are important to seniors such as health and wellness, income security benefits, etc.). In response to these findings, a number of recommendations were drawn up to improve literacy outreach to senior citizens: the development of guidelines and best practices to address the literacy needs of seniors, the creation of an operational definition of literacy (i.e., the ability to communicate, represent, compute and solve problems in one or more of the official languages of the NWT), the strengthening of literacy supports through improved interagency relationships among governments, literacy providers, communities and families, the creation of awareness of senior literacy activities, programs and supports, and the establishment of sufficient long-term funding through comprehensive and complementary public policy that does not distinguish between aboriginal and English language literacy and that is aimed at building capacity in developing and sustaining successful senior literacy supports.

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File No: 12 410 615**Licence No:** 13580**Region:** NS**Location:** Aurora College, Yellowknife**LEARNING FROM THE SWEDES: COMMUNITY PERSPECTIVES ON LITERACY**

As part of a larger study of adult literacy (Keith Walker and Angela Ward with Nayda Veeman – "Comparing adult literacy in Canada and Sweden: From policy to practice", funded by the Social Sciences and Humanities Research Council of Canada), the researcher interviewed six adult learners in Yellowknife in April 2004. She also interviewed a non-aboriginal adult education instructor and two members of a local NGO connected with adult literacy. The purpose of the interviews was to gather information on the ways in which

government policy affects practice, and more importantly, to gain an understanding of the current issues and practices in the field of adult literacy.

The researchers have taken qualitative data collected from interviews in various Canadian and Swedish contexts and used them to develop a Study Circle package (based on a grassroots Swedish tradition) to help both practitioners and policymakers to understand, discuss and address Canadian adult literacy issues. Information gathered from adult learners in the NWT, especially regarding second language issues and the importance of community-based education, has informed the Study Circle package.

168

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Region: SS

Location: Lutsel K'e

NEGOTIATING WITH MINING COMPANIES – LESSONS FROM THE LUTSEL K'E EXPERIENCE

This project gathered the views of women, youth, elders, miners, negotiators and leaders in Lutsel K'e Dene First Nation (LKDNF) regarding the impacts of mining, and lessons learned from consultations and negotiations with mining companies and government. The findings will be used to strengthen other indigenous communities, particularly in South America, in their interactions with companies, governments and non-governmental organizations.

Interviews revealed that: 1) there are far more negative than positive effects from mining, with significant socio-economic and environmental impacts; 2) youth and women are bearing most of the social costs; 3) miners (mostly middle-aged men) are benefiting the most, although very few are full-time employees; 4) there is a general feeling that LKDFN would be better off without mining (a view that is held by 87 % of those interviewed). Negotiation processes have strengthened since the first Impact Benefit Agreement (IBA) was negotiated with BHP. LKDFN now uses its own negotiators, follows a consultation protocol, undertakes community-based monitoring and uses its aboriginal rights to further its aspirations. However, youth feel left out of decision-making. Also, even if LKDFN is getting better at negotiating conditions through IBAs, many do not feel there is an option to say “no” to mining.

TRADITIONAL KNOWLEDGE

169

Traditional Knowledge

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File No: 12 410 594**Region:** SS**Licence No:** 13620**Location:** Fort Resolution**TRADITIONAL KNOWLEDGE STUDY OF FLOOD AND CLIMATIC HISTORY IN THE SLAVE RIVER DELTA, NWT**

Field activities in 2004 involved meeting with community members and local groups to lay the groundwork for continued collaboration on a Traditional Knowledge study of environmental change in the Slave Delta, based on interest expressed by the Fort Resolution Environmental Working Committee (FREWC). A number of activities were undertaken at this time, including : presenting the research project idea at the Deninu Kue Community Hall; meeting with the Fort Resolution Environmental Committee, as well as number of other community officials and representatives; and discussing the research idea with community members and undertaking field visits to the delta. An important outcome of these visits was the identification of a number of community concerns and suggestions such as: 1) Traditional Knowledge is a very sensitive subject that must be treated with respect and not be misused; 2) research results must be verified and reported back to the community; 3) active land users and elders hold the most knowledge about the land (a number of names were identified as particularly valuable people to talk to); 4) the project should engage community members wherever possible (e.g. research assistant, language interpretation, student projects); and 5) researchers should come into the community with an open mind and be ready to collaborate. As part of the preliminary research scoping, a number of community observations about environmental change in the delta were reported and related to weather, water levels, ice conditions, wildlife and plants.

170

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File No: 12 410 617**Region:** IN**Licence No:** 13599**Location:** Holman**RESEARCHING FORMS OF LITERACY IN A NORTHERN COMMUNITY**

This four-year study is aimed at investigating traditional, historical, and contemporary forms of aboriginal literacy in an Inuinnaqtun-speaking community using research methods derived from Inuinnaqtun ways of knowing. Relationships among the various forms of Inuinnaqtun and English literacy - traditional, historical, and contemporary, print-based and otherwise - and interactions among these forms over time will be examined. Specific research objectives centre on identifying ways of learning, documenting traditional, historical and contemporary literacy practices in depth, ascertaining if and how traditional and historical forms of literacy as well as ideas about literacy are active and visible in contemporary literacy in the community, and determining differences and similarities between English print-based literacy and various forms of (aural-image based) aboriginal literacy. Year 1 of the research focused on conducting interviews with Holman elders on the content and processes of traditional literacies. Findings to date have identified potential aboriginal literacies that provide insights into what may constitute literacy and text. Preliminary data analysis suggests that the characteristics of traditional Holman literacies might be: visualized, oral and aural, storied, multi-modal, relational/contextual, connected to identity, genealogical, situated (nested)/local, occur within

memoriescape, practical, kinesthetic, latent, personalized, recursive, numerical, historical, dialogic (process)/consensual (product), validated, colonized, metaphorical/descriptive and triggered

171

Traditional Knowledge

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File No: 12 410 627

Region: IN, GW

Licence No: 13683

Location: Inuvik, Aklavik, Tuktoyaktuk, Paulatuk, Sachs Harbour and Holman

INUVELUIT ETHNOBOTANY

The summer of 2004 constituted verification interview work for the Inuvialuit Ethnobotany Project. This is a joint project with the Inuvialuit Cultural Resource Centre, the Aurora Research Institute and Parks Canada (Western Arctic Field Unit). The Hamlets of Aklavik, Inuvik, Tuktoyaktuk and Holman were visited and the researchers spoke with eight elders at this time. All these interviews have been transcribed and archived at the Inuvialuit Cultural Resource Centre, Inuvik. A number of botanical voucher specimens were also collected in 2004 and they are deposited at the herbarium at the Aurora Research Institute.

The researcher is presently working on the main project deliverable, a book, the first draft of which will be ready on May 31, 2006.

172

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Location: Aklavik, Inuvik, Tuktoyaktuk, Paulatuk, and Fort McPherson

THE COLLECTION OF WOLVERINE (*Gulo gulo*) ABORIGINAL TRADITIONAL KNOWLEDGE (ATK) FROM NORTHERN CANADA COMMUNITIES FOR SPECIES ASSESSMENT: A CASE STUDY

This project was conducted to investigate how Aboriginal Traditional Knowledge (ATK) can be documented, described, and utilized in the species assessment process of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The wolverine status report is an example of a COSEWIC species assessment that could benefit from the inclusion of ATK. Correspondingly, ATK associated with wolverines was gathered during this project to enhance species assessment. A total of 30 interviews were conducted in ten different locations in the Yukon, NWT and Nunavut. These locations were chosen with assistance from local Hunter and Trapper Committees/Associations, regional wildlife management organizations and local biologists, and were originally compared to the documented wolverine range to ensure that all communities chosen were within wolverine distribution range. Findings indicate that wolverines continue to occupy the same range as in the past (i.e., distribution encompasses the Northern Mountain, Boreal and Arctic ecological areas, from forested and alpine areas in the west to arctic tundra in the east). Food availability is an overriding factor in these areas with wolverines preferring certain habitat types, mainly forested areas to open tundra in Boreal areas, and in treeless habitat, rocky to hilly habitats. In the Northern Mountain ecological area, wolverines were discovered to prefer higher altitude habitats. ATK holders noted that wolverines prefer to den along creeks and banks, in rocky outcrops or in the snow. It was noted that wolverines are naturally uncommon and generally solitary, except during the breeding season in late February to April, and in winter when groups of wolverine have been observed to be feeding on carrion. ATK holders reported that the health of wolverines harvested was good, indicating that wolverines have a high survival rate beyond their first year of life. As wolverines are also scavengers and have few natural competitors, the main cause of

wolverine mortality results from hunting and trapping, which occurs opportunistically and incidentally. It was noted that wolverine harvesting is area-dependent. This allows wolverines from unharvested regions to migrate to and sustain populations in areas where wolverine hunting or trapping occurs. The home ranges of wolverines were thought to be very large, with some wolverines being transient with no detectable home range. In the arctic and boreal areas, wolverines were observed to have caribou as their main source of food, which was thought to be obtained mainly from wolf kills. It was noted that wolverines are linked to wolves through the carrion they scavenge on, which originates from wolf kills; hence, impacts to either wolves or their prey could result in impacts to wolverines. Wolverines have also been observed to prey on rabbits and ptarmigan, and to feed on vegetation, bones and antlers in the summer. With regard to population sizes and trends, it was found that in the Kivalliq region wolverine numbers have been on the rise since the mid 1900s, when wolverine numbers recovered due to a wolf-control program was suspended. Wolverine populations in the Kitikmeot region were reported to be stable and large enough to support substantial harvesting. In the North Slave region, wolverine numbers have been observed to be stable or decreasing with a possible cause for the decline in populations attributed to extensive development occurring in the region.

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File No: 12 410 623**Licence No:** 13653**Region:** NS**Location:** Yellowknife, NT**INDIGENOUS KNOWLEDGE AND ENVIRONMENTAL IMPACT ASSESSMENT IN THE NWT**

In-depth interviews were conducted in Yellowknife from June to August 2004 as part of this Master's-level thesis study. The aim of the study was to explore how the formal incorporation of Indigenous Knowledge in resource management is an indicator of increasing authority and decision-making capacity of northern people. Twenty-five individuals were interviewed. All had a professional or personal connection to the application of Indigenous Knowledge in resource management in the NWT as well as involvement in current and past political change in the North. A series of political developments, namely the comprehensive land claims process and the devolution process, have increased northerners' decision-making capacity with regards to resource management. This, in turn, has led to efforts to formally incorporate Indigenous Knowledge in resource management, most notably through the *Mackenzie Valley Resource Management Act* (MVRMA). Hindrances on local decision-making capacity were identified as inadequate funding, unsettled land claims, stalling of the devolution process and unfair resource revenue sharing, decision-making authority of the federal government of the MVRMA, and ineffective attempts to incorporate Indigenous Knowledge into a system rooted in the Western scientific tradition.

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File No: 12 410 595**Licence No:** 13561**Region:** IN, GW**Location:** Inuvik, Aklavik, and Tuktoyaktuk**DEVON CANADA CORPORATION – TRADITIONAL KNOWLEDGE STUDY FOR THE PROPOSED BEAUFORT SEA OFFSHORE DRILLING PROGRAM**

The main objective for this study was: 1) to work with the people from local communities to obtain information to assist in the assessment of potential impacts on traditional activities; and 2) to obtain

Traditional Knowledge information that could be used to improve the biophysical and social impact assessment.

Kavik-AXYS Inc., on behalf of Devon Canada Corporation, collected Traditional Knowledge information from participants from Aklavik, Inuvik and Tuktoyaktuk. The interviewers were Camellia Grey and Andrea Hansen. They received training in environmental impact assessment procedures and interviewing methods from the Inuvialuit Cultural Resource Centre, and attended Devon's issues identification and impact assessment workshop.

A total of 71 people from Aklavik (25), Inuvik (24), and Tuktoyaktuk (22) were interviewed. All the interviews were recorded. Tapes were transcribed and, where appropriate, translated. Elders were given the option of working with an interpreter. Participant names were provided by the community corporations, elders committees or the hunters and trappers committees in each of the three communities. Interviewers collected information on community issues and concerns, patterns of traditional land use in the study area, Traditional Knowledge, and mitigation recommendations regarding the Devon program. Follow-up meetings with participants were held in November 2004 in each of the three communities to validate study findings.

The main issues of concern to participants were potential impacts to wildlife and harvesting, the potential for pollution and contamination, economic opportunities, and community and social issues. Although not directly related to Devon's program, environmental change was the topic of most concern to participants. Participants also mentioned their concern about the past effects of oil and gas operations in the region. Study findings confirm that traditional activities and harvest patterns continue to play a significant role in the economy and culture of the Inuvialuit, and that there is a need to balance economic benefits with environmental integrity.

175

Traditional Knowledge

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Licence No: 13581

Location: Tuktoyaktuk

TUKTOYAKTUK PLACE NAMES PROJECT

Work on the Tuktoyaktuk Place Names Project continued in 2004, and under an extension of the 2004 permit in January and February of 2005. The focus of the work was to continue writing the draft of the book, and to verify the information in it with elders in Tuktoyaktuk. The research team worked extensively with David Nasogaluak and Edger Kotokak to review the information on each place and to ensure that it was correct. Also important was to make sure that the project translator could hear how each name was pronounced so that she could write it in the Committee for Original Peoples Entitlement (COPE) standardized writing system. An update of the project was given at the February 2005 meeting of the Tuktoyaktuk Elders Committee. A committee of elders will review the final draft of the book in the late fall or early winter of 2005. Funding is being sought for the graphic design and printing of the book.

176

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Region: NS

Licence No: 13712
Location: Lac De Gras

2004 TRADITIONAL KNOWLEDGE STUDY

The purpose of this study is for the communities most affected by the mining operation of Diavik Diamond Mines Inc. to be able to collect and apply Traditional Knowledge to assess southern caribou migration, water quality and the quality of Lac de Gras fish before, during and after mining operations. Caribou migration monitoring was done by community participants doing observations in the field. Water quality information was obtained using a standard suite of parameters. Community participants selected the sampling locations and collected the samples. Fish palatability information was assessed by community members who caught fish, prepared them for eating, and evaluated the quality. Standard biological information for each fish was recorded with some fish used for scientific analysis. A helicopter, float planes, and boats were used to transport equipment and individuals to and from research sites. Each community selected three participants for the study.

177

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Location: Fort McPherson

SOCIO-ECOLOGICAL INDICATORS FOR COMMUNITY-BASED MONITORING AND RESOURCE MANAGEMENT

This project involved working with the Gwich'in Renewable Resources Board, the Tetlit Gwich'in Renewable Resources Committee, and elders and harvesters from Fort McPherson to document traditional indicators and methods for community-based monitoring. The main focus of the project was on berries and berry-harvesting. Specific goals included: identifying signs and symbols traditionally used by the Gwich'in to recognize changes in the community and environment; and understanding how the Gwich'in traditionally watched, listened, learned, understood and adapted to these changes. The project involved note-taking and audio- and/or video-recording of stories told by elders and harvesters about berries and berry-harvesting.

178

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Region: GW, IN

Licence No: 13685
Location: Aklavik, Inuvik, McPherson, Tsiigehtchic and traditional lands in the Gwich'in Settlement Area susceptible from the effects of the Mackenzie Gas Project

TRADITIONAL KNOWLEDGE AND SOCIO-ECONOMIC STUDIES IN THE GWICH'IN SETTLEMENT AREA

In 2004, activities were focussed on conducting interviews with holders of Traditional Knowledge, and updating socio-economic data collected from 2001-2004 under previous Scientific Research Licences. The Traditional Knowledge research was carried out by the Gwich'in Social and Cultural Institute, under contract with Imperial Oil. All activities complied with licence conditions.

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File No: 12 402 670**Licence No:** 13688**Region:** GW, IN**Location:** Inuvik, Aklavik, Tuktoyaktuk, Paulatuk, Sachs Harbour, and Holman**TRADITIONAL KNOWLEDGE (TK) AND SOCIO-ECONOMIC STUDIES IN THE INUVIALUIT SETTLEMENT REGION (ISR)**

In 2004, activities were focussed on completing a literature review with members of the community, and updating socio-economic data collected from 2001-2004 under previous Scientific Research Licences. This literature review work was directed by the ISR-TK study work group, which was formed in 2003, and which consists of representatives from the Hunters and Trappers Committee, the Community Corporations, and the Elders Committee in each of the communities participating in the study. All activities complied with licence conditions.

180**Traditional Knowledge****Povey, Andrew**

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File No: 12 402 670**Licence No:** 13705**Region:** GW, IN**Location:** Trout Lake and region**TRADITIONAL KNOWLEDGE AND SOCIO-ECONOMIC STUDIES AT TROUT LAKE**

The 2004 Traditional Knowledge studies conducted within the Deh Cho Region focussed on drafting a Sambaa K'e Traditional Knowledge report for the proposed Mackenzie Gas Line Project, based on a literature review and interviews with Traditional Knowledge holders in 2003. This work was completed by the Sambaa K'e Development Corporation under contract with Imperial Oil. Work under this licence also included updating socio-economic data which was collected from 2001-2004 under previous Scientific Research Licences. All activities complied with licence conditions.

181**Traditional Knowledge****Povey, Andrew**

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File No: 12 402 670**Licence No:** 13733**Region:** DC**Location:** Jean Marie River and region**TRADITIONAL KNOWLEDGE AND SOCIO-ECONOMIC STUDIES AT JEAN MARIE RIVER**

The 2004 Traditional Knowledge studies conducted within the Deh Cho Region (DCR) focussed on completing a literature review and identifying relevant Traditional Knowledge by conducting interviews with members of the community. This work was carried out by the members of the Jean Marie River First Nation under contract with Imperial Oil. All activities complied with licence conditions. Work under this licence also included updating socio-economic data which was collected from 2001-2004 under previous Scientific Research Licences. All activities complied with licence conditions.

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File No: 12 410 604**Licence No:** 13702**Region:** SS**Location:** Damant Lake (61°45'41"N, 105°00'01"W)**FOOD PRESERVATION, RETURN RATES AND ITS IMPLICATIONS FOR STORAGE**

In August 2004, the researcher completed her final field season of her doctoral dissertation fieldwork at Damant Lake. Travel to this site occurred with several members of the Black Lake Band from northern Saskatchewan, which enabled the researcher to gather data on what animals band members hunt and how they preserve food for the winter.

The goal of the research was to record data on caribou hunting, butchering, preservation and storage. Unfortunately, the researcher was unable to observe caribou hunting directly, as four caribou had been killed before her arrival at Damant Lake. Information on two of the caribou was recorded (e.g., how meat was eaten, how much meat was processed for smoking, and how long it took the meat to dry) with the other two returned to Black Lake unprocessed. Field observations aided the researcher in learning about the types of resources used when caribou are not available, and in realizing that winter is not as "lean" a season as generally assumed. Through the fieldwork, it was discovered that the summer months constitute the "lean" time of the year, when the use of dried and preserved meat is required.

Prince of Wales Northern Heritage Centre

ARCHAEOLOGISTS PERMITS

183

Archaeology

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File No: (NWT Archaeologists Permit 2004-948)

Region: IN **Location:** McKinley Bay

THE MCKINLEY BAY ARCHAEOLOGY PROJECT

Ethnohistoric records suggest that a group of bowhead whalers, the Nuvorugmiut, inhabited the northern Tuktoyaktuk Peninsula during the early contact period. Unfortunately, our knowledge of this adaptation has been limited by both a sparse ethnohistoric record, and by severe coastal erosion, which has destroyed virtually all evidence of this socioeconomic. However, one site on the outer Tuktoyaktuk Peninsula, McKinley Bay (OaTi-1), discovered in 1985 by C. Arnold, has survived the erosion. Positioned directly adjacent to the former location of Nuvurak, one of the few bowhead whaling villages described during the contact period, the site presents a rare opportunity to understand coastal Nuvorugmiut ways of life.

The McKinley Bay Archaeology Project seeks to produce a socioeconomic reconstruction of these poorly understood bowhead whalers, and more broadly, to understand the relationship between economy and social systems in the Western Canadian Arctic. Brief test excavations were conducted at McKinley Bay in 1991, providing a reference point for continued work at the site. Between July 17 and August 7, 2004, a crew of four returned to McKinley Bay to reassess the scope and integrity of the archaeological deposits, obtain a representative archaeological sample, and gauge the possibility of conducting larger scale excavations at the site in the future.

McKinley Bay is a prehistoric village site, composed of at least 13 semi-subterranean sod and driftwood structures that are roughly arranged along two rows. The northerly row contains six houses, which were generally larger and more robust than other houses at the site. The southerly row contains seven much smaller features, which were partially obscured by sand dunes that have developed in this area of the site. It is possible more features are present in this southerly row, which have been buried by the advancing sand. A comparison of the 2004 site plans and photos with those produced by Arnold in 1991 quite clearly indicates that substantial erosion has compromised parts of the site over the last 13 years. The extensive sand dunes, which once buffered the western portion of the site against the Beaufort Sea, are now almost completely eroded, and this destruction has begun to impact archaeological deposits, particularly the middens to the south-west of the site.

Consistent with this erosion, artifacts and bowhead whalebone were strewn in regular quantities on the beaches to the south and west of the site. The amount of worked whalebone recovered from the beaches, at some distance from the house clusters, suggests that whales were flensed and processed on the beaches. Enduring evidence for intensive processing of whales may be indicated by a greasy, oil soaked paleosol, which leaches into a small, and thoroughly polluted, tundra pond to the south-east of the site, near the tundra/beach margin.

Subsurface investigations focused on a large semi-subterranean house structure, labeled Feature 2. Approximately 10 m² of deposits were removed from the feature, in two transects. Although limited, the excavations reveal that Feature 2 was cruciform, with a carefully constructed floor of undressed driftwood logs laid side-by-side, and three low (ca. 20 cm in height) raised platforms, constructed from adzed planks and

large logs. Over most of the floor, a thick (ca. 10cm), compacted layer of wood chips and shavings was discovered. This layer was likely part of the active floor, because abundant animal bones and artifacts, the result of domestic activities, were found throughout it.

Artifact styles suggest that the house was occupied sometime in the period circa 1400 AD to 1850 AD. The material culture recovered from the site is typical of the region, although it may include a number of specific attributes that are unique to the northern Tuktoyaktuk Peninsula. While the faunal analysis is still ongoing, some preliminary observations are possible. Surprisingly, the most abundant taxon in the assemblage was likely bowhead whale, represented by hundreds of small fragmented pieces of ribs and vertebra, and occasional phalanges. Other taxa, including ringed seal, duck, geese, and fish, occurred in more-or-less equal frequencies throughout the assemblage. Interestingly, much of the whalebone recovered appears to have been debris from the manufacture of tools and other artifacts, a situation congruent with the number of finished whalebone implements recovered.

184
Bussey, Jean

Archaeology

Points West Heritage Consulting
Langley, BC

File No: (NWT Archaeologists permit 2004-949)
Region: NS **Location:** Ekati Diamond Mine

ARCHAEOLOGICAL ACTIVITIES AT THE EKATI DIAMOND MINE

Jean Bussey of Points West Heritage Consulting Ltd. has conducted archaeological investigations for BHP Billiton Diamonds Inc. (BHPB) in its claim block north of Lac de Gras since 1994. Each year, she has undertaken to provide archaeological potential assessments, complete archaeological inventories, assess or mitigate sites and conduct tours of archaeological resources for interested groups. Primarily as a result of her work, there are now 198 recorded archaeological sites associated with the EKATI Diamond Mine. Sites located near development areas have been tested and mitigated through systematic data recovery consisting of subsurface examination and/or surface collection. Sites well removed from such activity areas have been recorded and are periodically revisited, but are otherwise avoided.

The majority of the recorded sites in the BHPB claim block are associated with eskers, but sites are also found on other terrain types, usually near the larger lakes. There are still many portions of the claim block that have not been inventoried because no development or exploration activity has been identified in the vicinity. An intensive inventory was conducted at the narrows between Lac de Gras and Lac du Sauvage in response to concerns identified by the Yellowknives Dene First Nation although no BHPB activity is currently proposed in this area. During this inventory, 17 new archaeological sites were recorded and there is potential for additional sites in the area. These sites are likely associated with caribou hunting since the narrows represents an important caribou crossing, but judging by its significance today, fishing may have also been an important prehistoric subsistence activity. A number of the sites in the BHPB claim block have yielded small chert tools suggestive of the Arctic Small Tool tradition, which likely dates 2500-3500 years before present in this area, but the majority of the archaeological sites in the claim block probably relate to the last 2500 years.

The majority of the sites near EKATI are best described as lithic scatters, sites that are characterized by unworked flakes of stone with an occasional tool. The most common lithic or stone material is quartz, which is usually white, but may also be clear, grey or slightly pink in colors. Quartz is found naturally as veins in the bedrock of the Lac de Gras area. In fact, EKATI was named for these fat-like veins. Quartz cobbles are also found naturally in the numerous eskers that cut through the claim block. It is suggested that both sources of quartz were utilized prehistorically to obtain the raw material for stone tool manufacture. Although most sites are associated with the prehistoric period, a number of traditional use sites have also been recorded in the BHPB claim block.

In 2004, no new development areas were identified and no land-based exploration was proposed or undertaken, thus, there was no need to conduct archaeological fieldwork. However, as part of their ongoing commitment to share information on the archaeological work conducted at EKATI, BHPB requested that Jean Bussey conduct tours. Unfortunately, only two groups were able to send representatives on the tours that were offered in late August and early September. Representing the Lutsel K'e First Nation was Ernest Boucher. Representing the Yellowknives Dene First Nation were Mike Francis and Peter Sangris. During each of the two tours, five or six sites were visited on the ground

and many more were pointed out from the air while conducting helicopter over flights. The sites were viewed over two days; with the eastern portion of the study area examined the first day and the western on the second. Sites throughout the study area were examined, not just those near existing pits or activity areas. Development areas were also viewed from the air and an explanation of the type of archaeological work conducted at such locations was provided.

185

Archaeology

Bussey, Jean

Points West Heritage Consulting
Langley, BC

File No: (NWT Archaeologists Permit 2004-950)

Region: NS **Location:** Tibbitt to Contwoyto winter road

ARCHAEOLOGICAL INVESTIGATIONS ALONG THE TIBBIT TO CONTWOYTO WINTER ROAD

In 2004, Jean Bussey of Points West Heritage Consulting Ltd. conducted archaeological investigations for the Joint Venture that operates the Tibbitt to Contwoyto (formerly the Lupin) winter road. The winter road runs from the south end of Tibbitt Lake near Yellowknife to almost the north end of Contwoyto Lake in Nunavut. Field investigations in the NWT portion of the winter road involved a multi-disciplinary inspection tour conducted in June and the assessment of a possible gravel pit in August. This is the fourth consecutive year that the Joint Venture has sponsored investigations as part of their commitment to ensure that future archaeological impacts are avoided or minimized.

In 2001, an archaeological inventory was conducted and resulted in the discovery of 55 new archaeological sites and the revisit of 14 previously recorded sites. All, but six of these sites are situated in the NWT. Because the inventory was conducted nearly 20 years after construction of the road, there are some archaeological sites within 30 m of developed areas. In 2002, all sites within 30 m of the winter road or related facilities were revisited and if threatened were subjected to site assessment and/or mitigation or were protected through the erection of markers. The four sites in the NWT at which markers were erected in 2002 are KiPb-2, KjPa-1, KkNv-9 and LcNs-140. During the 2003 investigations, all sites located near areas with current winter road activity were revisited to assess their status and markers were installed at an additional site along the winter road - LcNs-133.

The major objective of the 2004 field reconnaissance was to determine if markers had adequately protected sites. The markers erected at four of these sites consist of standard four-foot (1.2 m) wooden survey stakes that were pounded approximately 30 cm (1 foot) into the ground. At KiPb-2 the stakes are at some distance from the actual site and are present only on the esker crest since they would be lost in snow cover on lower ground. At KkNv-9 and LcNs-140, it was necessary to install markers immediately adjacent to the east side of each site because of the proximity of the winter road portages. For the same reason, it was necessary to install stakes immediately adjacent to the west side of LcNs-133. At the fifth site, KjPa-1, because of the proximity of a winter road camp (Lockhart Lake Camp), Nuna Logistics arranged to install taller and more permanent metal markers with reflectors.

In 2004, the stakes were intact at KiPb-2 and KjPa-1 and six needed replacement at KkNv-9. Six stakes were also damaged at LcNs-140, likely as a result of snow removal activity, and were replaced. Additional stakes were installed between the original ones at LcNs-140 as added protection. No disturbance was noted within the protected areas associated with these four sites, but tire tracks were evident on the surface of LcNs-133. Two stakes at this site were broken and were replaced. Additional markers were added between the original ones to prevent vehicle traffic from using the site area. All wooden stakes were sprayed with fluorescent orange paint to make them more visible.

Some of the wooden markers are showing signs of wear although they could last another year or two. It is recommended that the status of the markers and their ability to provide site protection be reviewed annually. During this recheck it is recommended that any weakened markers be replaced, loose stakes be re-installed and the tops of all wooden markers be sprayed with orange paint. No new tools were noted at the sites visited, but additional unworked flakes are evident on the surface of both LcNs-140 and LcNs-133. No artifacts were collected since the 2004 field investigations were conducted under a Class 1 NWT Archaeologists Permit.

During the June inspection tour, limited archaeological survey was conducted at two abandoned repeater station locations formerly associated with the winter road. The more southerly location did not contain any archaeological material. The location on Mackay Lake yielded one new prehistoric archaeological site, a lithic scatter consisting of scattered and concentrated unworked flakes along with at least two tools; all artifacts were left in situ (in place). The identification of a potential gravel pit on Burnt Island in Gordon Lake prompted an archaeological assessment, which was conducted in August 2004. In the process both recent and potentially historic mining remains were located.

186**Archaeology****Bussey, Jean**Points West Heritage Consulting
Langley, BC**File No:** (NWT Archaeologists Permit 2004-951)**Region:** NS **Location:** Snap Lake**THE DE BEERS CANADA MINING INC. SNAP LAKE PROJECT**

Jean Bussey of Points West Heritage Consulting Ltd. conducted archaeological investigations for De Beers Canada Mining Inc. at Snap Lake in 2004. She previously conducted investigations on this property in 1998, 1999, 2001 and 2003. In 2004, the investigations involved the examination or monitoring of previously recorded sites and limited new inventory. Also working on this project were Bonnie Campbell of Points West and Darren Rabesca of the Dogrib Dene First Nation.

Past archaeological reconnaissance associated with the Snap Lake Project has resulted in the discovery of 53 archaeological sites, most of which are sufficiently distant from proposed development that no further investigation is required. Two sites judged to be threatened by development activity were previously mitigated. One of these sites, KkNv-6, is adjacent to the Snap Lake winter access road and was revisited in 2003 in company with representatives of the North Slave Metis Alliance (NSMA). At the recommendation of the NSMA, De Beers arranged for the installation of protective markers on the portage where KkNv-6 is located (Photo 1). The positioning of these markers was examined in 2004 to ensure that the site was accurately identified.

During the 2004 investigations, the entire length of the Snap Lake winter access road was flown to ensure no recorded archaeological sites had been disturbed. During this over flight, a number of recorded sites were visited on the ground. Three of the five sites recorded near Portage 1 were revisited, as were all three sites located near Portage 2. At Portage 2, a few unworked flakes exposed since KkNv-6 was mitigated in 2001 were noted on surface, but were left in situ since the markers have provided added site protection. Also in this area, KkNv-8 was examined because of concerns that thin ice might require a revised portage in future. It was determined that KkNv-8 is on slightly elevated terrain (Photo 2) that would be easily avoidable and does not provide a suitable crossing for a winter road. A number of sites associated with Portages 3 and 4 were revisited. All sites examined are intact and are sufficiently distant from or far enough above the access road that they are not threatened by its use. The sites near Portages 5 and 6 were not revisited, but were viewed from the air and have not been affected by use of the winter road.

Also as part of the 2004 investigations, archaeological inventory was conducted at three locations. One survey involved a new portage located between the originally assessed Portages 2 and 3 on the Snap Lake access road. This area was examined from the air and ground and is primarily suggestive of low archaeological potential. Foot traverses were undertaken on two slightly elevated bedrock-based landforms, one within the portage and one to the west. No archaeological resources were encountered. The second inventory area involved a bypass to Portage 6 utilized during the winter of 2002-2003 when thin ice precluded the use of the original portage. No archaeological evidence was located in the vicinity of this bypass. The third area of inventory involved the most north-westerly portion of the Snap Lake mine footprint. The shoreline in this area was walked for several kilometres and no archaeological sites were encountered. The entire mine footprint has now been adequately assessed and provided KkNv-6 is avoided and the portages are not revised, no further archaeological investigation is required along the Snap Lake winter access road.

187**Archaeology****Bussey, Jean**Points West Heritage Consulting
Langley, BC**File No:** (NWT Archaeologists Permit 2004-952)**Region:** SS **Location:** Kennady Lake**ARCHEOLOGICAL INVESTIGATIONS FOR THE GAHCHO KUÉ PROJECT**

Points West Heritage Consulting Ltd. conducted archaeological investigations for De Beers Canada Mining Inc. at their Gahcho Kué Project in 2004. The project is located at Kennady Lake, which is approximately 300 km east/north-east of Yellowknife and west of Walmesley Lake. Jean Bussey directed the field investigations and was assisted by Gabriella Prager, also of Points West, and Henry Basil and Aaron Catholique of the Lutsel K'e First Nation. The archaeological work was conducted under a Class 2 NWT Archaeologists Permit and was primarily concerned with the relocation and/or assessment of previously recorded archaeological sites associated with the proposed diamond mine and its ancillary facilities.

Twenty-six previously recorded sites located within 1 km of the proposed Gahcho Kué mine were relocated and assessed. Subsurface testing was conducted at 15 of these sites and they, in conjunction with an isolated find that was previously collected, were judged to be suggestive of low archaeological significance. This testing along with the preparation of updated site maps and surface collection, where relevant, is judged to be sufficient mitigation in the event these sites are threatened by the proposed mine development. At the remaining ten sites, detailed surface examination was judged to be sufficient to suggest that three sites have high archaeological significance and the other seven have low-moderate to moderate significance. Systematic data recovery consisting of subsurface excavation and surface collection is recommended at each of the three highly significant sites if avoidance is not feasible. Testing of the seven sites with low-moderate to moderate significance is recommended and it is likely that subsurface excavation and/or systematic surface collection will also be necessary at some of these sites if they can not be avoided. Additional archaeological inventory was conducted in areas that had not been previously examined or where revised development plans were identified in the area of Kennady Lake. No new archaeological sites were discovered.

Recorded archaeological sites located along the winter road route to Mackay Lake were also revisited. Emphasis was placed on visiting sites nearest to the land-based portages although aerial reconnaissance was conducted to ensure other sites were sufficiently above or distant from the route. A total of 20 sites were revisited. The majority of the 20 sites, and all sites that were not revisited, are situated over 30 m from the winter road route or are on elevated landforms that would not likely be crossed even if there was a route revision. Several sites, however, are located on low landforms near the existing route and require periodic monitoring to ensure they are not impacted, while a few sites are very near abandoned sections of the winter road route. One recorded site will require testing to determine if more intensive data recovery is justified and one new site was discovered, but is avoidable.

Ten previously recorded sites were relocated along the esker complex south of Kennady Lake. Two sections of this esker were traversed on foot to assist in the selection of areas where aggregate or other samples could be collected without disturbing archaeological sites. No new archaeological sites were discovered

188**Archaeology****Bussey, Jean**Points West Heritage Consulting
Langley, BC**File No:** (NWT Archaeologists Permit 2004-953)**Region:** NS **Location:** Courageous Lake

ARCHAEOLOGICAL ACTIVITIES AT THE COURAGEOUS LAKE PROPERTY

In 2003, exploration activity prompted archaeological investigations in the vicinity of Courageous Lake on behalf of Seabridge Gold Inc. In 2004, archaeological activities formed one component of a number of tours conducted on the property and a number of drill locations were assessed. Work in both years was directed by Jean Bussey of Points West Heritage Consulting Ltd. and was conducted through EBA Engineering Consultants Ltd.

To provide background, in 2003 a total of 14 new sites were recorded. Two graves, the location of a possible tent camp likely used during an early phase of mineral exploration and a log cabin were recorded north of Courageous Lake. Between Matthews and Courageous lakes six archaeological sites were found. Four are associated with esker deposits, one is on a bedrock ridge and the sixth site is on an old lake terrace/beach. All six sites contain varying quantities of quartz flakes, most of them unworked. Two archaeological sites were recorded east of Matthews Lake. One is a windbreak likely relating to early mineral exploration and the other is an isolated find consisting of a white chert artifact suggestive of the Arctic Small Tool tradition (approximately 2500 to 3500 years before present). Both sites are located in an area typified by scattered bedrock outcrops. To the south of Matthews Lake three prehistoric sites were found on elevated bedrock outcrops. One is an isolated find consisting of a stone tool fragment and the other two are lithic workshops and/or dense lithic scatters.

The investigations conducted in 2003 suggest that portions of the Courageous Lake Property contain landforms with archaeological potential. Only a small portion of this area was examined in detail and it was recommended that further work be conducted in advance of development and/or exploration. Seabridge conducted exploration drilling in 2004 and a post-activity archaeological examination was completed. The drilling activity occurred in areas with low archaeological potential or in locations that had been examined previously with negative results for archaeological sites although one drill hole was just over 30 m from a site. These 2004 investigations confirm that further work should be conducted in advance of any new exploration or development activity.

While Jean Bussey was present at the Courageous Lake property in 2004, representatives of the Lutsel K'e First Nation, Yellowknives Dene First Nation and Dogrib Treaty 11 Council visited one or more archaeological site. Representing the Lutsel K'e First Nation were Maryrose Enzoe, Windi Skye (Sai) Catholique, Jordan Michel, Gary Michel and Monica Krieger. Representing the Yellowknives were Noel Doctor, Peter Sangris, Michel Paper, Frank Paper, Leo Betsina, Alfred Balligeon and Louis Azzolini. Representing the Dogrib were Eddie Erasmus, James Rabesca, Georgina Chocolate, Joe Migwi and Joline Huskey. Since the major emphasis of the tours was the exploration activity, limited archaeological discussion occurred and only one or two sites were visited with each group. However, Joe Migwi provided useful information on the cabin and burials found to the north of Courageous Lake in 2003.

189

Archaeology

Clarke, Grant

Golder Associates Ltd.
Calgary, AB

File No: (NWT Archaeologists Permit 2004-956)

Region: IN **Location:** McKinley Bay

MACKENZIE GAS PROJECT HERITAGE RESOURCES PROGRAM

The 2004 program marks the third field season on the Mackenzie Gas Project. A consortium comprised of Imperial Oil Resources Ventures Ltd., the Aboriginal Pipeline Group, ConocoPhillips Canada Ltd., Shell Canada Ltd., and ExxonMobil Canada Properties Ltd is proposing the project.

At present, the project includes plans to develop: natural gas production facilities at Taglu, Parsons Lake, and Niglintgak; a gathering system that will collect the natural gas and associated gas liquids from these three fields and transport them to facilities in the Inuvik area; a natural gas liquids pipeline from the Inuvik area to Norman Wells; a natural gas pipeline

(the Mackenzie Valley Pipeline) from the Inuvik area south via Norman Wells that will connect to an existing pipeline in north-west Alberta allowing access to the market; and a number of infrastructure locations that will be required to support the construction and continued operation of the pipeline.

A team of archaeologists from MPEG (the Mackenzie Project Environment Group) conducted the 2004 archaeological field program. As the program is wide spread along the Mackenzie Valley numerous local assistants were also involved with the fieldwork and included:

- Inuvialuit Region: Dennis Chicksi, Tommy Chicksi, Robert McLeod, James Rogers
- Gwich'in Area: Julie Ann Andre, Andy Andre, Anna May MacLeod
- K'ahsho Got'ine Sahtu Area: Alfred Orleas, Alfred Masazumi
- Tulita Sahtu Area: Peter Horassi
- Pehdzeh Ki First Nation - Deh Cho Region: George Tally, William Williams
- Trout Lake Dene Band - Deh Cho Region: Fred Jumbo, Ron Kotchea
- Liidlii Kue First Nation - Deh Cho Region: Edward Cholo
- Jean Marie River First Nation - Deh Cho Region: Derrick Norwegian, Raymond Minoza, Darran Gorgon

The 2004 field program was focused primarily on a number of potential infrastructure and granular resource extraction sites that are situated along roughly 1 400 km of proposed pipeline route stretching from the tip of the Mackenzie Delta to the Alberta border. The primary goal of the 2004 program was to conduct heritage resource impact investigations at newly proposed sites as well as to further investigate sites that could not be assessed in 2003 due to snow cover. Reconnaissance level investigations were also conducted for several pipeline re-routes in locations that were considered to be of moderate to high potential for heritage resources. A number of post-impact assessments were also conducted in areas that were with a winter drilling program that was completed in the winter of 2003/2004. Two crews of three people including a local assistant completed the investigations. Ground based assessments were conducted at over 100 locations resulting in the discovery of 20 new heritage resource sites over a period of 30 days. Thirteen previously recorded heritage sites were also re-visited.

Both prehistoric and historic sites were recorded as a result of these investigations. All of the prehistoric sites identified during the 2004 field program are comprised of stone flakes and other debris resulting from the manufacture of stone tools. Historic period sites were more common and include a number of trails, traplines, cabins, and camps that are primarily related to traditional land use.

190 Archaeology

Hanna, Don

Bison Historical Services
Calgary, AB

File No: (NWT Archaeologists Permit 2004-945)

Region: IN **Location:** Mackenzie Delta

MACKENZIE DELTA HERITAGE SURVEY

In June of 2004, Bison Historical Services Ltd. and Axys Environmental Consulting Ltd. carried out a survey of heritage sites on northern Richards Island in the Mackenzie Delta on behalf of EnCana Corporation. Known sites were re-visited to ensure that they had not been damaged by last winter's Burnt Lake drilling program. We also examined five potential wellsites and related access routes to ensure that upcoming winter projects would avoid all known and newly identified heritage sites.

Fieldwork was based out of Tuktoyaktuk and carried out by helicopter and on foot. We did not excavate any materials at any sites and no artifacts or other cultural materials were collected.

Three known heritage sites were re-visited to evaluate the success of avoidance during the 2003-2004 EnCana Burnt Lake N-16 exploratory drilling programs. None of these sites had been damaged by last winter's Burnt Lake N-16 drilling activities.

A new wellsite and access roads in the Burnt Lake area were also examined. Three unrecorded sites were

identified near possible access routes. None of these sites will be impacted by the construction or use of the planned access routes. No known heritage sites will be damaged by the proposed Burnt Lake N-05 drilling activities.

A potential drilling program in the Corral Bay area was also examined. These investigations consisted of preliminary scouting of four possible wellsite locations and access north of Corral Bay. Each wellsite, sump location and access route was examined in detail from the air and on the ground.

Five unrecorded ancient heritage sites and two relatively recent traditional land-use localities were identified during these investigations. Where necessary, program elements were changed to ensure that no heritage sites would be impacted. Subsequent to these field examinations, EnCana has determined not to proceed with the Corral Bay drilling program. Consequently, no sites in the Corral Bay area will be impacted by proposed EnCana Corporation activities.

191 **Archaeology**

Hanna, Don
Bison Historical Services
Calgary, AB

File No: (NWT Archaeologists Permit 2004-947)

Region: SA **Location:** Summit Creek

SUMMIT CREEK HERITAGE SURVEY

On July 12 and 13 of 2004, Bison Historical Services Ltd. carried out a brief archaeological survey of heritage sites in the vicinity of Summit Creek, some 60 km south of Tulita, NWT. These investigations were carried out at the request of Northern EnviroSearch Ltd. on behalf of Northrock Resources Ltd. Fieldwork was based out of Tulit'a and carried out by helicopter over-flight and on foot. Investigations were carried out by Don Hanna of Bison Historical Services Ltd. and accompanied by Wilfred Lennie of Tulit'a, who acted as guide, advisor and wildlife monitor.

In 2003 Northrock drilled an oil well at B-44 near Summit Creek on the south-west flanks of the Flint Stone Range. This well was served by an access road extending 74 km east to the Mackenzie River ice road. Our job in 2003 was to identify any heritage sites that might be threatened by Northrock's construction program, and help Northrock develop ways to avoid all sites. In 2004 our role was to document successful avoidance of sites identified in 2003 and to examine new development areas that might contain heritage sites. Three known sites near Stewart Lake and within 100 m of the Northrock access road were re-visited. No impacts to any known heritage sites as a result of the Northrock 2003-2004 Summit Creek B-44 exploratory drilling program were identified.

Northrock also proposes to drill a new oil well at one of four possible locations near Summit Creek during the winter of 2004-2005. Each of the possible wellsites will require a short length of new access road connecting to the access road used last year. Each wellsite and access route was examined from the air and on foot and exploratory shovel tests were excavated at each proposed wellsite and at the planned camp location. No heritage sites were identified at any of these new locations. The proposed 2004-2005 Northrock Resources Ltd. drilling program in the Summit Creek area will impact no

192 **Archaeology**

Hanna, Don
Bison Historical Services
Calgary, AB

File No: (NWT Archaeologists Permit 2004-958)

Region: SA **Location:** Colville Lake

COLVILLE LAKE HERITAGE SURVEY

Between August 2 and 7, 2004 Bison Historical Services Ltd. carried out an archaeological survey for heritage sites in the general vicinity of Colville Lake, NWT. These investigations were carried out at the request of Northern EnviroSearch Ltd. on behalf of Apache Canada Ltd. and Paramount Resources Ltd. Fieldwork was based out of Norman Wells and carried out by helicopter over-flight and on foot. Investigations were carried out by Don Hanna and Bob Steinhauser of Bison Historical Services Ltd. and accompanied by Rhea MacDonald of Norman Wells and Robert Kochon of Colville Lake, who acted as guides, advisors and wildlife monitors. Examination consisted of helicopter over flight, on-foot surface examination and judgmental shovel testing.

There were three objectives to this study:

- To examine existing wellsites drilled by Paramount and Apache to determine if any heritage sites had been damaged by drilling;
- To look at proposed new wellsite locations to ensure that no heritage sites are damaged;
- To examine selected portions of the access routes associated with these wellsites to identify heritage sites that might be impacted.

Two wellsites and portions of access road in the Turton Lake area were examined. One recent traditional land-use locality was identified near the access route. The planned drilling program won't damage this locality. Four wellsites and portions of access road in the vicinity of Lac Maunoir were examined. A prehistoric lithic scatter and a relatively recent traditional land-use camp were identified near the already existing access route. Neither of these sites will be damaged by use of the access road. One wellsites and portions of access road in the vicinity of Tunago Lake were examined. A large traditional land-use camp area was identified on the north-east side of Tunago Lake. This concentration of land-use locales includes cabins, tent frames, stages, deadfall traps and other signs of intensive land use. One of these old camp locales, consisting of the remains of tent frames, stages and other camp debris is close to a proposed water uptake area on Tunago Lake. If necessary the access road will be adjusted to avoid this locality. Six wellsites and portions of access road in the Nogha vicinity were also examined. Two traditional land-use camp areas were identified near Lac Belot. Both of these locales are well away from proposed access routes and will not be damaged. Two old traditional land-use locales were also identified on the north end of Tweed Lake. These locales are well away from proposed access routes and will not be damaged.

The planned 2004-2005 drilling programs of Apache Canada Ltd. and Paramount Resources Ltd. in the Colville Lake area will damage no known heritage sites.

193

Archaeology

Hanna, Don

Bison Historical Services

Calgary, AB

File No: (NWT Archaeologists Permit 2004-964)

Region: SA **Location:** Mackenzie River

MACKENZIE RIVER WINTER ROAD BRIDGES PROJECT

In August of 2004, Bison Historical Services Ltd. and Sahtu Environmental Services Inc. carried out a survey of heritage sites at a series of bridge locations on the Mackenzie River winter road. The GNWT Department of Transportation is in the process of building 40 permanent bridges along the Mackenzie Valley Winter Road between Wrigley and Fort Good Hope. The Prince of Wales Northern Heritage Centre in Yellowknife recommended that 15 of these planned bridge installations should be examined by an archaeologist to make sure that no heritage sites would be damaged by construction.

Sahtu Environmental Services Ltd. sub-contracted Don Hanna of Bison Historical Services Ltd. to carry out the required investigations. Fieldwork was based out of Norman Wells and carried out by helicopter and on

foot. The area of each bridge crossing was extensively shovel tested. Accompanying Don Hanna were Bob Steinhauser of Bison Historical Services Ltd. and Thomas Manuel of Norman Wells. Bridge locations examined include those located at Blackwater River, Little Smith Creek, Big Smith Creek, Denise Creek, Rachelle Creek, Jackfish Creek, Jungle Ridge Creek, Christina Creek, Hellava Creek, Francis Creek, Elliot Creek, Gibson South, Gibson North, Tsintu River and Lynn Creek.

No heritage sites were found at Denise Creek, Jackfish Creek, Jungle Ridge Creek, Christina Creek, Hellava Creek, Francis Creek, Elliot Creek, Gibson South, Gibson North and Lynn Creek.

Two relatively recent traditional land-use localities were identified near the Rachelle Creek crossing. Neither will be impacted by the proposed bridge construction. A recorded traditional land use site and an unknown traditional land use site were identified at the Tsintu River crossing. Neither will be impacted by the proposed bridge construction. A small prehistoric site was identified at the Little Smith crossing. This site has already been damaged by bridge construction. However, this site has very limited importance. Four recorded ancient sites lie near the Big Smith Creek crossing. However, examination of this crossing indicates that none will be damaged by the planned bridge construction. Four recorded heritage sites are known to lie near the Blackwater River crossing. However, examination of this crossing indicates that none will be damaged by the planned bridge construction.

194

Archaeology

Johnson, Donald S.

University of Manitoba
Winnipeg, MB

File No: (NWT Archaeologists Permit 2004-962)

Region: IN **Location:** Minto Inlet

ARCHAEOLOGICAL INVESTIGATIONS AT MINTO INLET, VICTORIA ISLAND

Archaeological investigations (in conjunction with socio-cultural investigations, Hamlet of Holman, Victoria Island, NWT) were conducted between July 26 and August 15, 2004 in the Boot Inlet Area, and the Fish Bay Area of Minto Inlet, Victoria Island, NWT. The archaeological investigations represent the second field season in a two-year project, and focus on an assessment of mid-19th century direct and indirect contact and inter-societal interaction between historic northern Copper Inuit groups and the Royal Navy vessels H.M.S. Enterprise and H.M.S. Investigator in north-western Victoria Island. Specifically, the project is one of the first to systematically examine possible changes in northern Copper Inuit material culture, intra- and inter-group material trade systems and social relations resulting from direct and indirect contact with elements of the Royal Navy on Victoria Island. Additionally, these investigations also examined sites directly associated with the 1851-52 "wintering" of H.M.S. Enterprise at Winter Cove, Walker Bay and environs.

Field surveys were conducted in the immediate Boot Inlet area - including the Isthmus (itanyak) connecting Winter Cove, Walker Bay, and the northern extremity of Boot Inlet - and much of the Fish Bay area of north-west Minto Inlet. A total of approximately 24 sites, comprising historic Copper Inuit tent rings and caches, Royal Navy habitation, cache and survey features and one site preliminarily identified as Neo-eskimo, were recorded.

The nature and amount of data collected varied according to project research plans, though random sampling was conducted at each site, and all features were recorded in detail. The items recovered from sites also varied, although 19th century manufactured metals, glass, and wood predominated. In some cases, evidence of modification of manufactured materials into projectile points was present. All recovered items are now undergoing conservation procedures.

As was the case with the survey conducted in 2003, preliminary results of the 2004 field survey continue to suggest that Northern Copper Inuit groups interacting with the officers and crew of H.M.S. Enterprise in the

Winter Cove, Walker Bay, and Boot Inlet areas ca. 1851-52, acquired numerous manufactured items of European origin. Some of these items were modified into tools and introduced into the material culture of these groups. Similarly, it can also be suggested that these items were "filtered" into intra- and inter-group trade systems of the Walker Bay, Boot Inlet and Minto Inlet areas thereby contributing to changes in traditional social interaction.

The project has received the strong support of the Holman Community Corporation, and the Olokhaktomiu Hunters and Trappers Committee, Holman, Victoria Island, NWT. Aaron Kimiksana and Jack Kataoyak of Holman served as Research Assistants. Other invaluable support in the field and in Holman was provided by Joseph Halusit, Donald Inuktalik, Aaron and Susie Kimiksana, and the 1st Canadian Ranger Patrol Group, Holman, NWT. The following institutions and individuals have contributed support, expertise and guidance: Inuvialuit Land Administration; Aurora Research Institute; Prince of Wales Northern Heritage Centre; Joint-Faculty Research Ethics Board, University of Manitoba, Dr. Jill Oakes, Department of Environment and Geography, University of Manitoba; Dr. Rick Rieve, Department of Zoology, University of Manitoba; Dr. William "Skip" Koolage, Department of Anthropology, University of Manitoba; Dr. James Savelle, Department of Anthropology, McGill University, Vermilion Community College, Ely, Minnesota, Will Steger, Ely, Minnesota, Margaret O'Leary, Salamander Bay, Australia and Dylan Morgan, Ottawa, Canada.

195

Archaeology

Paquin, Tod
Golder Associates Ltd.
Saskatoon, SK

File No: (NWT Archaeologists Permit 2004-963)

Region: DC **Location:** Fortune Minerals near Nico Lake

HERITAGE RESOURCES IMPACT ASSESSMENT OF FORTUNE MINERALS NICO ALL-WEATHER ACCESS ROAD

Todd Paquin of Golder Associates Ltd. completed an archaeological inventory and assessment under NWT Permit 2004-963 for an all-weather access road proposed by Fortune Minerals to service their mine operation near Nico Lake, NWT. The mine property is located about 10 km east of Hislop Lake in the Marian basin, and the proposed access road will proceed approximately 50 km west and south from this location to an existing access road leading west to the village of Wha Ti. Edward Williah and Leon Nasken of the Dogrib First Nation and Marcel Lafferty of the North Slave Métis Alliance assisted with the investigations.

Previous archaeological records and studies within the region, as well as environmental and ethnohistorical data, were consulted to aid in providing a basis for structuring field studies. Map and aerial photograph mosaic analysis served as an orientation to the Project area landforms and their heritage resource potential.

The all-weather access road is in the preliminary planning stage of development; thus, field investigations focused on a 100 m wide proposed corridor. The aim of the pedestrian survey and shovel-testing program were to assess landforms considered to exhibit moderate to high potential for heritage resources. These included river and creek crossings, uplands, ridges and elevated areas adjacent to water bodies. In addition, a potential conflict was noted with previously recorded heritage resource KjPo-44 at the proposed Marian River crossing. Emphasis was placed on relocating the site to develop a mitigation strategy should a conflict exist.

In total 225 shovel tests were excavated along the proposed corridor. No artifacts were recovered from these tests. The Dogrib First Nation and North Slave Métis Alliance assistants indicated that use of the area away from the Marian River was limited and significant heritage resources were not expected.

Heritage resource KjPo-44, an approximately 450 m long portage trail site along the southern bank of the Marian River, occurs in conflict with a proposed bridge location. Shovel testing immediately adjacent to the trail and in the near vicinity did not result in the identification of intact cultural components. However,

portages are an important component of the Dogrib cultural landscape and considered highly significant. A recommendation for avoidance of this site has been made to mitigate impacts from construction activities.

Additionally, visual examinations encountered one claim post, one trail and three small metal traps. The three metal traps occur along cleared winter roads while the trail exhibits trees cut by chainsaw. In recent times, Aboriginal harvesters on snowmobile would access these trapping locations. The claim post lacks an identification plaque but is consistent in size and structure with claim posts from ca. 1968 identified during a 2003 heritage assessment of the Nico Mine property. None of these areas contains evidence of antiquity greater than 50 years and are not considered archaeological resources under the current provisions of the NWT Archaeological Sites Regulations (GNWT 2001).

All moderate and high potential landforms were examined within the proposed all-weather access road corridor. The crossing of the Marian River must be rerouted to avoid impacting KjPo-44. As a result, additional heritage assessment will be required at the new crossing location, once determined. No heritage concerns were noted for the remainder of the proposed Fortune Minerals all-weather access road corridor. Given that local area traditional users are known to use the region, consultations, directed at determining impacts to local harvesting activities, is recommended.

196

Archaeology

Prager, Gabriella

Points West Heritage Consulting
Leduc, AB

File No: (NWT Archaeologists Permit 2004-961)

Region: NS **Location:** Old Discovery Mine, ~85 km north of Yellowknife

TYHEE YELLOWKNIFE GOLD PROJECT

In July 2004, on behalf of Tyhee NWT Corp., Points West Heritage Consulting Ltd. completed archaeological assessments relative to proposed mining developments. This project is near the old Discovery Mine, abandoned in 1969, and located approximately 85 km north of Yellowknife. The original Discovery Mine is situated on Giauque Lake, but the two current proposed developments are on Winter Lake, known as the Discovery property (a short distance west of Giauque Lake) and on Nicholas Lake to the north-east, approximately 12 km apart. Both properties have previously excavated exploratory shafts, which are to be reopened and developed.

Archaeological assessments were conducted of proposed development areas identified on a conceptual plan received from EBA Engineering in June 2004. Planned facility locations are fairly preliminary; therefore, archaeological field work was aimed at providing a combination of impact assessments of those more firmly defined developments as well as overview assessments of possible development areas. The latter were meant to provide indications of archaeological potential and to identify specific locations where fieldwork may be required. Impact assessments consisted of pedestrian surveys together with shovel testing where necessary. Overview assessments were completed using low and slow aerial over flights as well as pedestrian surveys of selected portions.

Ground reconnaissance was conducted in the vicinity surrounding the proposed mine on the Discovery property, the entire perimeter of Round Lake (the proposed tailings pond), a possible waste rock storage area west of the mine site, as well as selected portions of the terrain surrounding the Nicholas mine site. Several transects were also walked over a large, broad, rocky ridge extending west from the old Discovery Mine town site, past the current camp location to the north end of Narrow Lake. Old mining debris and various structural remains associated with the past mining activities were found scattered over this ridge. An esker identified as a possible gravel source south-west of Giauque Lake was also walked. A broad exposed area at the south end was shovel tested, and an old, gravel borrow at the north end contained extensive exposures that were closely inspected.

Low-level helicopter over flights were completed of the general route for a road between Discovery and Nicholas Lake properties as well as the northern two-thirds of the old winter road between Discovery property and Yellowknife. This provided a good indication of terrain suggestive of archaeological potential where ground reconnaissance will be necessary when routes are finalized. These landforms generally consist of elevated terrain near the larger water bodies.

Heritage resources found this season were all associated with past mining activities, with one possible exception. Some camp remains found on the south side of Round Lake may relate to Aboriginal hunting activities, but this site did not appear to contain any evidence suggestive of a date older than 50 years. Additional archaeological assessments will be required when locations of all ancillary developments have been finalized.

197

Archaeology

Thomson, Callum
 Thomson Heritage
 Calgary, AB

File No: (NWT Archaeologists Permit 2004-955)

Region: NS **Location:** Great Slave Lake

ARCHAEOLOGICAL SURVEYS AROUND GREAT SLAVE LAKE

The Great Slave Lake investigations comprised four parts. In early July, Callum Thomson and Mike Beauregard, Project Geologist for Snowfield Development Corp., conducted boat-assisted surveys on the coastline and several kilometres into the interior between Drybones Bay and Matonabbee Bay. Alfred Baillargeon, Modeste Sangris, Morris Martin and Paul Mackenzie from the Yellowknives Dene First Nation (YKDFN) joined them for the last two days. The objective was to locate sites that may be affected during Snowfield's mineral exploration activities, expand the site inventory developed during a preliminary survey in the area by the YKDFN, Randy Freeman, and Callum Thomson in 2003 (NWT Permit 2003-927), and assess the need for any mitigation measures to protect sites during exploration.

Forty new pre-contact and early historic sites and three recent sites were found during our five days of survey on more than 30 km of access trails, cut lines, exploration grids and lake shoreline. Sites were found primarily on exposed bedrock outcrops close to lakes and ponds. Some contained worked quartz veins and stone tools, indicating pre-contact occupation of the area. No sites had been affected by previous exploration activities and, in general, there seemed to be little potential for conflict between planned exploration activities and heritage resources in this area. In August, a follow-up survey was conducted by helicopter of several additional claim blocks east of Drybones Bay. Rachel Crapeau of the YKDFN Land and Environment Committee accompanied Mike Beauregard and Callum Thomson. No sites were found. Although archaeological potential was judged to be high in some parts of the Snowfield claim blocks, the planned winter exploration program, which mostly involves lake-ice drilling and use of existing winter trails, was considered unlikely to negatively affect any heritage resources.

The second part of the survey involved more intensive work between Francois Bay and Gros Cap, and then focused on the east shore of the North Arm, north-west of Yellowknife Bay, and the west shore of North Arm between Whitebeach Point and Alexander Point. Forty-two more new sites were found, including fish camps, old cabin sites, cemeteries, and a large number of pre-contact sites on sandy terraces on the west side of the North Arm, several of which had been disturbed by sand and gravel quarrying operations.

The third and fourth parts of the project involved two phases of boat-assisted survey in July and August of parts of the north shore of the East Arm and the North Arm of Great Slave Lake with representatives of the YKDFN Alfred Baillargeon, Peter Sangris, Modeste Sangris, Paul Mackenzie and Mike Francis. The first part of the survey area extended from Taltheilei Narrows on East Arm to Gros Cap, south of Matonabbee Bay. Thirty-three new sites were found, including at least three pre-contact sites containing quartz veins and tools, two cemeteries, a trading post site, six old cabin sites and more than 30 boulder features such as tent rings and hide-drying rings.

Overall, the finding and interpretation of 115 new archaeological sites in two weeks of surveys, added to the 61 new sites found in the vicinity of Drybones Bay in 2003, has contributed greatly to the picture of land use around Great Slave Lake by the Yellowknives Dene and other contemporary, historic and pre-contact groups over several millennia. These results suggest that a need exists for intensive surveys wherever major exploration and development projects are planned around Great Slave Lake, and indicates that collaborative research and field survey projects by archaeologists and Aboriginal people are beneficial.

198**Archaeology****Thomson, Callum**Thomson Heritage
Calgary, AB**File No:** (NWT Archaeologists Permit 2004-965)**Region:** NS **Location:** Mackay Lake**MACKAY LAKE ARCHAEOLOGICAL SURVEY**

In late September, on behalf of Yellowknives Dene First Nation (YKDFN), Callum Thomson joined Noel Doctor, Paul Mackenzie and Angus Martin for seven days of boat-assisted surveys from the MacKay Lake Lodge to Warburton Bay, areas traditionally used by the YKDFN for caribou hunting and trapping. While we lost a great deal of time to bad weather and a faulty outboard motor which prevented us from visiting many planned target areas, we were able to record 40 new sites, 33 of which contained pre-contact stone tools and 12 of which contained boulder features such as tent rings and hearths. Many of the sites were associated with eskers, including three that had been disturbed by runway construction at MacKay Lake Lodge. During our two days at the Warburton Bay camp, more than 500 caribou, in small herds of 50-200, were seen resting at narrow lake crossings on their way south to the tree line.

This was the first intensive archaeological survey around MacKay Lake since the late 1960s, when William Noble recorded several sites, and suggests that many more sites associated with caribou hunting, trapping, fishing and travel on the lake remain to be found. As at Great Slave Lake (see Permit 2004-955), it is recommended that archaeological surveys and assessments be undertaken prior to any major exploration or development project around MacKay Lake, with the research involving collaboration between experienced archaeologists and aboriginal groups familiar with the local environment and resources.

199**Archaeology****Unfreed, Wendy J.**FMA Heritage Resources Consultants Inc.
Calgary, AB**File No:** (NWT Archaeologists Permit 2004-954)**Region:** IN **Location:** Ellice, Garry, and Niglntgak islands**ARCHAEOLOGICAL INVESTIGATIONS FOR CHEVRON CANADA RESOURCES ON ELLICE, GARY, AND NIGLNTGAK ISLANDS**

On behalf of Kavik-AXYS Inc., as agents for Chevron Canada Resources, Wendy Unfreed of FMA Heritage Resources Consultants Inc. conducted two archaeological investigations that were grouped together under NWT Class 2 Archaeologists Permit #2004-954. These investigations included an archaeological impact assessment of two proposed well locations related to the proposed 2004-2006 Ellice Tuktuk Drilling Program and an archaeological field overview of an area that will be explored during the Garry 3D Seismic Program. The project areas, which are located in the outer Mackenzie Delta, are focused in the vicinities of Ellice, Garry and Niglntgak Islands, approximately 120 km north of Inuvik, NWT.

The proposed 2004-2006 Ellice Tuktuk Drilling Program is located on Ellice Island, on the western portion of the outer Mackenzie Delta. Situated within Crown Land in the Inuvialuit Settlement Region (ISR), the program involves the drilling of an exploratory natural gas wells (the West Ellice well), as well as the expansion and testing of an existing well that was drilled in 2003-2004 (well I-48). Drilling at the three locations is scheduled to commence during winter 2004-2005, although some of this work may be carried through to completion during the winter of 2005-2006.

The -48 and West Ellice well locations were subject to surface examination and subsurface (shovel) testing in an attempt to ascertain whether they were in conflict with any archaeological deposits. Based on the investigation of the two wellsites, it was noted that both are situated in low-lying areas of Ellice Island and a small adjacent island to the north-west, all of which are subject to seasonal flooding. This information,

combined with that provided by an Inuvialuit Elder who accompanied the field crew, led to the interpretation that the two wellsite areas possess low potential for the identification of archaeological sites. Surface examination and shovel testing did not result in the identification of any archaeological deposits. One site of traditional concern, however, was identified adjacent to the West Ellice wellsite. This was found in the form of a burial (site NhTx 1), observed on the crest of a pingo approximately 300 m south-east of the proposed West Ellice sump location. Due to the sensitive nature of this site, it was recommended that three steps be taken to preserve the location: (1) that development respect a 100 m buffer around the site as a “no impact” zone; (2) that unnecessary visitors within this zone be discouraged from visiting the site, to avoid hastened erosion or vandalism; and (3) that local community Elders be consulted to gain insight about the location and determine a culturally relevant mode of treatment for the site.

The Garry 3D Seismic Program is located on land surrounding the mouth of the Middle Channel of the Mackenzie River. It covers an area of approximately 144 km², and includes portions of Garry and Niglintgak Islands, as well as part of a third unnamed island on the outer delta and adjacent sections of the mainland channel. Situated within ISR lands, the program will extend into areas protected by the Canadian Wildlife Service as the Kendall Island Bird Sanctuary.

The investigation of the Garry 3D Seismic areas involved an intensive surface examination of a sample of areas within the proposed seismic exploration area, as well as adjacent areas on the Middle Channel of the Mackenzie River that will be used as campsite and staging locations. Based on the results of the investigation, two archaeological sites and one traditional site were identified. The archaeological sites were comprised of two isolated artifact finds, while the traditional site was interpreted as a fishing camp. The traditional site (site NiTw 3) and one isolated artifact find (site NiTw 2) were identified on the southern sand spit of Garry Island, while the remaining artifact find (site NiTw 4) was noted on a mid-slope area of the highest landform of Niglintgak Island. The remainder of the study area, outside Garry Island and the central portion of Niglintgak Island, were found to be low areas of mud flats and sandbars subject to seasonal flood as part of the active Mackenzie Delta. Based on these observations, combined with insights provided by an Inuvialuit Elder who accompanied the field crew, an interpretation was made that the areas of highest potential for the identification of older archaeological and traditional sites would be in the higher ice-thrust landform areas of Garry Island and central Niglintgak Island. The areas of the active delta and associated sand spits, although obviously important for modern site location such as NiTw 3, were considered to be of lower potential for the identification of archaeological materials. This is considered to be the result of a combination of factors, including the removal of evidence through water flooding or the burying of evidence through alluvial silting.

Based on the results of the field overview assessment conducted for the Garry 3D Seismic program, it was recommended that the areas of the three identified sites (two archaeological sites, one traditional site) be protected by identifying a large “impact-free” buffer zone around them. With this buffer, the integrity of each of these locations can be preserved both from primary and secondary impacts. For the remainder of the area, no archaeological or traditional sites were identified in conflict with the objectives of the Garry 3D Seismic Program. As additional development occurs in the region, however, more detailed models of archaeological site probability should be developed and tested with field reconnaissance. Creation of these models will be greatly facilitated through consultation with local community Elders.

Department of Environment and Natural Resources

WILDLIFE RESEARCH PERMITS

200 Wildlife

Auriat, Denise
Gwich'in Renewable Resource Board
P.O. Box 2240
Inuvik, NT X0E 0T0

File No: 3279
Region: IN **Location:** Richardson Mountains

DALL'S SHEEP ECOLOGY USING SATELLITE TRACKING

Objectives: To conduct a study on Dall's sheep in the Richardson Mountains. Two Dall's sheep were collared, both 3/4 curl eight year old rams. Blood and fecal samples were collected during collaring. Blood samples were obtained for cell blood counts, as well as parasite and trace mineral analysis. The fecal samples will be analyzed for parasites and diet. The satellite collars accumulated three GPS locations per day: one at midnight, one at 1:00 am and one at 4:00 pm. The data has been compiled and mapped using GIS. Twenty-one locations were selected using the GPS data and surrounding habitat, and ground assessments were done to determine vegetation, slope aspect, and distance from escape terrain.

201 Wildlife

Bekhuys, Tim
AMEC Earth and Environmental
2227 Douglas Road
Burnaby, BC V5C 5A9

File No: 2984
Region: NS **Location:** Kennady Lake (Gahcho Kué)

BIOPHYSICAL BASELINE STUDIES AT KENNADY LAKE

Objectives: Baseline wildlife studies on caribou, carnivore and bird abundance and distribution in relation to exploration activities at Kennady Lake.

202 Wildlife

Bollinger, Karen
US Fish and Wildlife Service
Waterfowl Population Surveys
11500 Americal Holly Drive
Laurel MD USA 20708-4002

File No: 2871
Region: DC **Location:** Mills Lake

BIRD AND WATERFOWL BANDING

Objectives: Bird banding at Mills Lake under Western Canada Cooperative Waterfowl Banding Program.

203 Wildlife

Branigan, Marsha
GNWT Department of Environment and Natural Resources
Bag Service #1
Inuvik, NT X0E 0T0

File No: 3281

Region: IN

Location: Inuvialuit Settlement Region

GRIZZLY BEAR POPULATION STUDY: PHASE 1 SATELLITE TRACKING

Objectives: To obtain current distribution and movement of grizzly bears in the area between the Mackenzie Delta and the ISR-Nunavut boundaries. To identify areas to focus mark-recapture or aerial efforts so that an accurate population estimates can be obtained. To obtain current information on body condition, size, age structure, reproductive status, litter sizes, ages of first reproduction, and diet of grizzly bears in the area. To determine the levels to which grizzly bears in the region have been exposed to rabies.

204

Wildlife

Branigan, Marsha

GNWT Department of Environment and Natural Resources

Bag Service #1

Inuvik, NT X0E 0T0

File No: 3293

Region: IN

Location: Traditional hunting areas near Inuvik and Tuktoyaktuk

CARIBOU HARVEST DATA COLLECTION

Objectives: To conduct a caribou harvest data collection program in Inuvik and Tuktoyaktuk.

205

Wildlife

Carriere, Suzanne

GNWT Department of Environment and Natural Resources

Wildlife and Fisheries Division

Yellowknife, NT X1A 3S8

File No: 2859

Region: NS

Location: Along the proposed Taltson River transmission line to Snap Lake

SNOW TRACK-MONITORING OF FURBEARERS AND HARES

Objectives: To conduct track count surveys in North Slave region and near Fort Providence.

206

Wildlife

Carriere, Suzanne

GNWT Resource, Wildlife and Economic Development

Wildlife and Fisheries Division

Yellowknife, NT X1A 3S8

File No: 2870

Region: ALL

Location: Across the NWT

NWT SMALL MAMMAL AND HARE SURVEY

Objectives: To establish the ability to predict small mammal cycles throughout the NWT. Trend information is used in predicting population trends of economically important furbearers, and in other wildlife, and monitoring changes in ecosystem.

207

Wildlife

Catto, Steve

Parks Canada

P.O. Box 348

Fort Simpson, NT X0E 0NO

File No: 3039

Region: DC

Location: Greater Nahanni ecosystems

SEASONAL DISTRIBUTION MOVEMENTS OF WOODLAND CARIBOU

Objectives: To assess distribution, movements, demography of caribou in greater Nahanni ecosystem by deploying satellite collars on to caribou.

208 **Wildlife**

Cluff, Dean

GNWT Department of Environment and Natural Resources
North Slave Regional Office
Yellowknife, NT X1A 2P9

File No: 2857

Region: NS **Location:** North Slave

MOOSE ABUNDANCE AERIAL SURVEYS AND OBSERVATION IN THE NORTH SLAVE REGION

Objectives: Conduct studies on moose abundance using aerial surveys and observation technology in North Slave Region.

209 **Wildlife**

Cluff, Dean

GNWT Department of Environment and Natural Resources
North Slave Regional Office
Yellowknife, NT, X1A 2P9

File No: 2860

Region: NS **Location:** North Slave region

RELOCATION OF COLLARED WOLVES ON THE BATHURST WINTER RANGE

Objectives: Conduct and aerial survey to re-locate radio collared wolves in the North Slave Region.

210 **Wildlife**

Cluff, Dean

GNWT Department of Environment and Natural Resources
North Slave Regional Office
P.O. Box 2668
Yellowknife, NT X1A 2P9

File No: 2892

Region: NS **Location:** Central Barrens

ECOLOGY AND MOVEMENTS OF TUNDRA-DENNING WOLVES

No report available.

211 **Wildlife**

Cluff, Dean

GNWT Department of Environment and Natural Resources
North Slave Regional Office
P.O. Box 2668
Yellowknife, NT X1A 2P9

File No: 3264

Region: NS **Location:** North Slave region

CARIBOU HABITAT SURVEY

Objectives: Boreal woodland caribou habitat survey in the North Slave Region, NWT

212 **Wildlife**

Cook, Joseph

University of New Mexico
Museum of Southwestern Biology
Albuquerque, NM USA 87131

File No: 2863

Region: SS, SA **Location:** South Slave, Sahtu, and Inuvik

PHYLOGEOGRAPHY OF SNOWSHOE HARES AND BIRCH

No report available.

213 **Wildlife**

Derocher, Andrew

University of Alberta
CW405 Biological Sciences Centre
Edmonton, AB T6G 2EP

File No: 3282

Region: IN **Location:** Pipeline Development Area in the Inuvialuit Settlement Region

GRIZZLY BEAR STUDY

Objectives: To conduct a study on grizzly bears.

214 **Wildlife**

Dickson, Lynne

Canadian Wildlife Service
4999 98th Avenue
Edmonton, AB T6H 2X3

File No: 3280

Region: IN **Location:** Victoria Island

MIGRATION PATTERNS AND POPULATION SURVEY

Objectives: To conduct a study on long-tailed ducks and king eiders.

215 **Wildlife**

Elkin, Brett

GNWT Department of Environment and Natural Resources
5th Floor 600-5102 50th Avenue
Yellowknife, NT X1A 3S8

File No: 2873

Region: SS **Location:** In and near Fort Smith

WHITE-TAILED DEER BASELINE HEALTH SURVEY

Objectives: To collect up to five white-tailed deer to determine the bacteria, virus and parasite fauna of the species in the southern NWT. The aim of the study is to determine the type and levels of parasites present; to collect samples to check for the presence of a bacterial disease which may be found in white-tailed deer; to collect samples for laboratory confirmation; to collect baseline information on the body condition, health status, and nutritional status of the collected animals; and finally, to mitigate the risk of disease introduction or movement associated with the natural movement of white-tailed deer in the NWT.

216 **Wildlife**

Ferguson, Carl
US Fish and Wildlife Service
11500 American Holly Drive
Laurel, MD USA 20708-4002

File No: 2872
Region: NS **Location:** Stagg River

BIRD AND WATERFOWL BANDING

Objectives: Pre-season banding of: 2 000 mallards, 1 500 northern pintails, and 1 000 of all other waterfowl species at each of the 20 banding stations in Canada. In 2003, the Mills Lake station banded 1 553 ducks including: 776 mallards, 253 northern pintails, 510 American green-winged teal, 3 blue-winged teal and 11 ducks of other species.

217 **Wildlife**

Goad, Robin E.
Fortune Minerals Ltd.
148 Fullarton Street
London, ON, N6A 5P3

File No: 2980
Region: NS **Location:** Lou Lake, 22 km west of Snare Lake Hydro Station.

BASELINE WILDLIFE SURVEY FOR FORTUNE MINERALS NIC0 PROJECT - ALL WEATHER ACCESS ROAD
No report available.

218 **Wildlife**

Goad, Robin E.
Fortune Minerals Ltd.
148 Fullarton Street
London, ON, N6A 5P3

File No: 3257
Region: NS **Location:** Lou Lake

ENVIRONMENTAL SURVEYS FOR THE FORTUNE MINERALS NIC0 PROJECT
No report available.

219 **Wildlife**

Godwin-Sheppard, Chris
AMEC Earth and Environmental
221-18St SE
Calgary, AB, T2E 6J5

File No: 3257
Region: NS **Location:** Kennady Lake

BIOPHYSICAL BASELINE STUDIES AT KENNADY LAKE
No report available.

220 **Wildlife**

Gunn, Anne
GNWT Department of Environment and Natural Resources - Wildlife and Fisheries
600, 5102 50th Avenue
Yellowknife, NT X1A 3S8

File No: 2861 **Region:** NS **Location:** Kennady Lake

STUDY ON MOVEMENTS OF THE BATHRUST CARIBOU HERD

No report available

221 Wildlife

Gunn, Anne
GNWT Department of Environment and Natural Resources - Wildlife and Fisheries
600, 5102 50th Avenue
Yellowknife NT X1A 3S8

File No: 2862 **Region:** NS **Location:** North Slave region

BOREAL CARIBOU HABITAT AND LAND USE PLANNING IN THE NORTH SLAVE REGION, NWT

No report available.

222 Wildlife

Hanks, Chris
BHP Diamonds Inc.
Ste. 1102, 4920 - 52nd Street
Yellowknife, NT X1A 3T1

File No: 2978

WILDLIFE EFFECTS MONITORING PROGRAM AT EKATI

No report available.

223 Wildlife

Haszard, Shannon

File No: 2868
Region: DC, SA, **Location:** Deh Cho region and Sahtu Settlement Area

PEHDZEH KI DEH SMALL SCALE WATERBIRD SURVEY

Objectives: Aerial surveys on water birds in the Sahtu and Deh Cho regions, also water chemistry and land cover.

224 Wildlife

Haszard, Shannon
Ducks Unlimited
5017, 52nd Avenue
Yellowknife, NT X1A 1T6

File No: 2985

LAC LA MARTRE WATERBIRD ECOLOGY PROJECT, NT

No report available

225 **Wildlife**

Haszard, Shannon

Ducks Unlimited
5017, 52nd Avenue
Yellowknife, NT X1A 1T5

File No: 3037

Region: DC **Location:** Deh Cho area

DEH CHO AERIAL WATERFOWL SURVEY

Objectives: Aerial surveys to determine the distribution and abundance of waterfowl, and to determine other areas of significance for waterfowl in the NWT.

226 **Wildlife**

Hindmarch, Trevor

Golder Associates
1000-940, 6th Avenue SW
Calgary, AB T2P 3T1

File No: 3001

Region: DC, SS **Location:** Cameron Hills

POST CONSTRUCTION WILDLIFE MONITORING AND SITE ASSESSMENT WITHIN PARAMOUNT'S CAMERON HILLS SIGNIFICANT DISCOVERY AREA

Objectives: The objectives of the post-construction winter track count survey are to: determine if the right-of-way (ROW) effecting wildlife movement; compare early and late winter use of the ROW and adjacent habitat types by wildlife; determine the relative use of the habitat found along the pipeline corridor by wildlife in winter; and compare use of the ROW by wildlife with use of adjacent edge, interior habitat and an undisturbed buffer area.

227 **Wildlife**

Hines, Jim

Canadian Wildlife Service
Suite 301, 5204, 50th Avenue
Yellowknife, NT X1A 1E2

File No: 3256

Region: NS **Location:** Yellowknife to Rae Road

ABUNDANCE AND PRODUCTIVITY OF WATERFOWL IN THE BOREAL FOREST

No report available.

228 **Wildlife**

Hines, Jim

Canadian Wildlife Service
Suite 301, 5204, 50th Avenue
Yellowknife, NT X1A 1E2

File No: 3285

Region: IN **Location:** Banks Island and the Inuvialuit Settlement Region

SNOW GEESE POPULATION STUDY

Objectives: To conduct a study on snow geese on Banks Island.

229 **Wildlife**

Hines, Jim

Canadian Wildlife Service
Suite 301, 5204, 50th Avenue
Yellowknife, NT X1A 1E2

File No: 3286

Region: IN **Location:** Inuvialuit Settlement Region and Anderson River Bird Sanctuary

SNOW GEESE POPULATIONS

Objectives: To conduct a study on snow geese in Anderson River.

230 **Wildlife**

Hines, Jim

Canadian Wildlife Service
Suite 301, 5204, 50th Avenue
Yellowknife, NT X1A 1E2

File No: 3287

Region: IN **Location:** Inuvialuit Settlement Region

AERIAL SURVEYS TO DETERMINE THE DISTRIBUTION AND ABUNDANCE OF WATER BIRDS

Objectives: To conduct an aerial survey in the coastal mainland portion of the ISR.

231 **Wildlife**

Johnson, Deborah

GNWT Department of Environment and Natural Resources
Fort Smith, NT X0E 0P0

File No: 2856

Region: DC **Location:** Fort Smith

BOREAL CARIBOU AND LAND USE PLANNING

Objectives: To measure baseline adult female and calf survival in high and low value caribou habitats in the Cameron Hill area of the Deh Cho; determine seasonal use of habitat by adult cow caribou; and map predicted high value habitat at various scales.

232 **Wildlife**

Johnston, Vickie

Canadian Wildlife Service
Suite 301, 5204-50th Avenue
Yellowknife, NT X1A 1E2

File No: 3288

Region: SA, DC **Location:** East Side of Mackenzie River

STUDY ON SONGBIRDS AND THEIR HABITAT ON EAST SIDE OF MACKENZIE RIVER

Objectives: To conduct study on shorebirds and their habitat.

233 **Wildlife**

Kustan, Ed

Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, AB T2P 5C5

File No: 3032

Region: DC **Location:** Deh Cho

WINTER WILDLIFE TRACK COUNT SURVEY

Objectives: To determine if the right-of-way (ROW) is affecting wildlife movement; and to compare early and late winter use of the ROW by wildlife.

234

Wildlife

Kustan, Ed

Paramount Resources Ltd.
4700 Bankers Hall West
888 3rd Street SW
Calgary, AB T2P 5C5

File No: 3036

Region: DC **Location:** Shiha Pipeline right-of-way

MIGRATORY BIRD MONITORING PROGRAM FOR FORT LIARD DEVELOPMENT PROJECT

Objectives: To conduct a migratory bird monitoring program in the vicinity of the Shiha Pipeline right-of-way.

235

Wildlife

Larter, Nic

GNWT Department of Environment and Natural Resources
Fort Smith, NT, X0E 0N0

File No: 3030

Region: DC **Location:** Near Trout Lake between Redknife River and Arrowhead Plateau

WILDLIFE RECONNAISSANCE SURVEY AND DEVELOPMENT OF SATELLITE COLLARS ON BOREAL CARIBOU

Objectives: To collect information on mid-winter distribution and relative densities of large mammals, specifically boreal caribou, in the Trout Lake area between Redknife River and Arrowhead Plateau.

236

Wildlife

Machtans, Craig

Canadian Wildlife Service
301, 5204-50th Avenue
Yellowknife, NT X1A 1E2

File No: 2866

Region: SA, DC **Location:** Fort Simpson and Norman Wells

BASELINE SURVEYS ON FOREST BIRDS

Objectives: To determine the density of birds in the common forest types in the two study sites mentioned above.

237

Wildlife

Moore, Steve

EBA Engineering Consultants Ltd.
Ste. 201, 4916 - 49th Street
Yellowknife, NT, X1A 2P7

File No: 3261

Region: NS **Location:** Areas of Matthews and Courageous Lakes, NT

2004 BASELINE DATA COLLECTION ON WILDLIFE FOR COURAGEOUS LAKE GOLD PROJECT, SEABRIDGE GOLD INC.

No report available.

238 **Wildlife**

Mulders, Robert

GNWT Department of Environment and Natural Resources
Scotia Centre
Yellowknife, NT X1A 3S8

File No: 3177

Region: NS **Location:** Central Barrens

WOLVERINE DNA SAMPLING ON THE CENTRAL BARRENS

No report available.

239 **Wildlife**

Mulders, Robert

GNWT Department of Environment and Natural Resources
Scotia Centre
Yellowknife, NT X1A 3S8

File No: 3262

Region: NS **Location:** Central Barrens

WOLVERINE HEALTH, CONDITION AND HARVEST PATTERNS IN THE CENTRAL BARRENS

No report available.

240 **Wildlife**

Nagy, John

GNWT Department of Environment and Natural Resources
Bag Service #1
Inuvik, NT X0E 0T0

File No: 3289

Region: IN **Location:** Inuvialuit Settlement Region

CALVING GROUND SURVEY

Objectives: To conduct a calving ground survey on the Bluenose-west and Cape Bathurst herds.

241 **Wildlife**

Nagy, John

GNWT Department of Environment and Natural Resources
Bag Service #1
Inuvik, NT X0E 0T0

File No: 3291

Region: IN **Location:** Banks Island, north-west Victoria Island, and Melville Islands

PEARY CARIBOU PRODUCTIVITY SURVEY

Objectives: To conduct a study on Peary caribou on Banks, NW Victoria, and Melville Islands.

242 **Wildlife**

Nishi, John

GNWT Department of Environment and Natural Resources
Fort Smith, NT X0E 0P0

File No: 3002

Region: SS **Location:** South Slave

MACKENZIE WOOD BISON POPULATION MONITORING PROJECT

Objectives: To measure calf, yearling, and bull: cow ratios during the post-calving period; to monitor the

Mackenzie herd for the presence of brucellosis and tuberculosis; and to monitor the Mackenzie herd for the occurrence of anthrax related mortalities in summer.

243 **Wildlife**

Nishi, John
GNWT Department of Environment and Natural Resources
Fort Smith, NT X0E 0P0

File No: 3003
Region: SS **Location:** Slave River lowlands

SLAVE RIVER LOWLANDS BISON POPULATION STUDY

Objectives: To measure calf, yearling and bull: cow ratios during post calving period for the Hook Lake and Grand Detour herds; To monitor the Slave River lowland herd for the occurrence of anthrax related mortalities; and to collect bison fecal samples to be screened for the presence of Johnes and bacteriophages.

244 **Wildlife**

Nishi, John
GNWT Department of Environment and Natural Resources
Fort Smith, NT X0E 0P0

File No: 3005
Region: SS **Location:** Highway 3

VEGETATION AND BISON DISTRIBUTION

Objectives: To monitor bison and vegetation along Highway 3.

245 **Wildlife**

Nishi, John
GNWT Department of Environment and Natural Resources
Fort Smith, NT X0E 0P0

File No: 3033
Region: DC **Location:** Nahanni - Liard area

MONITORING OF THE LIARD WOOD BISON POPULATION

Objectives: To measure calf, yearling and bull: cow ratios during post calving period and to census the Nahanni bison population.

246 **Wildlife**

Panayi, Damian
Golder Associates Ltd.
4910 - 50th Avenue, Unit 200
Yellowknife, NT X1A 2P1

File No: 2983
Region: NS **Location:** Baker Creek (Giant Mine) near Yellowknife, NT

MUSKRAT SAMPLE COLLECTION PROGRAM

No report available.

247 **Wildlife**

Panayi, Damian
Golder Associates Ltd.
4910 - 50th Avenue, Unit 200
Yellowknife, NT X1A 2P1

File No: 3260

Region: NS

Location: Tundra Mine area (between MacKay and Courageous Lake)

ENVIRONMENTAL INVESTIGATIONS OF RECLAMATION PLANNING AT THE TUNDRA MINE

No report available.

248

Wildlife

Poole, Kim

Aurora Wildlife Research &
Rescan Environmental Services Ltd.
Yellowknife, NT X1A 3S9

File No: 2865

Region: NS, SS **Location:** Along the proposed Taltson River transmission line to Snap Lake

BASELINE WILDLIFE MONITORING OF THE PROPOSED TALTSON HYDRO PROJECT

Objectives: To determine the distribution and relative abundance of selected wildlife along the proposed transmission line corridor.

249

Wildlife

Povey, Andrew

Mackenzie Project Environment Group
Suite 1100, 815-8th Avenue SW
Calgary, AB T2P 3P2

File No: 2858

Region: SA **Location:** Sahtu Settlement Area

2004 WINTER TRACKING STUDIES WITHIN THE SAHTU SETTLEMENT AREA

Objectives: To conduct winter track count and surveys in South Sahtu.

250

Wildlife

Povey, Andrew

Mackenzie Project Environment Group
Suite 1100, 815-8th Avenue SW
Calgary, AB T2P 3P2

File No: 2869

Region: SA **Location:** Sahtu area

2004 SPRING WILDLIFE STUDIES WITHIN THE SAHTU SETTLEMENT AREA

Objectives: Pellet group distribution data will provide information on occurrence, distribution, and habitat use by hares and ungulates. Species that will be particularly focused on in the surveys will include caribou and moose with a potentially high vulnerability to possible pipeline related impacts. These species are also those of importance for ecological and socio-economic reasons. Incidental observations on scat from other species will also be collected. Information collected will be used to support habitat modeling exercises and would compliment information obtained from other past or concurrent studies.

251

Wildlife

Povey, Andrew

Mackenzie Project Environment Group
Suite 1100, 815-8th Avenue SW
Calgary, AB T2P 3P2

File No: 3034

Region: DC **Location:** Deh Cho area

2004 SPRING WILDLIFE STUDIES WITHIN THE DEH CHO REGION

Objectives: To conduct spring pallet group surveys that will provide information on occurrence, distribution and habitat use by hares and ungulates.

252

Wildlife

Povey, Andrew

Mackenzie Project Environment Group
Suite 1100, 815-8th Avenue SW
Calgary, AB T2P 3P2

File No: 3035

Region: DC **Location:** Deh Cho area

2004 WINTER TRACKING STUDIES IN THE DEH CHO REGION

Objectives: To conduct winter track surveys that will provide information on occurrence, distribution, and habitat use by furbearer's species and ungulates.

253

Biology

Schryer, Richard

Golder Associates Ltd.
4910 - 50th Avenue, Unit 200
Yellowknife, NT X1A 2P1
rschryer@golder.com

File No: 3255

Region: NS **Location:** North Slave

SNAP LAKE DIAMOND PROJECT WILDLIFE MONITORING PROGRAM

No report available.

254

Wildlife

Slattery, Stuart

Ducks Unlimited Canada
Institute for Wetland and Waterfowl Research
P.O. Box 1160
Stonewall, MB R0C 2Z0

File No: 3284

Region: GW, SA **Location:** Mackenzie Valley

BREEDING DUCK POPULATION STUDY

Objectives: To conduct a study on breeding duck populations in the Mackenzie Valley with emphasis on scoters and scaup.

255

Wildlife

Stirling, Ian

Canadian Wildlife Service
5320 133 Street
Edmonton, AB T6H 3S5

File No: 3277

Region: IN **Location:** Beaufort Sea and Amundsen Gulf

POLAR BEAR POPULATION ASSESSMENT

Objectives: To conduct a population assessment of polar bears in the Beaufort Sea and Amundsen Gulf. To delineate the boundaries of the southern Beaufort and northern Beaufort regions for management purposes, and to determine the size of each population so that sustainable quotas for Inuvialuit hunters can be determined. A total of 258 bears were caught, 111 in the northern Beaufort, and 147 in the southern

Beaufort. There were no mortalities from handling. Several bears were recaptured from previous year's studies; in particular, several bears from Alaska were captured in the vicinity from Herschel Island to Tuktoyaktuk. Bears from a full age range and both sexes were well represented and in proportion to what would be expected from a healthy population. Four satellite radio collars and one VHF radio collar deployed in earlier years were removed. Prototype satellite ear tags were deployed but none worked for more than a few days. Future development of this part of the project is not expected. Several litters of cubs of the year were captured, including one litter of three. Abandoned maternity dens were found on Herschel Island, and will be plotted on a map. A large abundance of male-female breeding pairs were found, suggesting there will be a large abundance of females with cubs next year. An adult female with a cub, and a sub-adult of unknown gender were found killed by an adult male a few kilometres north of Herschel Island. A polar bear cub was found killed by wolves near Shelter Island.

256 **Wildlife**

Stirling, Ian
 Canadian Wildlife Service
 5320 133 Street
 Edmonton, AB T6H 3S5

File No: 3278
Region: IN **Location:** Beaufort Sea and Amundsen Gulf

TRACKING STUDY USING SATELLITES OF MALE POLAR BEARS

Objectives: To deploy a maximum of three ear tags on male polar bears in the southern Beaufort.

257 **Wildlife**

Veitch, Alasdair and Popko, Richard
 GNWT Department of Environment and Natural Resources
 P.O. Box 130
 Norman Wells, NT X0E 0V0

File No: 2867
Region: SA **Location:** Willow Lake

WESTERN CANADA COOPERATIVE DUCK BANDING PROGRAM AT WILLOW LAKE

Objectives: The United States/Canada Cooperative Banding program sets annual banding objectives. Our objective is to band 2 000 mallards, 1 500 northern pintails, and all incidentally captured waterfowl (preferably 1 000 per species), prior to the opening day of duck hunting season (1 September).

258 **Wildlife**

Voelzer, James
 US Fish and Wildlife Service-DMBN
 Waterfowl Population Surveys
 911 NE 11 Avenue, Room 125
 Portland, OR USA 97232-4181

File No: 2864
Region: All **Location:** Over the NWT mainland

COOPERATIVE U.S./CANADA WATERFOWL POPULATION SURVEYS

Habitat conditions for nesting waterfowl species were rated as good for most of the survey unit with some drier areas in the eastern half of northern Alberta extending into the south-east area of the NWT, rated as fair. Precipitation during the survey period helped modify these conditions, although the western half of northern Alberta dried out considerably during the survey period. Spring was approximately a week early in the western half of northern Alberta and north-eastern British Columbia, and the southern portion of the NWT. It was about 1 week plus late in the northern portion of the Mackenzie River Valley, Yellowknife area, north and east of Yellowknife, and the eastern half of northern Alberta. Observed ratios of breeding pairs to

lone drakes was good for mallards, and most other dabblers. Some flocked groups of scaup, scoters, ring-necked duck, and mergansers were observed occasionally in the northern portion of the survey area and in the eastern half of northern Alberta.

Department of Fisheries and Oceans

FISHERIES SCIENTIFIC LICENCES

259**Fisheries****Bergmann, Martin**

DFO

501 University Crescent,
Winnipeg, MB R3T 2N6**File No:** SLE-04/05-280**Location:** The Beaufort Sea, latitude 69.1505° to 70.46865° N; longitude 133.09160° W

Objectives: the objectives of the project are to collect scientific samples from fish communities in the Mackenzie Delta and Beaufort Sea using a number of traditional fishing gear types. The purpose of collection is: 1) to “ground truth” data from hydroacoustic surveys of the biota on the sea floor and water column; 2) for an ongoing study of the trophic structure of the fish communities. This is accomplished by examining the stomach contents and other characteristics (stable isotopes of nitrogen and carbon) of the fish samples; and 3) for ongoing genetic (stock structure and variability) and contaminants studies. All fish samples will be archived for future use. In addition to collecting fish, some attempt will be made to collect organisms from lower trophic levels (benthic and pelagic invertebrates) that support the fish populations.

260**Fisheries****Bergmann, Martin**

DFO

501 University Crescent,
Winnipeg, MB R3T 2N6**File No:** SLE-04/05-281**Location:** Beaufort W Sea: Latitude 69.15205N° to 70.46865° N; longitude 133.09160° W to 138.68188°W

Objectives: The benthic program is a component of the larger biological program taking place aboard the CCGS Nahidik in the Beaufort Sea. The purpose of the benthic program is to determine what kinds of communities of animals live on and in the seabed in this shallow, ice-disturbed coastal shelf of the Beaufort Sea, and to sample the catch of the subsistence fishers and to obtain a record of the fishing effort.

261**Fisheries****Bergmann, Martin**

DFO

501 University Crescent,
Winnipeg, MB R3T 2N6**File No:** SLE-04/05-282**Location:** The Beaufort Sea between longitude 131° 00' W and 141° 00' W (does not include Alaskan waters)

Objectives: The Joint Western Arctic Climate Study (JWACS) is part of an ongoing co-operative effort between Japan and Canada to study ocean ice processes and climate change in the western Arctic Ocean using moorings and hydrographic surveys. The Beaufort Gyre Exploration Project (BGEPE) is a collaboration between the US-NSF (Woods Hole Oceanographic Institution) and Canada to study the storage of freshwater in the central Canada Basin using moorings and hydrographic surveys.

CTD/Rosette measurements and water column samples will be collected at a number of stations (~30) in the Canada Basin (to 3 800 m or deeper); XCTD probes will be deployed between stations. Vertical net tows will be conducted at a selected number of stations, sampling at a range of depths from 0 - 100 m to 0 - 1 000

m. As ice conditions and time allow, the hydrographic survey will be extended to include sampling in the northern Canada Basin and/or the eastern Canada Basin.

262

Fisheries

Cobb, Donald

DFO

501 University Crescent
Winnipeg, MB, R3T 4N2

File No: SLE-04/05-251

Location: Mackenzie River at Pokiak Channel 68°13'10"N, 135°00'20"W

Objectives: To conduct index gillnetting programs to gather information on the health of the fish stocks.

263

Fisheries

Cobb, Donald

DFO

501 University Crescent
Winnipeg, MB, R3T 4N2

File No: SLE-04/05-252

Location: Shingle Point 68°59'00"N, 137°22'00"W

Objectives: To conduct index gillnetting programs to gather information on the health of the fish stocks.

264

Fisheries

Cobb, Donald

DFO

501 University Crescent
Winnipeg, MB R3T 4N2

File No: SLE-04/05-253

Location: Whitefish Station 69°22'45"N, 133°37'00"W

Objectives: To conduct index gillnetting programs to gather information on the health of the fish stocks.

265

Fisheries

Cobb, Donald

DFO

501 University Crescent
Winnipeg, MB R3T 4N2

File No: SLE-04/05-254

Location: Tuktoyaktuk Harbor 69°26'00"N, 132°58'00"W

Objectives: To conduct index gillnetting programs to gather information on the health of the fish stocks.

266

Fisheries

Cott, Pete

DFO

Suite 101 Diamond Plaza
5204-50th Avenue
Yellowknife, NT X1A 1E2

File No: SLE-04/05-317

Location: All water bodies within the Chitty Lake Scientific Reserve bounded by the following coordinates:

62.75000°N; 114.03788°W

62.75000°N, 114.12879°W

62.75295°N; 114.16225°W
62.71796°N; 114.25821°W
62.67074°N; 114.23201°W
62.66231°N; 114.07828°W
62.66203°N; 114.04672°W
62.66105°N; 114.03788°W

Objectives: To determine fish species present in the water bodies listed in this licence and to collect baseline data to determine the effects of water withdrawal on fish and fish habitat.

267 **Fisheries**

Harwood, Lois

DFO

Suite 101 Diamond Plaza
Yellowknife, NT X1A 1E2

File No: SLE-04/05-221

Location: Near-shore transects on the Beaufort Sea within coordinates 69°04' to 70°30'N and 137°00' to 132°45'W

Objectives: To conduct a systematic aerial survey and observe/count numbers of marine animals.

268 **Fisheries**

Harwood, Lois

DFO

Suite 101 Diamond Plaza
Yellowknife, NT X1A 1E2

File No: SLE-04/05-222

Location: Waters in Amundsen Gulf used by Holman and Sachs Harbour subsistence harvesters.

Objectives: To collect ageing structures, tissues for contaminants/disease testing and measurements from seals harvested by subsistence users.

269 **Fisheries**

Harwood, Lois

DFO

Suite 101 Diamond Plaza
Yellowknife, NT X1A 1E2

File No: SLE-04/05-244

Location: Waters off Kendall Island (69°30'00"N, 135°20'00"W) and Hendrickson Island (69°30'00"N, 133°35'00"W) in the Beaufort Sea.

Objectives: To collect specimens and data, on site, from beluga whales landed by subsistence hunters.

270 **Fisheries**

Harwood, Lois

DFO

Suite 101 Diamond Plaza
Yellowknife, NT X1A 1E2

File No: SLE-04/05-249

Location: Husky Lakes area – study zone enclosed by coordinates 69°15' to 69°40'N and 130°30' to 132°00' W

Objectives: To document the size, sex, and age structure, fish abundance and determine the present exploitation rate of fish.

271 **Fisheries**

Harwood, Lois

DFO

Suite 101 Diamond Plaza
Yellowknife, NT X1A 1E2

File No: SLE-04/05-255

Location: Hornaday River 69°20'00"N, 123°30'00"W

Objectives: To sample the catch of the subsistence fishers and to obtain a record of the fishing effort.

272 **Fisheries**

Harwood, Lois

DFO

Suite 101 Diamond Plaza
Yellowknife, NT X1A 1E2

File No: SLE-04/05-256

Location: Rat River 30 Km radius of 67°46'00"N, 135 03'00"W

Objectives: To sample the catch of the subsistence fishers and to obtain a record of the fishing effort.

273 **Fisheries**

Harwood, Lois

DFO

Suite 101 Diamond Plaza
Yellowknife, NT X1A 1E2

File No: SLE-04/05-257

Location: Fish Lake, 71°10'00"N 116°40'00"W

Objectives: To sample the catch of the subsistence fishers and to obtain a record of the fishing effort.

274 **Fisheries**

Harwood, Lois

DFO

Suite 101 Diamond Plaza
Yellowknife, NT X1A 1E2

File No: SLE-04/05-263

Location: Kendall Island 69°29'N, 135°15'W, and Hendrickson Island 69°30'N, 133°35'W

Objectives: Community whale samplers will be taking measurements and samples from beluga whales taken in the regular subsistence harvest at their respective whaling camps. The hunters will permit access to their landed whales for sampling (aging structures, tissues for contaminants testing, tissues for disease testing, reproductive tracts, stomachs, lungs) and measuring (girth, length, fatness). Samples are either frozen or preserved in formalin. This is the fifth year of the project in both Hendrickson Island and Kendall Island locations. At the Kendall Island site a veterinarian from Abbotsford, BC will be present and he will be taking additional biological samples from the landed whales (see attached list of what is planned by Dr. Rafferty for the Kendall Island site).

275 **Fisheries**

Harwood, Lois

DFO

Suite 101 Diamond Plaza
5204-50th Avenue
Yellowknife, NT X1A 1E2

File No: SLE-04/05-305**Location:** Fish Hole on the Rat River 67°46'49"N, 136°18'46"W

Objectives: to collect data on the size, sex and maturity of char; to apply floy tags to obtain information on the movements and numbers of fish; and to enhance the expertise in the local communities on the scientific collection of biological data.

276**Fisheries****Johnson, Jim**

DFO

501 University Crescent,
Winnipeg, MB R3T 2N6**File No:** SLE-04/05-296**Location:** Mackenzie Delta and the Beaufort Sea encompassed by latitudes 68° 45' N to 70° 00' N
and longitude 131° 00' W to 139° 00' W

Objectives: This application is to cover the field component of an ongoing, multi-year study investigating the trophic structure of the Beaufort Sea / Mackenzie Delta ecosystem. The main objective of this study is to develop a baseline database on the isotopic ratios for nitrogen, carbon and sulfur for tissues collected from organisms representing all trophic levels present in the various Beaufort Sea / Mackenzie Delta environments (e.g., riverine, estuarine, brackish near shore, marine near shore and marine offshore). However, the achieved level of funding necessitated scaling back the project concentrating our efforts on the Mackenzie Delta and near shore coastal areas with an emphasis on anadromous fish species and the prey species that support these populations.

277**Fisheries****Low, George**

DFO

42043 Mackenzie Highway
Hay River, NT X0E 0R9**File No:** SLE-04/05-209**Location:** Tsetso Lake 61°51'N, 123°01'W

Objectives: To collect fish to investigate reports of emaciated, watery, low quality fish in the lake. The catch will be sampled for length, weight, sex, maturity, age and condition. Parasite counts and signs of disease will be recorded.

278**Fisheries****Low, George**

DFO

42043 Mackenzie Highway
Hay River, NT X0E 0R9**File No:** SLE-04/05-218**Location:** Area 1W of Great Slave Lake 61°07'00"N, 116°00'00"W

Objectives: To determine the size ranges of whitefish caught in different sizes of gillnets and to establish the presence/absence of shortjaw cisco.

279**Fisheries****Low, George**

DFO

42043 Mackenzie Highway
Hay River, NT X0E 0R9

File No: SLE-04/05-219

Location: Area 1E of Great Slave Lake 61°00'00"N, 115°00'00"W

Objectives: To determine the size ranges of whitefish caught in different sizes of gillnets and to establish the presence/absence of shortjaw cisco.

280

Fisheries

Low, George

DFO

42043 Mackenzie Highway

Hay River, NT X0E 0R9

File No: SLE-04/05-295

Location: Dogface Lake, 60°17' N 119°06' W

Objectives: To investigate a concern from the lodge owner about the sudden lack of walleye in Dogface Lake. Until last summer the lodge which harvests very few fish in a season had an abundant source of walleye to support their sport fishing business. It appears there has been some kind of kill which has drastically and suddenly reduced the population of fish. There have been other problems with walleye populations in the Deh Cho region recently. A wasting type disease was investigated in Trout Lake last year and there have been stock problems in Kakisa and Tathlina lakes as well. This trip will be preliminary to follow-up study if it is required with a partner from Science.

281

Fisheries

Orr, Jack

DFO

501 University Cr.

Winnipeg, MB R3T 2N6

File No: SLE-04/05-220

Location: Hendrickson Island/Kugmallit Bay 69°35'00"N, 133°40'00"W

Objectives: To gain a better understanding of the movements of beluga whales and their ecology in the Beaufort Sea with the aid of satellite tags

282

Fisheries

Stern, Gary

DFO

501 University Crescent

Winnipeg, MB R3T 2N6

File No: SLE-04/05-320

Location: Ramparts Rapids near Fort Good Hope (66°15'00"N, 128°38'00"W)

Objectives: To assess the level of bio-accumulating substances and current-use chemicals in fish to determine temporal trends.

283

Fisheries

Tallman, Ross

DFO

501 University Crescent,

Winnipeg, MB R3L 0N1

File No: SLE-04/05-270

Location: Great Bear Lake (Keith Arm), 65°10'00"N, 123°00'00"W

Objectives: 1) To gather baseline data for Keith Arm lake trout on size and age structure, fecundity (egg number per female), growth and mortality over a five year period. These data will be used for stock assessment of Keith Arm lake trout. They will also be used to compare the productivity of Keith Arm lake trout to stocks in the other parts of the lake.

2) To gather baseline data on size and age structure, fecundity (egg number per female), growth and mortality of Dease, Smith, McVicar and McTavish arm lake trout. One of each of these arms will be sampled over a 4 year time period.

3) To determine if lake trout are genetically distinct between basins.

4) To determine the extent of movements (if any) by lake trout in Great Bear Lake by using molecular genetics.

284 **Fisheries**
Tallman, Ross
DFO
501 University Crescent
Winnipeg, MB R3T 2N6

File No: SLE-04/05-318

Location: Mackenzie River, upstream from Tsiiigehtchic near Pierre Creek (67°19'55"N, 133°20'55"W)

Objectives: To implant radio tags in broad whitefish to identify spawning and over-wintering areas and determine the migration and spawning timing of the species.

285 **Fisheries**
Tyson, Dave
DFO
Suite 101 Diamond Plaza
Yellowknife, NT X1A 1E2

File No: SLE-04/05-213

Location: Mackenzie River, between latitudes 68 and 69° North.

Objectives: To collect data on the effects of exposure to the output of a seismic air-gun on the auditory systems of fish.

286 **Fisheries**
Watkinson, Douglas
DFO
501 University Crescent
Winnipeg, MB R3T 2N6

File No: SLE-04/05-311

Location: South Nahanni Watershed (61°03'00"N, 123°21'00"W) outside the boundaries of Nahanni National Park.

Objectives: To collect information on the distribution, population sizes, biology and genetic connectivity between populations.

2005 Licensed Research Projects

Aurora Research Institute

Scientific Research Licences

BIOLOGY

287

Biology

Bekhuys, Tim

AMEC Americas Ltd.
 Earth & Environmental Division
 2227, Douglas Road
 Burnaby, BC V5C 5A9
 tim.bekhuys@amec.com

File No: 12 402 747**Region:** NS, SS**Licence No:** 13767**Location:** Gahcho Kué (Kennedy Lake)

GAHCHO KUÉ BIOPHYSICAL BASELINE STUDIES

The baseline studies comprised the following components: wildlife, fisheries, water quality, hydrology, meteorology and air quality, vegetation and soils. The studies were a continuation of work undertaken on the same components in previous years. Wildlife studies included spring, summer and fall surveys of caribou, grizzly bears, wolverines and wolves. Bird studies included upland game birds, raptors, breeding birds (passerines), and waterfowl. Occurrences of denning/nesting, feeding and rearing behaviour and success were studied. Fisheries studies focused on smaller lakes not previously studied and extensions downstream in the Kennedy Lake (Gahcho Kué) drainage. Populations were censused and habitats were studied. Water quality and hydrology studies were continued from programs conducted in previous years to add to the database of baseline information. Lakes and streams in the immediate Gahcho Kué area were monitored during the spring, summer and fall. Air quality and meteorology studies were similarly extensions of previous programs. Instruments were set up at the Gahcho Kué camp to record weather and air quality conditions throughout the spring, summer and fall. Limited additional soils and vegetation studies were carried out during the summer of 2005 to add to the existing database. Soils and vegetation community maps will be developed to characterize the terrestrial habitats around Gahcho Kué.

288

Biology

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File No: 12 402 755**Region:** NS**Licence No:** 13855**Location:** Matthews Lake, near the Tundra/Salmita Mine

PROPOSED MONITORING PLAN - MATHEWS LAKE AND AREA FISH HABITAT RESTORATION PROJECT

In the summer of 2004 work was undertaken to improve fish habitat in and around Matthews Lake, NWT. This work involved: creating fish habitat in Matthews Lake and Sandy Lake; improving spawning grounds in a local stream (Stream B); and removing in-lake and on-shore waste abandoned at two former mine sites. In the summer of 2005, the first year of a multi-year post-enhancement monitoring program was conducted to assess fish utilization and response of the enhanced habitats. The areas where habitat was created in Matthews Lake were found to be stable and differences were starting to emerge between the constructed habitat and a control area (e.g., presence of more invertebrates which fish feed on). In Sandy Lake, fish were

actively using an embayment that was created from a previously fishless pond that was permanently connected to Sandy Lake. Arctic grayling juveniles were spotted in the vicinity of the enhanced spawning habitat in Stream B and some of the areas which had the waste removed from the lakes were now indistinguishable from the natural surroundings. Monitoring will continue during the summers of 2007 and 2008 to ensure that the created habitat is functioning as designed.

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File No: 12 402 688**Region:** NS**Licence No:** 13903**Location:** La Martre River**2005 FISH AND FISH HABITAT SURVEYS FOR THE NAILII HYDRO PROJECT**

This work was conducted as part of a study to determine the feasibility of developing a run-of-river hydro project on the La Martre River (the Nailii Project), about 18 km east of Wha Ti. The proposed project would divert water out of the La Martre River, reducing the flow over a 1.2 km section. A main issue associated with the reduced river flow is the need to ensure that there is sufficient flow to protect fish habitat. A field survey was conducted to determine the presence or absence of fish, to document the fish habitat available, and to investigate the hydrology of the La Martre River. This information would then be used to determine a preliminary estimate of in-stream flow requirements for the La Martre River within the project area. The field survey took place on September 9, 2005. The study area extended from 1 km upstream of the la Martre falls to 3 km downstream. No fish sampling was undertaken. Unsafe wading or boating conditions resulted in limited on-the-ground data collection. A photographic aerial reconnaissance was conducted from a helicopter. The habitat of the La Martre River was mapped over the length of the study area. Two cross-sectional profiles were recorded: one at the intake site, and one about 1 900 m downstream of the falls. Water quality measurements (pH, conductivity, temperature and dissolved oxygen) were recorded at both sites. The La Martre River at the project site was assessed to be a fish-bearing river. This preliminary assessment indicated that the fish habitat within the affected reach was of generally low quality, due primarily to the abundance of rapids with high water velocity throughout the reach. Of the approximately 1.2 km section of the river that would be impacted by reduced flows as a result of the project, about 700 m has low fish habitat suitability.

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File No: 12 402 748**Region:** SS**Licence No:** 13797**Location:** Wood Buffalo National Park**DEVELOPMENT OF A MONITORING PROGRAM FOR THE WHOOPING CRANE FOOD SOURCES IN WOOD BUFFALO NATIONAL PARK**

The Revised International Recovery Plan for the whooping crane (*Grus americana*) has outlined the need to monitor potential prey (fish and aquatic invertebrates) on the breeding grounds of this critically endangered species. Whooping crane breeding grounds within the Wood Buffalo National Park (WBNP) were studied with the aim of developing a long-term prey monitoring program that could be used by WBNP staff to gather information on wetland habitat characteristics and whooping crane prey, and to relate this information to chick survival and opportunities for population expansion. In 2005, the research team repeatedly sampled sets of isolated nesting area ponds to assess differences in prey among each nesting area in WBNP. A set of

easily accessible ponds located near the nesting area was also sampled to assess the effectiveness of various types of sampling gear as well as temporal changes in prey composition and abundance. Aquatic invertebrates were sampled for laboratory analysis, whereas fish were counted in the field and subsequently released. Results will be analyzed to determine the precision, accuracy, and efficiency of the various techniques to reflect the spatial and temporal variability of whooping crane prey in the breeding-area ponds. Recommendations will be developed for Parks Canada to employ an optimal long-term monitoring protocol.

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File No: 12 402 742**Licence No:** 13749**Region:** IN**Location:** North Richards Island, Mackenzie Delta**A RESEARCH STUDY TO UNDERSTAND AND MITIGATE THE EFFECTS OF EXPLOSIVE USE BENEATH WATER BODIES**

The study was conducted in the first week of April 2005 with the caged fish component specifically occurring from April 3-5. All work was completed; however, due to the proprietary nature of the tamping component results, only the caged fish component will be given here. Rainbow trout eggs and fry were exposed to different pressure changes in the water column to identify the pressure change that causes injury to fish. Pressure created by the explosives ranged from 7kPa to 280kPa.

There were 14 exposures in total, using different setbacks from the fish cage and different charge sizes to produce the range of pressure changes. Twenty fish of each life stage (eggs and fry) were used per exposure. Three hydrophones were placed in each cage to accurately monitor the pressure change the fish were exposed to. Injury and mortality were assessed in the field but all fish were subsequently sent to the Freshwater Institute, Winnipeg for a complete examination by microscope. This work is ongoing.

292**Biology****Crossman, Bill**

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File No: 12 402 760**Licence No:** 13896**Region:** IN, GW**Location:** Disturbed areas in the Inuvialuit Settlement Region and east of the Dempster between Inuvik and Tsiiigehtchic**NORTHERN NATIVE PLANT DEVELOPMENT FOR RECLAMATION AND REVEGETATION IN THE NWT**

The objective of this program is to develop technologies to propagate and cultivate plant species native to the NWT which will enable these species to become available for revegetation projects in the NWT. The need for native plant seed for revegetation has been identified due to increased industrial development in the territory and the need to improve land reclamation practices and environmental mitigation strategies. Funding was not received in time to fully initiate the project in 2005; therefore only a small amount of seed was collected from plant species in the Inuvik region. Seeds from the following plant species were collected: *Deschampsia caespitosa*, *Beckmannia syzigachne*, *Calamagrostis canadensis*, *Calamagrostis stricta*, *Arctagrostis latifolia*, *Astragalus alpinus*, *Hedysarum alpinum*, *Oxytropis campestris*, *Oxytropis deflexa*, *Elymus macrorurus*, *Elymus trachycaulis*, *Artemisia tilesii*, *Arctophila fulva* and *Poa glauca*. The seeds were dried, cleaned and stored for future germination and growth trials.

293**Biology****Dick, Terry**

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File No: 12 402 722**Region:** NS**Licence No:** 13856**Location:** Chitty Lake, about 45 km north of Yellowknife**SEASONAL MOVEMENTS OF LAKE TROUT, LAKE WHITEFISH, AND NORTHERN PIKE IN A SMALL NORTHERN SHIELD LAKE**

Fieldwork at Chitty Lake, involving the collection of fish, was undertaken in late June and August 2005. Acoustical transmitters were implanted in five lake whitefish in June and eight northern pike in August. The fish were captured using either a rod and reel or an index gillnet that was set for less than one hour and brought back to camp for the surgical procedure. Fish that were suitable for the tagging study (>1 kg) were anaesthetized. Post-operated fish were observed in an enclosure made of a seine net attached to shore for approximately 15 minutes until they swam upright. The fish were subsequently released. Eleven hydrophones were positioned throughout the lake in June and information was downloaded in August and December 2005. Data recovered from the acoustic receivers indicated that all fish survived.

294**Biology****Eschenroder, Randy**

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File No: 12 402 679**Region:** SS**Licence No:** 13860**Location:** East Arm of Great Slave Lake near Lutsel K'e**MORPHOLOGICAL DIVERSITY OF LAKE TROUT: DIFFERENTIATION BETWEEN DEEP AND SHALLOW FORMS**

The objectives of the fieldwork were to determine whether a deep-water type of lake trout resembling the "humper" of Lake Superior exists in Great Slave Lake, and to increase samples of other deep-water morphotypes sampled in 2002. The field team made 17 gillnet lifts, starting on August 6 and ending on August 12, and worked up 150 lake trout. Most of the fishing was carried out in deep water (>50 m), and the bulk of the catch was of a deep water, siscowet-like trout. The team were successful in catching humper-like trout. Almost all of what appeared to be humper morphotypes were juveniles, and the absence of gravid (non-resting) adults in the nets suggests that they were aggregated at unknown locations for spawning. In addition to the lake trout, approximately 25 shortjaw and three least ciscoes were caught.

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File No: 12 402 762**Region:** NS**Licence No:** 13906**Location:** Discovery Mine site, Giauque Lake, Thistletonwaite Lake, Control Lake A**AQUATIC STUDIES IN SUPPORT OF THE DISCOVERY MINE REMEDIATION WORK**

A freshwater fisheries program was conducted from August 21-25, 2005 at Giauque Lake, Thistletonwaite

Lake and Lake A, adjacent to the Discovery mine site. The purpose of the program was to determine the post-reclamation effects of the sub-aqueous mine tailings on the aquatic ecosystem. This was accomplished through fish collection at several sites in the aforementioned lakes along with collection and analysis of benthic invertebrates. Target species for fish sampling included lake trout, lake whitefish and longnose sucker. Fish were measured and weighed, their aging structures (scales and otoliths) and tissues (liver and dorsal muscle) removed and analyzed, the latter for the presence of mercury and other metals. Benthic invertebrates were collected in order to conduct taxonomic analysis. Study results indicate that while still high (most exceed federal human consumption guidelines), mercury content in fish tissues appear to be declining over time.

296**Biology**

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Location: Mackenzie River, 2 km upstream and downstream of Norman Wells

NORMAN WELLS AQUATIC EFFECTS MONITORING PROGRAM - PLUME DELINEATION STUDY

Work conducted in 2005 was the second year of a two-year study. In the first year, the mixing characteristics of three separate effluents in the Mackenzie River were examined as part of a field dye tracer study. The data obtained from the dye study was used to describe the dispersion of the effluent plume in the Mackenzie River. Computer modelling of effluent dispersion in the Mackenzie River was undertaken in 2005 based on results of the dye tracer survey conducted in 2004. A second dye tracer survey was conducted in August 2005 at the Central Processing Facility site. The 2005 survey was conducted during higher river flows than in 2004, allowing the effluent dispersion model to be calibrated for different flow regimes.

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Location: Along Highway 5 at locations of recent burns, and the Crown Fire Modeling plots north of Fort Providence

POST-FIRE FOREST REGENERATION IN THE WESTERN CANADIAN CONTINENTAL BOREAL FOREST:**MEASUREMENT AND LANDSCAPE MODELING**

The objective of this study is to develop a landscape model capable of predicting regeneration after fire in the northern boreal forest. Data was collected in the past from Porter Lake (near Lutsel K'e), Big Fish Lake, Alberta, and Wood Buffalo National Park (between Pine Lake and Peace Point). Data was also collected from the International Crown Fire Modeling Experiment near Fort Providence. This study involved revisiting these sites in order to record visual observations (written and photographic) and GPS coordinates.

298**Biology**

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Location: Fortune Mineral's NICO property & along route of proposed road

ENVIRONMENTAL SURVEYS FOR THE FORTUNE MINERALS NICO PROJECT

Work at the NICO site included fish and fish habitat, water and sediment quality, benthic invertebrate abundance, and wildlife and vegetation surveys. Aquatic surveys were conducted on each of the water bodies located within a 10 km radius of the mine site (study area) and a reference site. Similarly, all wildlife surveys were conducted within a 5 km buffer of the proposed road route and the 10 km radius of the project site. Fisheries surveys focussed on the collection of population metrics and spring and fall spawning information for northern pike, lake whitefish and walleye in each water body in the study area. Various techniques including electro-fishing, angling, gillnets and trap nets were used to collect specimens. Early to late season (June - August) surveys of water and sediment quality and benthic invertebrate abundance was conducted on each water body in the study area to supplement the existing baseline dataset. A late-season vegetation survey (August) identified and characterized vegetative communities with visual observations. The identification of any rare species, which may be impacted by project activities, was also noted. Aerial surveys for moose and caribou numbers, distribution, behaviour, habitat use and snow track densities were performed. Nests and potential nest sites were identified to document the presence of raptor species (including eagles, falcons, hawks, and owls). Point counts were conducted to determine the presence and relative abundance of upland breeding birds. Surveys for aquatic mammal sign and water birds were conducted on water bodies within the study area. All incidental wildlife observations were recorded.

299

Biology

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Region: NS

Licence No: 13904

Location: East Basin, Lac de Gras

FISH HEALTH AND POPULATION ASSESSMENT ADJACENT TO DIAVIK MINING ACTIVITIES ON LAC DE GRAS

The fish health and population assessment on Lac de Gras was completed to meet the requirements of a DFO Fisheries Authorization. Diavik Diamond Mines Inc. was required to collect health information (length, weight, liver and gonad weight, fecundity), contaminant burden, and metallothionein analysis of 20 lake trout and 20 round whitefish from three different sites (near diffuser close to the Traditional Knowledge camp, and a reference site in north-east corner). Length, weight and species data was required from an additional 80 fish for each of the two fish species from each site. Fish catching in late August/early September were not successful at collecting the required numbers of fish despite considerable effort. From 37 gillnet sets (average soak time: 1.4-1.6h) and 493 hours of soak time for trap nets, a total of 106 lake trout and 27 round whitefish were captured. These catches were insufficient for estimation of fish populations in the east basin of Lac de Gras, and health analysis of captured fish showed no significant differences among the three sites. Metals and metallothionein analysis also showed no significant differences among sites. There was no observable influence of the mine diffuser on the local fish health.

300

Biology

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Licence No: 13824
Location: Along seismic lines near Inuvik and Tsiigehtchic

TREE REGENERATION ON SEISMIC LINES

This study is intended to increase understanding of the process of regeneration on the seismic lines in the Mackenzie River uplands and delta, and to explore possible ways of accelerating regeneration. Specifically, experimental sowing and cutting were performed to find out the effects of factors such as substrate type, forest floor scarification, and light availability on the establishment and growth rates of black and white spruce. Results indicate that scarification had little effect on germination rates because the poorer seedbeds such as feathermosses remained sufficiently wet; therefore, no dramatic differences were observed in seedbed-mediated survivorship at the germination stage that would be expected in non-permafrost terrain further south. The type of natural seedbed did, however, have a strong effect on germination rates. Generally, germination success was as good as on the best seedbeds in the southern boreal forest. Likewise, predation intensity by rodents was similar to that typical of the south. Increasing the light levels on overtopped delta white spruce saplings by removing the covering shrubs had little effect on spruce growth because light levels were already very high and the bulk of the light was coming from the side. Finally, it was found that while there was considerable subsidence on seismic lines, this did not preclude rapid regeneration by either spruce species.

301

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Licence No: 13827
Location: Mackenzie River, delta, and surrounding areas

PHYLOGEOGRAPHY AND GENETIC POPULATION STRUCTURE OF BROAD WHITEFISH (*COREGONUS NASUS*) IN THE MACKENZIE DELTA AND RIVER AND SURROUNDING AREA, NWT

The objective of this study was to collect samples that represent the different putative populations of broad whitefish in and around the Mackenzie River delta for the purpose of classifying the genetic population structure of this species. Broad whitefish samples were collected during the summers and falls of 2003 to 2005, by biologists of the Gwich'in Renewable Resource Board, DFO, the Alaska Department of Natural Resources and local Gwich'in and Inuvialuit harvesters. Thus far, DNA has been extracted from 1 410 broad whitefish collected from 55 locations including Alaskan drainages, east to the Mackenzie River system and its major tributaries. Although there are samples from 55 locations, each locality likely does not represent a distinct population, especially for samples collected throughout the Mackenzie River delta where several populations are known to migrate through. Several primers (short artificial strands of DNA used to amplify, or make many copies of, a specific region of DNA) have been identified, and amplified products have been analyzed for three out of the eight primers to be used in this study. Of those samples, considerable genetic variation between samples has been observed although no conclusions can be drawn until more data is collected. Once all eight primers have been employed, genetic analysis of the data, where genetic differences between populations will be determined, will commence thereafter.

302

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Location: Throughout the Travallant Lake system

CONTINUED RADIO-TRACKING OF BROAD WHITEFISH (*COREGONUS NASUS*) IN THE TRAVAILLANT LAKE SYSTEM, NWT

Although the seasonal migrations of anadromous broad whitefish in the Mackenzie River drainage have been documented, the movements and habitats critical to the survival of the lacustrine life history form of this species are poorly known. In this study, radio telemetry was used to document the seasonal migration patterns and identify spawning and over-wintering habitats of a purported lacustrine form of broad whitefish in Travaillant Lake. Fifty mature broad whitefish were radio-tagged from three locations within the Travaillant Lake system; 30 of these were tagged at feeding areas located within Travaillant Lake proper and 20 were tagged near spawning areas located in the north and south reaches of the Travaillant River. Tagged fish were relocated on 15 separate occasions through aerial tracking. Three specific reaches of the Travaillant River, 5 km, 11 km and 16 km upstream of Travaillant Lake, were identified as potential spawning locations due to the congregation of many fish in these areas during the time when broad whitefish spawn. In addition, a spawning area was identified in the Travaillant River at the outlet of Travaillant Lake. Following spawning, broad whitefish either migrated into Travaillant Lake or into smaller lakes within the Travaillant system. It is presumed that the broad whitefish over-winter in these locations; additional tracking in late winter/early spring may add to these findings. The results indicate that feeding, spawning and likely over-wintering take place within the Travaillant River system thus supporting the hypothesis that these populations represent a distinct lacustrine life history form.

303

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Location: Tuktoyaktuk

SEWAGE LAGOON DISCHARGE ASSESSMENT

The Incorporated Hamlet of Tuktoyaktuk's sewage lagoon facility is a natural lake that has been modified with a perimeter berm structure at the south edge to provide retention. The lagoon is annually discharged into the adjacent ocean. The objective of the study was to evaluate the potential impacts of sewage discharges on fish and benthic invertebrates in the receiving environment by comparing reference and effluent exposed communities. The Sewage Discharge Assessment was carried out to meet the water licensing requirements of the Hamlet of Tuktoyaktuk as issued by the NWT Water Board. The Department of Municipal and Community Affairs (MACA) requested that fish within the study area (reference and exposed) be collected to determine population and possible contamination levels. The study was conducted from September 21-23, 2005. Tissue samples were collected from 25 individual fish specimens; a wildlife monitor from the Hamlet of Tuktoyaktuk was employed to ensure ethical treatment of the animals. There was no indication that the status of the fish community is impaired in the receiving environment. There were no signs of internal or external stress observed in any of the fish captured. All physiological measures suggested that the growth and health of fish collected in the exposure area, when compared to the reference area, are not subject to any impairment. For all analytical parameters, including metals and PCBs there is likely no basis for concern for the health of any consumers of fish. The results were provided to MACA and the Hamlet of Tuktoyaktuk for submission to the NWT Water Board.

304

Biology

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Location: 31km radius of Snap Lake Diamond Project

DE BEERS SNAP LAKE DIAMOND MINE 2005 MONITORING PROJECT

The objective of this study was to continue collecting data pertaining to terrestrial and aquatic resources within and around the 31 km radius of the Snap Lake Diamond Mine. Sampling was conducted by Golder Associates Ltd. across the site between January and October, 2005. The aquatics program included monitoring of water quality, sediment quality, benthic invertebrates, plankton, and fish health. The wildlife program included caribou, grizzly bear, wolverine, wolf and falcon surveys. Vegetation and air quality studies also occurred on site. Members of aboriginal groups took part in facets of these studies and provided input on fish habitat, fish palatability, aquatic sampling, and wildlife surveys. Results of the various programs are being finalized and will be submitted to the Mackenzie Valley Land and Water Board as a 2005 Annual Report. Copies of the report will be provided to the various community groups. The report will also become part of the public record.

305

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Location: Travallant Lake system

CONTINUED POPULATION ASSESSMENT OF HARVESTED FISH SPECIES IN THE TRAVAILLANT LAKE SYSTEM

During the 2005 fieldwork, a total of 875 fish were caught at three sampling sites using multi-mesh fill nets: 340 broad whitefish (lake: 107; south river: 30; north river: 203), 293 lake whitefish (lake: 64; south river: 219; north river: 10), 203 cisco species (lake: 202; north river: 1), 17 northern pike (lake: 13; north river: 4), 21 lake trout (lake) and one longnose sucker (north river).

Whitefish and crooked back were found to be larger in the north river than the south river, and generally, both species were larger in both rivers than in the main lake. This is because the rivers were sampled during spawning, when the majority of fish are mature and large as well as heavy with reproductive organs. The longest whitefish was 21.85" and the longest crooked back, 20.12" (both caught in the main lake). Significant numbers of other species were not caught in either river but in the main lake. The largest jackfish was 43.11" in length and 18.96 lb in weight. The largest lake trout was 34.29" in length and 16.76 lb in weight. Cisco was the most common species caught in the main lake, averaging 5.81" in length and 0.07 lb in weight.

306

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Location: Keith Arm and Dease Arm of Great Bear Lake

ASSESSMENT OF LAKE TROUT STOCKS IN GREAT BEAR LAKE

A total of 306 fish were captured in gillnets. There were 212 lake trout (12 released), 12 cisco spp. (0 released), 59 round whitefish, 44 lake whitefish (four released), and two longnose suckers (0 released). Two nine-spine sticklebacks and five sculpin spp. were caught in beach seined (0 released).

Lake trout averaged 25.3" and 7.6 lb; figures for the largest and smallest lake trout were 51.2" and 32 lb and 7.1" and 0.2 lb respectively. Lake whitefish averaged 20.9" and 4.9 lb, while round whitefish averaged 13.1" and 0.8 lb. There were relatively few cisco spp. caught; average cisco size recorded at 7.1" and 0.1 lb.

307**Biology****Hoyt, Andrea**

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File No: 12 402 624**Region:** IN**Licence No:** 13922**Location:** Big Fish River, Cache Creek and Fish Hole (sites located approximately 70 km W-NW of Aklavik)**COMMUNITY MONITORING OF THE BIG FISH RIVER**

The field portion of the five-year Big Fish Community Monitoring project took place at Big Fish River from November 1-5, 2005 during the traditional char harvesting season. The field crew included Aklavik Elders and Hunters and Trappers Committee (HTC) members, Moose Kerr School high school students, and Fisheries Joint Management Committee (FJMC) resource biologists. The field crew completed portions of a stream habitat survey and a water quality survey, establishing benchmark sampling locations for use in future years. Students made observations and recorded data; Elders and HTC Committee members shared stories and discussed how the environment has changed over the years, imparting Traditional Knowledge to help the students develop an understanding of how the environmental changes impact the life and culture of the Inuvialuit people. Some observations pointed to water levels being much lower than in the past, channel banks increasingly sloughing/eroding, and portions of the streambed have increased sedimentation.

Plans for taking a limited number of samples from char for analysis of contaminants, particularly mercury, did not occur due to difficulties obtaining a DFO Fisheries Scientific Licence. However, it was observed that there only a few adult fish and a low number of juvenile fish were present in the stream. Water samples were collected for laboratory analysis. Following completion of the fieldwork, the youth participants, with the assistance of the FJMC resource biologists and Joint Secretariat staff, analyzed data collected (water quantity and quality, GPS information), and prepared reports and presentations describing the project. The reports and presentations included reflections of the students' experiences and recommendations for improving the project in future years.

308**Biology****Katz, Sharon**

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File No: 12 402 758**Region:** IN, GW**Licence No:** 13874**Location:** Inuvik area**NATURAL DYES**

In the summer of 2005, the research team produced several dyes, using methods outlined in Judy Waldner McGrath's *Dyes from Lichens and Plants* (1977). The first was a dye from a local plant, the identity of which is concealed due to patenting possibility. Samples were sent to Professor Jean Lavelle at Northampton Community College for analysis as ink products. The results of these tests are still pending, and completion of

this project is dependent upon the results. Secondly, a dye was created from the lichen, *Cetraria nivalis*, which yielded a beige colour. Bacteriochlorophyll was also extracted from green algae, collected from ponds and ditches around Inuvik.

309**Biology****Kutz, Susan**

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File No: 12 402 746**Region:** IN, GW**Licence No:** 13762**Location:** Sachs Harbour, Paulatuk, Aklavik, Inuvik, Tsuigehtchic

USING HUNTER OBSERVATIONS AND ECOLOGICAL KNOWLEDGE TOGETHER WITH SCIENCE TO UNDERSTAND PAST AND CURRENT OCCURRENCE OF DISEASES IN NORTHERN WILDLIFE

From January-March 2005, the researchers held a series of focus group interviews on wildlife disease occurrence in ten communities in the Sahtu, Gwich'in and Inuvialuit settlement regions. The purpose of the project was to record experienced harvesters' observations of wildlife disease in the past and present, and to determine if harvesters had noticed any changes in disease occurrence (i.e., types or frequency of diseases or locations). The work was conducted with the local Renewable Resource Councils and Hunters and Trappers Committees to identify suitable harvesters to interview. A community assistant was hired to contact participants and assist with the interviews. A total of 63 experienced harvesters, both men and women (aged 34-88) participated in the project. Focus group sessions were tape-recorded and notes were also taken. Transcripts of the sessions are currently being analyzed. So far, one notable finding is the common observation of a sub-skin green, slimy fluid in caribou.

This work represents a unique approach to understanding and monitoring changes in disease occurrence in a rapidly changing Arctic environment. It is a component of a larger project to evaluate the effects of climate change on wildlife health in the Canada's Western Arctic and Subarctic.

310**Biology****Lantz, Trevor**

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File No: 12 402 712**Region:** IN, GW**Licence No:** 13815**Location:** Sites between Inuvik and Tuktoyaktuk, along Horton River and Anderson River, and sites accessible from the Dempster Hwy between Fort McPherson and Inuvik

AUTECOLOGY AND POPULATION ECOLOGY OF GREEN ALDER

There is growing evidence, both anecdotal and quantitative, that the abundance of tall shrubs such as alder and willow is increasing in the Western Arctic. The broad goal of this project is to examine the causes and extent of recent changes to shrub cover in the Mackenzie Delta region. Fieldwork to date has focused primarily on comparisons of the effects of temperature and disturbance on alder (*Alnus viridis* ssp. *crispa*) patch dynamics. To assess the importance of climate on alder populations, alder patch characteristics have been sampled along the temperature gradient from the forest-tundra south of Inuvik to the low arctic tundra at the Beaufort coast. Recent burns and permafrost slumps have also been sampled to examine the effect of disturbance on alder. Preliminary results show increases in seed viability, percent cover, and growth with distance from the coast, suggesting that temperature increases are likely to drive changes in alder abundance. The number of catkins, seed viability, percent cover, and growth are also consistently greater on disturbed

sites compared with control sites, regardless of latitude. This suggests that changes due to increased temperature are likely to be exacerbated by increased rates of natural and anthropogenic disturbance.

311
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File No: 12 402 754

Region: SA, DC, NS, SS

Licence No: 13853

Location: Yellowknife, Nahanni National Park Reserve, Norman Wells, Tulita, Gordon Lake and Daring Lake, as well as along roads in the North Slave and South Slave regions

BUTTERFLY INVENTORY IN THE NWT

Butterfly collection occurred in June and July, 2005 with the assistance of GWNT Environment and Natural Resources (ENR), the Sahtu Renewable Resources Board, Parks Canada and the Canadian Wildlife Service and schools in Fort Good Hope. Collection was carried out in the following areas: Yellowknife, Ingraham Trail, Highway 3 (west of Yellowknife), Fire Camp (near Tippett Lake), Reid Lake campsite, Niven Lake Trail, Fort Good Hope, Fossil Lake, Norman Wells, Tulita, Deline, Mount Hamar, Kee Scarp, Canol Heritage Trail, MacTung Mine Road, Virginia Falls campsite, Sunblood Mountain, Deadmen Valley Ranger Cabin, Nahanni Butte, Daring Lake Tundra Ecological Research Station, Enterprise, and Hay River. All butterfly specimens that were collected by the researcher have been mounted and identified, in addition to another 150 specimens collected by others in and around Nahanni National Park Reserve. The additional 150 specimens have been donated to the Canadian National Collection. Information on the entire collection has been sent to ENR biologists. Five species were previously unknown in the NWT, and to the database on the website of the Canadian Biodiversity Information Facility in Ottawa.

312
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File No: 12 402 638

Region: SS

Licence No: 13914

Location: Pine Point Mine area

ENVIRONMENTAL BASELINE STUDIES, TAMERLANE VENTURES INC., PINE POINT MINING PROJECT

A program of stream biophysical sampling and water quality sampling was conducted in September 2005 in order to gain an understanding of prevailing aquatic conditions in the area of the Pine Point Mine operated by Tamerlane Ventures Inc. For the water sampling component, sampling sites were located in Buffalo River and Twin Creek, as well as at the locations where the Buffalo River and Twin Creek flow into Great Slave Lake; samples were also collected in Great Slave Lake. Stream biophysical sampling consisted primarily of fish habitat assessment; sampling for fish presence was not conducted. The water quality for all sites sampled along Twin Creek, Buffalo River and in Great Slave, with the exception of two sites, were typical of natural background values for this area of the NWT; where exceedances occurred, for example, in the case of aluminium, it should be noted that this metal is typically associated with the limestone, dolomite, sandstone and shale found in the Pine Point area. No fish sampling occurred but observations of aquatic habitat were made at six stations on the Buffalo River and nine on the 45km-long Twin Creek.

Baseline data collection to complete an ecological land classification for the Pine Point area was also undertaken in September, 2005. A total of 38 field inspections were completed in seven ecosystem types (or

ecosites) across a study area of 36 153 ha. Mapping was then completed of the study area at a 1:50 000 scale. Eleven ecosystem types were classified within the study area, an area encompassing the Slave River and Hay River Lowland Ecoregions. Eight of these ecosystem types are naturally vegetated and one is classified as water. Just over 50 % of the study area is classified as lowland and 47% is classified as upland. Most of the area is forested, and shrub units tend to be present in low-lying areas that have some evidence of fire. These same shrub units made up the majority of the mixed-wood units. Confidence in the mapping and subsequent data analysis is moderate to high for most units. Jack pine and trembling aspen are common, with white and black spruce dominating in later successional timber stands. The most common ecosite in the study area is the upland, Labrador tea – mesic ecosite at 28%, with shrubby fens and treed fens representing 25% and 24%, respectively. A preliminary wildlife baseline survey was conducted concurrently with the ecological land classification study. The objective of the fieldwork was to document biological diversity over the 36 153 ha study area. Whilst examining the habitat types in the study area, information on species presence was recorded by means of actual observations, tracks, burrows and other signs. Within the 11 identified ecosystem types or habitat, 80 bird observations were recorded, including of species with special status designations such as the whooping crane and peregrine falcon. A total of 104 mammal observations were made of 13 different mammal species, including woodland caribou and wood bison, both of which have special status designations. Species that appear to occupy multiple habitat types within the study area include moose, black bear, and species of woodpecker.

313 **Biology**

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File No: 12 402 727
Region: NS

Licence No: 13907
Location: Lac de Gras

SHOAL HABITAT UTILIZATION STUDY

As stated in the Authorization for Works or Undertakings Affecting Fish and Fish Habitat (DFO File No. SC98001), Diavik Diamond Mines Inc. (DDMI) is responsible for conducting a Fish and Fish Habitat Utilization Study prior to in-lake dike construction. To meet the requirements outlined in the Fisheries Authorization, DDMI has been conducting a yearly Shoal Habitat Utilization Survey (hydroacoustic shoal surveys). In 2005, hydroacoustic shoal surveys were attempted on September 15 and October 2 on eight transects that were part of the 2004 survey. All eight transects are located east of the A154 dike, and each was surveyed twice by boat based on previously mapped shoals.

In addition to the hydroacoustic surveys, angling was utilized in an attempt to ground-truth the hydroacoustic data, and to capture, tag, and obtain life history data from fish utilizing the shoals. The program was also supposed to include the use of a remotely operated vehicle (ROV) to obtain visual confirmation of fish using the shoals. However, inclement weather conditions and equipment problems caused by cold weather resulted in the suspension of the 2005 survey. No fish were captured.

314 **Biology**

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File No: 12 402 711
Region: NS

Licence No: 13811
Location: Forty-seven lakes and approximately 40 other sites west of the Long Lake Containment Facility Area, Ekati Diamond Mine

2005 AQUATIC MONITORING PROGRAM - EKATI DIAMOND MINE

The objectives of the program are to determine if the Ekati Diamond Mine is affecting its surrounding aquatic environment, and to provide baseline data for the mine area.

Field activities consisted of: water quality, phytoplankton and zooplankton sampling; the establishment of hydrology and meteorology stations; limnology measurements; benthos and sediment quality measurements; fish sampling; and the monitoring of the Panda Diversion Channel.

Findings from this program will be made publicly available through BHP Billiton.

315
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Biology

File No: 12 402 756 **Licence No:** 13857
Region: NS **Location:** Hill Creek, east of Rae-Edzo on Highway 3

FISHERIES SURVEY OF HILL CREEK (LOCATED ON HIGHWAY 3)

Fieldwork cancelled.

316
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Biology

File No: 12 402 412 **Licence No:** 13805
Region: SS **Location:** Wood Buffalo National Park

CARBON DYNAMICS IN CHRONOSEQUENCE OF BOREAL FOREST ECOSYSTEMS: A PRODUCTION ECOLOGICAL APPROACH

This research concerns the circulation of organic matter and carbon in jack pine forests as well as between such forests and the atmosphere. The question as to the quantity of carbon that jack pine forests can accumulate during growth will be addressed in the research; this may reveal something about the role of these forests in delaying or accelerating global warming. Measurement of aboveground forest litter and estimation of the amount of soil respiration [particularly those respired by soil organisms (heterotrophic respiration)] were undertaken in 2005. The amount of aboveground litter for approximately a one-year-period in the study sites ranged between 55 and 138 g/m² of organic matter. The average amount of heterotrophic respiration was in the range of 0.312 and 0.336 g CO₂ m² hr⁻¹ for measurements taken in August, 2005. The value was smaller (0.138 g CO₂ m² hr⁻¹) when measured in June, 2005. With these data and other information gathered, it is planned to calculate the total amount of carbon and organic matter moving through and into the jack pine forests of the NWT.

317**Biology****Osawa, Akira**

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File No: 12 402 412**Region:** GW**Licence No:** 13848**Location:** Crown Land within 500m of the Dempster Highway, between the south shore of Campbell Lake and 20 km east of Fort McPherson**STRUCTURE OF BLACK SPRUCE FORESTS ON CONTINUOUS PERMAFROST**

This research attempts to discover a common growth pattern of forests growing on continuous permafrost regions. The researcher's previous work in Siberia described a peculiar pattern of forest growth in which biomass (amount of wood and other living organic matter) reached a relatively small maximum value of 50 to 80 tons ha⁻¹ in dry weight. This limit was found to be reached at a relatively young age. Typically, larch forests (on permafrost) in Siberia grow rapidly after a stand-replacing forest fire. However, their growth (or biomass accumulation) virtually stops at stand age of 20-30 years. After that the forests may live 200 more years but show no more biomass accumulation during that long period. Thirty stands of black spruce were measured in August 2005 along the Dempster Highway. The number of forest stands that were measured is still not sufficient to arrive at any definite conclusions; however, the pattern of forest development described above seems to be present in the current data set. Data collection will be continued in the near future.

318**Biology****Povey, Andrew**

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File No: 12 402 670**Region:** DC**Licence No:** 13770**Location:** Selected lakes and streams along the proposed pipeline corridor, Jean Marie River and Trout Lake areas**2005 WINTER AND SPRING AQUATIC SURVEYS IN THE DEH CHO REGION**

Winter fish and fish habitat surveys were conducted at four sites within the Deh Cho Region during April 12-14 by a field crew of three people. The purpose of the winter surveys was to assess watercourse freezing conditions and over-wintering conditions of selected water bodies along the proposed pipeline corridor. Selection of sites was based on observation made during summer surveys conducted in 2004. Information collected during this survey included: an assessment of winter habitat use, using remote videography; in situ water quality measurements (temperature, dissolved oxygen, conductivity & pH); discharge and depth measurements; ice thickness and depth of water below the ice cover and presence or absence of frazle ice.

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File No: 12 402 670**Region:** IN**Licence No:** 13780**Location:** Selected streams and lakes along the proposed pipeline corridor in the Inuvialuit Settlement Region

2005 WINTER AND SPRING AQUATIC STUDIES IN THE INUVIALUIT SETTLEMENT REGION

The 2005 winter and spring aquatic studies in the Inuvialuit Settlement Region included fisheries, hydrology and water quality investigations. All activities complied with licence conditions. The aquatic studies were conducted by a crew of three individuals, including a local assistant. Fish and fish habitat surveys were conducted during April 29-30 by a field crew of three people, including a local assistant. The purpose of the winter surveys was to assess watercourse freezing conditions and over-wintering conditions of selected water bodies along the proposed pipeline corridor and within the production area leases. Selection of sites was based on observations made during summer surveys conducted in 2004. Information collected during this survey included: an assessment of winter habitat use using remote videography; in situ water quality measurements (temperature, dissolved oxygen, conductivity and pH); discharge measurements; ice thickness and depth of water below the ice cover; and presence or absence of frazle ice.

320

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File No: 12 402 670

Licence No: 13781

Region: GW

Location: Selected streams and lakes along the proposed pipeline corridor in the Gwich'in Settlement Area

2005 WINTER AND SPRING AQUATIC STUDIES IN THE GWICH'IN SETTLEMENT AREA

The 2005 winter and spring aquatic studies in the Gwich'in Settlement Area included fisheries, hydrology and water quality investigations. All activities complied with licence conditions. Winter fish and fish habitat surveys were conducted at two sites during April 27-28 by a field crew of three people, including a local assistant. The purpose of the winter surveys was to assess watercourse freezing conditions and over-wintering conditions of selected streams along the proposed pipeline corridor. Selection of sites was based on observation made during summer surveys conducted in 2004. Information collected during this survey included: an assessment of winter habitat use, using remote videography; in situ water quality measurements (temperature, dissolved oxygen, conductivity and pH); discharge and depth measurements; ice thickness and depth of water below the ice cover; and presence or absence of frazle ice.

321

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File No: 12 402 670

Licence No: 13794

Region: IN

Location: Ninglintgak Island access channels in the Kendall Island Bird Sanctuary; Middle, Kumak and East channels; Kittigazuit and Kugmallit bays

2005 AQUATIC AND MARINE ENVIRONMENTAL STUDIES RELATED TO BARGE-BASED FACILITIES IN THE INUVIALUIT SETTLEMENT REGION

The 2005 aquatic studies related to barge-based facilities focussed on hydrology investigations. All activities complied with licence conditions. The aquatic studies were undertaken by crews of two to four individuals, including a local assistant. A survey of ice and water level conditions during spring break-up in the delta channels near Niglintgak Island was conducted between May 26 and June 3. Ice conditions were documented with videos and photos. Time lapse cameras were installed to monitor the ice break-up as it progressed.

Access to the sites was by helicopter.

Water level monitoring stations were installed at Shallow Bay (west), Kittigazuit Bay and Kumak Channel during July 11-13. Each station consisted of a pressure probe in the channel connected by a cable to a data logger on the banks. The west bank of Kumak Channel was also surveyed on July 13 to develop baseline information to monitor annual natural shoreline erosion. During the week of July 18, a two-person survey team collected detailed GPS measurements for each of the monitoring sites. An additional water level monitoring station was installed at Shallow Bay (east) during August 1-3. During this period, the crew also inspected the previously installed water level and wind monitoring stations and downloaded data from those sites. The water level monitoring stations recorded water levels in their respective channels until October 3, when they were decommissioned and removed. On October 4, GPS positioning data was collected at the proposed bargeset-down location and resistance measurements were taken in four borehole sites.

322 **Biology**

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File No: 12 402 670

Licence No: 13846

Region: GW

Location: Along the proposed pipeline survey corridor within the Gwich'in Settlement Area

2005 SUMMER & FALL AQUATIC SURVEYS IN THE GWICH'IN SETTLEMENT AREA

Fieldwork cancelled.

323 **Biology**

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File No: 12 402 670

Licence No: 13847

Region: GW

Location: Along the proposed pipeline survey corridor within the Gwich'in Settlement Area

2005 TERRESTRIAL STUDIES IN THE GWICH'IN SETTLEMENT AREA

Fieldwork cancelled.

324 **Biology**

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File No: 12 402 670

Licence No: 13850

Region: IN

Location: Along the proposed pipeline survey corridor within the Inuvialuit Settlement Region

2005 SUMMER AND FALL AQUATIC SURVEYS IN THE INUVIALUIT SETTLEMENT REGION

Fieldwork cancelled.

325 **Biology**

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File No: 12 402 670

Region: IN

Licence No: 13851

Location: Within the anchor fields and the pipeline gathering system survey corridor in the Inuvialuit Settlement Region

2005 TERRESTRIAL STUDIES IN THE INUVIALUIT SETTLEMENT REGION

Fieldwork cancelled.

326 **Biology**

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File No: 12 402 670

Region: SA

Licence No: 13883

Location: Along the pipeline study corridor within the Sahtu Settlement Area

2005 TERRESTRIAL STUDIES IN THE SAHTU SETTLEMENT AREA

Fieldwork cancelled.

327 **Biology**

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File No: 12 402 670

Region: SA

Licence No: 13885

Location: At water bodies along and around the proposed and alternate pipeline routes in the Sahtu Settlement Area

2005 SUMMER AND FALL AQUATIC STUDIES IN THE SAHTU SETTLEMENT AREA

Fieldwork cancelled.

328 **Biology**

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File No: 12 402 752

Region: SS

Licence No: 13810

Location: "Fox Holes Lakes" (unnamed water bodies) at 60°03'N, 112°27'W

MOLECULAR ANALYSIS OF EVOLUTIONARY CHANGE IN STICKLEBACK POPULATIONS

The goal of this study is to determine the genes which control skeletal changes in different populations and

species of animals. Stickleback fish were found to be ideal subjects for study because various populations around the world show significant differences in skeletal structures. Of special interest to the study was a unique population of nine-spine sticklebacks from Fox Holes Lakes that completely lack pelvic fins (the equivalent of our legs). In June 2005, the research team used minnow traps to collect samples of nine-spine sticklebacks from Fox Holes Lakes. The fish were taken to a laboratory at Stanford University for analysis. The correlation between specific DNA sequences and the presence or absence of the pelvic fins was studied. In addition, some of the fish was analyzed to determine if nine-spine sticklebacks from Fox Holes Lakes have modifications in the same gene that causes pelvic reduction in a population of three-spine sticklebacks (a completely different species) from British Columbia. This important result is included in a forthcoming scientific paper to be published in the journal, *Proceedings of the National Academy of Sciences of the USA*.

329**Biology****Smith, Lisa**

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File No: 12 402 584**Licence No:** 13864**Region:** GW, SA, DC**Location:** Various sites throughout the Gwich'in Settlement Area, the Sahtu Settlement Area and the Deh Cho Region**ESTABLISHMENT OF PERMANENT MONITORING PLOTS IN THE NWT**

Permanent Monitoring Plots (PMPs) are permanent sites set up in the forest to obtain tree and vegetation information in the same location every ten years. The plots provide baseline information on the state of the forest resource, and provide a mechanism for long-term monitoring of change to forest and vegetation condition. To date, there are about 180 PMPs in the NWT. In 2005, 6 PMPs were established in the Deh Cho Region, and 32 in the Sahtu Region. The data and long-term trend summaries will be available to resource managers, communities and researchers for a variety of uses such as understanding forest growth and succession, forest management planning, and monitoring effects of climate change.

330**Biology****Stabler, James Matt**

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File No: 12 402 721**Licence No:** 13889**Region:** IN**Location:** Beaufort Sea**INUVALUIT SETTLEMENT REGION MARINE EXPLORATORY FISHERY**

Fieldwork cancelled.

331**Biology****Thomas, Craig**

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File No: 12 402 605**Licence No:** 13915**Region:** DC**Location:** Prairie Creek Winter Access Road

CANADIAN ZINC- PRAIRIE CREEK WINTER ROAD FISH HABITAT ASSESSMENT- UPDATES

Fisheries and fish habitat assessments were completed along the Prairie Creek Winter Access Road, from Liard River to the Prairie Creek Mine site, with support from Dillon Consulting Ltd biologists and technical staff. The study area included the proposed alignment for the winter road, which largely follows the historical alignment of the Liard to Prairie Creek Winter Road constructed for exploration and initial mine development in the early 1980s.

Detailed habitat and fisheries assessments were completed by: helicopter over-flights, ground surveys at crossings accessible from air, and ground surveys of road sections accessible by ATV. Ground-based assessments utilized standard stream habitat survey forms and general procedures (i.e., BC Integrated Land Management Bureau's Reconnaissance (1: 20 000) Fish and Fish Habitat Inventory: Standards and Procedures)

Habitat assessments were completed on 19 watercourses, including Prairie Creek, Funeral Creek, Sundog Creek, two unnamed tributaries of Sundog Creek, Tetcela River, Fishtrap Creek, three unnamed watercourses, Grainger River and eight unnamed tributaries of Grainger River.

Fish sampling was completed on six watercourses. A backpack electrofisher was used and each sample obtained was visually-identified. Arctic grayling and slimy sculpin were found in Grainger River at Grainger Gap (UTM: 479276, 6799589). Arctic grayling was also found in Tetcela River (UTM: 460386, 6813946). No fish were collected in the sampled reaches of: Funeral Creek (UTM: 464450, 6831654), two tributaries of Sundog Creek (UTM: 431604, 6829807; 436365, 6828647), and an unnamed tributary of Grainger River, east of Grainger Gap (UTM: 482648, 6796642).

332

Biology

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File No: 12 402 763

Licence No: 13910

Region: SA

Location: Loon Lake near Fort Good Hope

POPULATION ABUNDANCE AND VITAL RATES OF FISH HARVESTED ALONG THE MACKENZIE VALLEY PIPELINE ROUTE – LOON LAKE 2005

The Loon Lake fish study took place from August 24 to September 4, 2005. The goal was to collect baseline life history and relative abundance information about harvested fish populations in Loon Lake. The project was coordinated by the DFO (Winnipeg) and the Fort Good Hope Renewable Resource Council. The field crew consisted of two biological consultants hired by DFO, one adult resident from Fort Good Hope, and one youth resident from Fort Good Hope. Fish were caught with multi-mesh gillnets and were sampled for length, weight, sex, maturity stage, ageing structures, and tissues. A total of 459 fish were caught and sampled, including lake whitefish, northern pike, walleye, lake cisco, broad whitefish, nine-spine sticklebacks and an unidentified minnow species.

333

Biology

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Licence No: 13740

Region: NS

Location: Within a 20km by 20km square surrounding the Discovery mine

BASELINE DATA COLLECTION, YELLOWKNIFE GOLD PROJECT, TYHEE NWT CORP.

The purpose of this fieldwork is to continue the collection of baseline data to support an anticipated application to the Mackenzie Valley Land and Water Board. Five main assessments were conducted as part of the 2005 program: 1) air quality, climate and noise (general air quality monitoring; particulate data collection; noise measurements; climate data collection from a weather station installed in 2004); 2) aquatic and groundwater resources (monitoring of hydrometric and lake elevation stations; secondary bathymetry surveying of Round Lake; second-year snow surveys at five stations investigated in 2004; second-year surface water quality data collection for comparison with the 2004 and regional data); 3) vegetation and plant communities (vegetation sampling and habitat classification, extending from the area studied in 2004 and including the winter road corridor; ground-truthing and refinement of classifications based on the 2004 work and satellite imagery); 4) wildlife and wildlife habitat (expansion of the 2004 fieldwork; wildlife studied included caribou, moose, carnivores, raptors, waterfowl and breeding birds); and 5) fish and fish habitat (length, weight and age data collection; tissue sampling; bathymetry surveying using GPS and a depth-sounder; underwater surveying to record habitat characteristics such as widths, depths, substrates, cover elements, and spawning, foraging and overwintering areas; water temperature, dissolved oxygen, conductivity and pH measurements; species studied included northern pike, lake whitefish, lake chub, slimy sculpin, and Arctic grayling).

Local communities will be updated on the fieldwork and provided with plain language summaries and a copy of the final report.

334**Biology****Weagle, Ken**

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File No: 12 402 670**Licence No:** 13790**Region:** NS**Location:** Within a 20km x 20km square surrounding the Salmita Mine**BASELINE DATA COLLECTION, COURAGEOUS LAKE GOLD PROJECT, SEABRIDGE GOLD INC**

During summer and autumn of 2005, EBA Engineering Consultants Ltd. conducted a hydrometric survey of Matthews Creek, which flows between Matthews Lake and Courageous Lake. The survey was conducted on behalf of Seabridge Gold Inc. The activities that occurred during the survey are as follows: instrumentation installation and collection of an initial set of stage-discharge information; further stage-discharge data collection from a different creek flow; and final stage-discharge data collection and instrumentation removal for the season. The flow data was used to develop a stage-discharge curve. The maximum discharge recorded in the survey was 1.2m³/s on 24 June, in the post-freshet period. Data indicated that creek flows generally declined over the summer and autumn, with a minimum flow of 0.2m³/s recorded on 22 September 2005, prior to freeze-up. Creek water temperatures were also recorded for the same period and ranged from a high of 18° in summer to 1.5° in autumn. Using the stage-discharge relationship and the recorded stages, a time history or hydrograph was developed for the survey period. Data also indicated that snowmelt and evaporation had a minimal impact on creek flows during the survey period. As variations between years can be significant, it is recommended that the hydrology program be continued for at least another year.

Aerial surveys were conducted in four periods between autumn 2004 and autumn 2005 in order to document the presence of caribou, grizzly bears and wolves in the survey area; in addition, the aerial caribou surveys also provided data on caribou abundance and distribution across the study area. As could be expected, caribou abundance was lowest in the July and November periods and highest in September, the time when caribou are migrating southward. The surveys were informed by the cumulative data from the satellite-collar program conducted by the GNWT Department of Environment and Natural Resources (ENR). Miscellaneous wildlife

observations were also recorded during the surveys and included foxes, raptors and waterfowl. Surveys were conducted in 2004 to document bears, dens and bear sign, with a total of five dens and seven bears observed. In 2005, aerial surveys and ground checks were conducted incidentally to other field surveys. Nevertheless, five bears and one old den were observed. Similarly, observations of wolves, wolf activity and dens were documented incidentally to other field surveys in both 2004 and 2005. In 2004, one active wolf den and one inactive den were recorded and 24 observations of wolf sign recorded. In 2005, it was observed that the same active wolf den was being used again and two old den sites were located. Two adult wolves were observed.

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Location: Lac de Gras

DAVIK DIAMOND MINES INC. DUST DISTRIBUTION AND MONITORING USING LICHENS AS BIOINDICATORS

The Diavik Diamond Mine impacts the immediate tundra community resulting in increased levels of elements and compounds in lichen tissue compared to reference communities 30 and 60 km away. Sampling direction and lichen species affected accumulation of airborne pollutants in tissue; however, there was no consistent pattern. The presence of phthalates cannot be associated with the Diavik Diamond mine as levels were consistent between reference sites and mine. Polycyclic aromatic hydrocarbons (PAHs) were not found in lichen tissue or soil. Element and compound concentrations in lichen tissue are, in general, well below Canadian Council of Ministers of the Environment (CCME) guidelines for soil quality. Guidelines do not exist for plant tissue, and therefore, it is not possible from this study to assess the type of magnitude of impact, if any, elevated levels may have on lichen and plant communities. This research and that carried out in other arctic regions supports the use of lichens as bioindicators of air quality surrounding point sources of pollution. Quantitative data on element concentrations in lichen tissue are required to provide precise data that can be compared to background levels in the region and regulatory criteria. More detailed research would be beneficial to determine the specific effect of direction and species, if any, on the accuracy of air quality data collected using lichens.

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Location: Lac de Gras

DAVIK DIAMOND MINES INC. 2005 AQUATIC EFFECTS MONITORING PROGRAM

Diavik Diamond Mines Inc. conducted the Aquatic Effects Monitoring Program in 2005 as a requirement of the Type A Water Licence N7L2-1645. This is the fifth year of post-baseline aquatic effects monitoring and the third full year of monitoring (open-water and ice cover) since the Mackenzie Valley Land and Water Board approved the program in July 2001. Despite the very close (60m) proximity of Surveillance Network Program (SNP) Station 19 to the effluent diffuser, open-water and ice cover results remain below Canadian Council of Ministers of the Environment (CCME) "Guidelines for the Protection of Aquatic Life". Ice cover concentrations at SNP Station 19 tend to be higher and more variable than open-water concentrations. This

is likely a result of increased wind driven lake circulation in the open-water, resulting in better initial dilution or mixing.

Open-water chlorophyll *a* concentrations closest to the effluent discharge were found to be elevated. These results indicate at least a short-term increase in primary productivity and the gradient of increase indicates that the final effluent could be the source. Results from the near-field monitoring location showed an increase in number of tax and density of benthic organisms. While too early to be conclusive, combined with the chlorophyll *a* results, there appears to be some effects of nutrient enrichment. Sediment quality parameters are similar to previous years and have shown higher concentrations further way from Diavik with a reverse concentration gradient; this concludes that Diavik is not the source but that the observed changes may be naturally occurring within the lake.

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Region: NS

Location: Lac de Gras

DAIVIK DIAMOND MINES INC. 2005 REVEGETATION RESEARCH

The goal of this research is to identify the most effective and economical methods for establishing self-sustaining native vegetation cover on disturbed sites at the Diavik Diamond Mine. The research seeks to determine: which substrates are most effective for plant establishment and growth; the soil amendments that are most effective at enhancing substrate properties and plant establishment; and the groups and individual native plant species that are able to establish and survive on a variety of substrates.

Preliminary soil analyses show that for all treatments, phosphorus is the most limiting nutrient, cation exchange capacity is relatively low, pH is neutral and total organic carbon is low. Heavy metal concentrations of potential concern include arsenic, chromium, cobalt and nickel. Plant growth was limited at the time of the assessment and seedlings were not more than 5 cm in height. Fall seeded fertilizer plots had the greatest plant establishment although densities were not more than 25 seedlings per plot. Grasses established more readily than forbs, which were uncommon. In the topsoil treatments, *Betula* *sp.* and *Vaccinium* *sp.* established from remnant vegetation islands. There was evidence of the importance of microsites (safe sites) in all plots; seed appeared to germinate and establish more readily if there was some protection provided (rocks, soil clumps etc.) by the substrate.

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Region: SS

Location: Four sites approximately 250 km south-east of Lutsel K'e (61°32.5'-61°45.1'N and 105°52.3'-106°49.3'W)

THE RELATION BETWEEN CLIMATE AND ABUNDANCE CYCLES IN BARRENLAND CARIBOU HERDS, NWT

This year's field season was completed with one day of sampling and was aimed at obtaining cross-sections (disks) from black spruce stands at two sites. The purpose for sampling these sites was to develop tree-ring chronologies south-east of Great Slave Lake to better understand the local climate in this region. Obtaining a local record of climate will enable determination of what influence large-scale climate, specifically the Arctic Oscillation (AO), has on barren-ground caribou population abundance cycles.

Fieldwork took place August 26, 2005. The research team commuted by float plane to Site 19 (McArthur Lake; 61° 33.740N, 106° 49.165W) and Site 16 (Penylan Lake; 61° 640N, 106° 27.679W). 36 cross-sections were collected from Site 19, and 40 cross-sections from Site 16. The cross-sections were taken at breast height (1.3 m above ground) to reduce the influence of biological factors. Due to time constraints, it was not possible to sample cross-sections at Sites 17-18. The results demonstrate that caribou population abundance cycles are closely, but inversely, related to the first two phases of the AO (approximately 1900-1929 and 1930-1969). In contrast, caribou population abundance was not inversely related to the last phase of the summer AO (1970-2000), but demonstrated a rather episodic relationship. This study is the first to demonstrate the long-term relation between the AO and caribou population abundance cycles of barren-ground caribou.

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File No: 12 402 503**Licence No:** 13862**Region:** SS, DC, SA**Location:** Colville Lake, Cli Lake, and the east arm and west basin of Great Slave Lake

SPATIAL AND LONG-TERM TRENDS IN PERSISTENT ORGANIC CONTAMINANTS AND METALS IN LAKE TROUT AND BURBOT FROM THE NWT

The study is designed to find out whether contaminant levels are changing in fish in the NWT. Most of the research effort is focusing on lake trout in Great Slave Lake where work has been carried out at Lutsel K'e (East Basin) and west of Hay River (commercial fisheries, West Basin) since 1993. Organic contaminant levels are low in lake trout fillet, with many chemicals such as DDT and PCBs showing evidence of a decline in concentrations. These declines appear due to the fact that the lake trout are younger and less lipid-rich in the early 2000s than those measured in the early to mid 1990s. Fish were a little more lipid-rich in 2004 with organic contaminant levels also higher. Mercury levels are relatively low in lake trout although larger fish have higher values, which approach the 0.5 ppm guideline for the commercial sale of fish. Time trends are less evident. Mercury concentrations in lake trout were measured from Colville Lake and levels are similar to those measured in 1996; Cli Lake fish have not yet been analyzed. Contaminant monitoring in burbot in Great Slave Lake is now occurring only at Fort Resolution, near the Slave River mouth, and shows similar temporal patterns as observed in lake trout. Burbot liver has higher organochlorine contaminant concentrations than lake trout fillet, while mercury concentrations are similar in lake trout and burbot fillet.

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File No: 12 402 503**Licence No:** 13869**Region:** SA**Location:** Mackenzie River and tributaries, near Fort Good Hope, Norman Wells and Tulita

AQUATIC STUDIES ALONG THE MACKENZIE RIVER AND ITS TRIBUTARIES

This study was designed to investigate small fish living in the Mackenzie River between Fort Good Hope and Norman Wells to assess their healthiness. The fieldwork involved travelling in two boats with community members from Fort Good Hope. A lot of various small fish were located and sampled at different sites. All appeared healthy, including those fish sampled on the drill islands at Norman Wells. There also was a good amount of fish food (aquatic insects and worms) in the shallow waters of the river. Fish, aquatic insects and worms, and the water chemistry of six creeks in the Norman Wells area and along the pipeline route were also investigated. This was done by helicopter. Some of the rivers were found to be slightly salty, although the bottom animals were found to be healthy. There were different kinds of fish living in the creeks, sculpins being very abundant except at Chick Creek (where grayling were most abundant). Very young Arctic lamprey were captured in Oscar Creek and in the Mackenzie River near the Oscar Creek mouth. There seemed to be

slightly fewer fish and fish food downstream than upstream of the winter roads.

341

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Region: NS

Location: Vicinity of Giant Mine, Baker Creek, and Old Town in Yellowknife

SPECIATION AND MOBILITY OF ANTIMONY IN SOIL, SEDIMENT, AND WATER IN THE REGION OF THE GIANT MINE ROASTER

The aim of this research is to understand the interaction of surface waters, pore waters and sediment, and the implications of this interaction on the present and future mobility of antimony. Three sample sites — Baker Creek (the channel portion shoreward of the breakwater immediately before it discharges into Yellowknife Bay), the vegetated section of Baker Creek (also shoreward of the breakwater), and Baker Pond (on the Giant Mine site) — were chosen in order to study antimony in porewater and sediment. Sampling was performed by gathering sediment cores and installing dialysis arrays (peepers). Surface water samples were also collected in order to gauge the effects of the water treatment plant on the discharged waters entering Baker Creek, and subsequently, Yellowknife Bay. Surface water samples were collected in June 2005, prior to the operation of the water treatment plant, and again in September 2005, after eight weeks of operation. Surface waters were collected in the settling pond, the polishing pond, Baker Pond, Baker Creek channel, and the vegetated portion of Baker Creek. Water entering the water treatment plant was also sampled.

Pore and surface water samples have been sent for analysis to the US Geological Survey (USGS) in Boulder, Colorado; the samples will be tested for SbIII and SbV, AsIII and AsV, FeII and FeIII as well as selected cations and anions.

342

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Region: NS

Location: Lakes near the Colomac Gold Mine

ECOLOGICAL CONDITIONS IN THE PROPOSED DISCHARGE ROUTE OF THE COLOMAC MINE

The aquatic/fisheries investigations were conducted from July 14 to July 21, 2005 by Rescan Environmental Services Ltd. for the Contaminants and Remediation Directorate of the Department of Indian Affairs and Northern Development (DIAND). Four lakes (Spanner Lake, L-Shaped Lake, Paddle Lake and Lake 315) were sampled for water quality, sediment quality, phytoplankton, benthic macroinvertebrates, and fish community (only from Spanner Lake and Lake 315). Aquatic vegetation (*Carex spp.*) was also sampled from three wetlands for analysis of tissue metal concentrations. Metal concentration trends in water, sediment and vegetation reflected natural biogeochemical processes. With the exception of total copper, none of the water quality variables exceeded the Canadian Council of Ministers of the Environment (CCME) guidelines and many were below detection limits. None of the sediment quality variables exceeded CCME guidelines for effects on aquatic life, with the exception of total arsenic and total zinc. Average phytoplankton biomass values were low but not uncommon for arctic lakes. Similarly, benthos density was low in all lakes, the highest values of which were observed in the two shallow lakes, L-Shaped Lake and Paddle Lake. Fish communities were sampled using gillnets and minnow traps. Lake trout were captured in both Spanner Lake and Lake 315, whereas lake whitefish were captured only in Lake 315. Tissue samples were removed from a subset of these fish for metal analysis. None of the mercury concentrations in either lake trout or lake whitefish exceeded the Health Canada guideline of 0.5 mg/kg wet weight.

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File No: 12 408 134**Licence No:** 13746**Region:** IN, GW**Location:** Inuvik, with participants recruited from communities in the Inuvialuit Settlement Region**MONITORING TEMPORAL TRENDS OF HUMAN ENVIRONMENTAL CONTAMINANTS IN THE NWT AND NUNAVUT**

In 2004, a feasibility study to establish trends for human environmental contaminants in the NWT and Nunavut began with funding from the Northern Contaminants Program. The project acts as a follow-up to the Human Environmental Contaminants Exposure study that was conducted between 1995 and 2001 and will be valuable in Canada's effort to meet its international obligation to the Persistent Organic Pollutants (POP) and Heavy Metals Protocols of the United Nations Economic Commission for Europe (UN/ECE) and Long Range Transboundary Air Pollution (LRTAP) Convention. The program will contribute data to the Global Monitoring Plan created under the Stockholm Convention that includes human blood as a biomarker.

This study involved the baseline collection of maternal blood and hair samples as well as lifestyle/dietary information from pregnant women in the Inuvik. Approximately 50 women who gave birth in Inuvik were recruited to the study; participants were interviewed before they delivered to assess diet and lifestyle during pregnancy and then asked to sign a consent form agreeing to provide blood and hair samples for the study. Communication of results is expected to occur before March 31, 2007. The study will initially provide information to participants, then to community members regarding country food consumption in women of childbearing age and then produce data to international contaminant monitoring initiatives. Consultation was a key component to offering this project and consultation activities continued as a priority to include meetings with and ongoing presentations to: territorial health departments, regional health authorities and staff, territorial environmental contaminants committees, regional and national aboriginal organizations including the local Inuvialuit Regional Corporation and the Gwich'in Tribal Council, with a primary focus on women of childbearing age and community members in the Inuvialuit Settlement Region.

ENGINEERING

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400, 10201 Southport Road
Calgary, AB T2W 4X9
mgp.regulatory@colteng.com**File No:** 12 406 032**Licence No:** 13736**Region:** IN**Location:** Five potential sources of granular materials adjacent to the proposed pipeline right-of-way and at the proposed site of Storm Hills Pigging Facility**2005 WINTER FIELD GEOTECHNICAL INVESTIGATION PROGRAM IN THE INUVIALUIT SETTLEMENT REGION**

The 2005 Winter Field Geotechnical Investigation Program in the Inuvialuit Settlement Region (ISR) was conducted between January 23 and March 13, 2005. The objective of the program was to obtain information with respect to sub-surface conditions in the ISR within potential borrow sources and at a facility site. This information is required in order to assess the feasibility of a Mackenzie Valley pipeline and for the preparation of subsequent regulatory applications. Over the course of the program, information was collected from four proposed borrow sources (1.004P, 2.029PB, 2.029P and 20.038P) and the proposed Storm Hills Pigging Facility.

Execution of the program was approved by various regulatory agencies including the Inuvialuit Land Administration, Indian and Northern Affairs Canada, the NWT Water Board and the Aurora Research Institute. Protocols from the Department of Fisheries and Oceans (DFO) were also complied with during the planning and implementation of the program. Indian and Northern Affairs Canada (INAC) conducted three environmental inspections during the execution of the program. Meetings and telephone communications were held on a consistent basis with the regulatory agencies. Implementation of the program commenced on January 23 with a survey of the Cockney Channel access to the Storm Hills Staging Area. Site investigations commenced on February 9 with a test pit excavation carried out at Site 1.004P near Swimming Point Camp. Clean up of the program area was completed on March 13 at Site 20.038P. The program was executed over 50 days during this time period. A total of six boreholes were drilled and 14 test pits were excavated at the four proposed borrow sources. A total of four boreholes were drilled at the proposed Storm Hills Pigging Facility. None of the field activities resulted in any major environmental incidents. There were five minor hydrocarbon spills, all of which were less than two litres in volume. All of these spills were immediately reported, responded to and cleaned up without any residual effects. Contaminated snow and contaminated absorbent pads and rags were stored separately, and ultimately disposed of at the appropriate landfill site. There was no known disturbance to wildlife during the program. As well, there was no known negative environmental impact to the ground surface or to the water resources and fisheries in the one water source (Peter Lake) used during the program.

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mgp.regulatory@colteng.com**File No:** 12 406 032**Licence No:** 13737**Region:** IN**Location:** Proposed site of the Taglu Field Development**2005 WINTER GEOTECHNICAL FIELD PROGRAM: TAGLU FIELD**

The Taglu Winter 2005 Geotechnical Program in the Inuvialuit Settlement Region (ISR) was a field-based

multi-component sampling and survey exercise located on the Taglu Development Pad within the Kendall Island Bird Sanctuary in the Mackenzie Delta. The objective of the program was to obtain information regarding subsurface conditions at the Taglu site. The fieldwork ran between February 17 and March 24, 2005, taking a total of 36 days to complete. Thirteen boreholes were augured to a maximum depth of 25 m to: characterize subsurface soil and ice conditions; delineate the thickness of the active layer and any interfaces between frozen and unfrozen ground; collect undisturbed samples of both frozen and unfrozen soil; obtain ground temperature data and install ground temperature monitoring equipment; and obtain data on auger penetration rates.

The lithology in the undisturbed tundra generally consists of 0.6–0.9 m of peat cover overlying non-plastic silt grading into very fine sand. Permafrost was encountered in all overland boreholes. Excess ice contents in the superficial 4 m ranged from 20% to 100%. Below this depth, visible excess ice in the drilled boreholes was generally less than 5%. An ice vein was encountered in one borehole, PL3, between 7.15 m and 7.65 m depths.

Porewater salinity measurements from 44 soil samples taken from depths up to 25 m ranged from 0 ppt to 6 ppt, averaging at 2 ppt. The existing gravel pad, which was constructed in the area of the former D43 wellsite, consists of approximately 1–2 m of granular fill overlying the tundra. Subsurface conditions at two potential dock site locations were investigated. The depth from ice cover to river bottom at the two borehole locations ranged from 3.0–4.2 m. The river bottom at these locations consists of unfrozen, soft to firm non-plastic silt grading into loose to very dense, very fine-grained silty sand at 5–6m depths below the river bottom.

Ground temperatures at a 10m depth were approximately $-5.0^{\circ} + 0.5^{\circ}$ C in undisturbed tundra, except in the vicinity of water bodies or disturbed areas. Permafrost was encountered in the vicinity of the former sump, former exploration well (D43) and the river bank, albeit at warmer ground temperatures. Because the boreholes were drilled during the winter it was not possible to determine the depth of the active layer.

The information collected during the field program is being used as primary input into the development of: 1) future project permit applications (i.e., land use permits, water licences); 2) engineering design criteria for foundations of future structures; 3) preliminary construction and design planning; operational criteria; and cost estimating.

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2005 WINTER FIELD GEOTECHNICAL INVESTIGATION PROGRAM IN THE GWICH'IN SETTLEMENT AREA

The 2005 Winter Field Geotechnical Investigation Program in the Gwich'in Settlement Area (GSA) was conducted between February 11 and April 4, 2005. The objective of the Program was to obtain information with respect to sub-surface conditions in the GSA within potential borrow sources, at a facility site and at a potential location for a pipeline anchor test. This information is required in order to assess the feasibility of a Mackenzie Valley Pipeline and for the preparation of subsequent regulatory applications. Over the course of the program, information was collected from two proposed borrow sources (2.051PA and 20.073P), from the proposed Inuvik Area Facility (IAF) site and from along the proposed access road between the IAF and the Dempster Highway. Information was also collected from four areas along the Dempster Highway, which exhibited a variety of subsurface soil conditions, to test the suitability of using slurry and screw anchors as anti-buoyancy measures for pipeline construction.

Execution of the program was approved by various regulatory agencies including the Gwich'in Tribal Council, the Gwich'in Land and Water Board and the Aurora Research Institute. Protocols from the Department of Fisheries and Oceans (DFO) and Acceptance Conditions from the GNWT Department of Transportation were also complied with during the planning and implementation of the Program. Indian and Northern Affairs Canada (INAC) conducted four environmental inspections and one Industrial Water Licence inspection during the execution of the program. Meetings and telephone communications were held on a consistent basis with the regulatory agencies. Implementation of the program commenced on February 11 with a survey of the IAF access. Site investigations commenced on February 25 with drilling conducted at Anchor Test Area 1 (Staging Area). Clean up of the program area was completed on April 4 at Anchor Test Area 4. The Program was executed over 52 days during this time period. A total of ten boreholes were drilled at the two proposed borrow sources. A total of 13 boreholes, 43 slurry anchor holes and 20 screw anchor pilot holes were drilled at the four Anchor Test Areas. A total of 18 boreholes were drilled at the proposed Inuvik Area Facility. A total of 6 test pits were excavated and 11 boreholes were drilled along the proposed access to the IAF.

None of the field activities resulted in any major environmental incidents. There were five minor hydrocarbon spills, all of which were less than ten litres in volume. All of these spills were immediately reported, responded to and cleaned up without any residual effects. Contaminated snow, and contaminated absorbent pads and rags were stored separately and ultimately disposed of at the appropriate landfill site. There was no known disturbance to wildlife during the program. As well, there was no known negative environmental impact to the ground surface or to the water resources and fisheries in the two water sources (GSA-1 and Dolomite Lake) used during the program.

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Region: SA

Location: Within the pipeline study corridor of the Tulita District of the Sahtu Settlement Area

**2005 WINTER FIELD GEOTECHNICAL INVESTIGATION PROGRAM IN THE SAHTU SETTLEMENT AREA -
TULITA DISTRICT**

Fieldwork cancelled.

348

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Region: SA

Location: All major watercourse crossings located on the proposed pipeline right-of-way in the K'ahsho Got'ine District of the Sahtu Settlement Area

2005 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM IN THE SAHTU SETTLEMENT AREA

The 2005 Spring Break-up Watercourse Investigation Program in the Sahtu Settlement Area (SSA) was a helicopter-based program that was conducted in two phases to observe the break-up conditions at the major watercourse crossing locations along a proposed pipeline corridor. The overall purpose of the program was to acquire information necessary for the engineering design and operation of the proposed Mackenzie Valley

Pipeline at each of the crossing points and as input to the project cost estimate. The objectives of the program were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed watercourse crossing points. The program consisted of a pre-break-up phase and a break-up phase, and took three days to complete, between April 17 and April 20, 2005.

The first phase of the Program was conducted in the Gwich'in Settlement Area (GSA), SSA and the Deh Cho Region (DCR) between April 14 and April 22, 2005. In this phase, all the required break-up conditions were observed. The second phase was conducted only in the Inuvialuit Settlement Region to meet the late break-up conditions in the Mackenzie Delta. The required observations were made at all proposed crossing locations in this area as the break-up was underway.

There was no known interaction with any wildlife, during the ground portion of the program. Helicopters were contracted with companies designated by Imperial Oil Resources Ventures Limited, based on Access and Benefits considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The program operating plan was developed to assign a helicopter company and community monitors to each program and to each community area of the respective regions.

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Region: DC

Location: All major watercourse crossings located on the proposed pipeline right-of-way in the Deh Cho region

2005 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM - DEH CHO REGION

The 2005 Spring Break-up Watercourse Investigation Program in the Deh Cho Region (DCR) was a helicopter-based program that was conducted in two phases to observe the break-up conditions at the major watercourse crossing locations along a proposed pipeline corridor. The overall purpose of the program was to acquire information necessary for the engineering design and operation of the proposed Mackenzie Valley Pipeline at each of the crossing points and as input to the project cost estimate. The objectives of the program were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed watercourse crossing points. The program consisted of a pre-break-up phase and a break-up phase, and took three days to complete between April 14 and April 16, 2005.

The first phase of the Program was conducted in the Gwich'in Settlement Area (GSA), Sahtu Settlement Area (SSA) and the DCR between April 14 and April 22, 2005. In this phase all the required break-up conditions were observed. The second phase was conducted only in the Inuvialuit Settlement Region to meet the late break-up conditions in the Mackenzie Delta. The required observations were made at all proposed crossing locations in this area as the break-up was underway.

There was no known interaction with any wildlife, during the ground portion of the program. Helicopters were contracted with companies designated by Imperial Oil Resources Ventures Limited, based on Access and Benefits considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The program operating plan was developed to assign a helicopter company and community monitors to each program and to each community area of the respective regions.

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File No: 12 406 032**Licence No:** 13769**Region:** GW**Location:** All major watercourse crossings located on the proposed pipeline right-of-way in the Gwich'in Settlement Area**2005 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM IN THE GWICH'IN SETTLEMENT AREA**

The 2005 Spring Break-up Watercourse Investigation Program in the Gwich'in Settlement Area (GSA) was a helicopter-based program that was conducted in two phases to observe the break-up conditions at the major watercourse crossing locations along a proposed pipeline corridor. The overall purpose of the program was to acquire information necessary for the engineering design and operation of the proposed Mackenzie Valley Pipeline at each of the crossing points and as input to the project cost estimate. The objectives of the program were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed watercourse crossing points. The program consisted of a pre-break-up phase and a break-up phase, and took one day to complete between April 21 and April 22, 2005.

The first phase of the program was conducted in the GSA, Sahtu Settlement Area (SSA) and the Deh Cho Region (DCR) between April 14 and April 22, 2005. In this phase all the required break-up conditions were observed. The second phase was conducted only in the Inuvialuit Settlement Region to meet the late break-up conditions in the Mackenzie Delta. The required observations were made at all proposed crossing locations in this area as the break-up was underway.

There was no known interaction with any wildlife, during the ground portion of the Program. Helicopters were contracted with companies designated by Imperial Oil Resources Ventures Limited, based on access and benefits considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The program operating plan was developed to assign a helicopter company and community monitors to each program and to each community area of the respective regions.

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File No: 12 406 032**Licence No:** 13785**Region:** SA**Location:** Commissioner's Land at Norman Wells**NORMAN WELLS STRAW BALES AND REFLECTIVE SURFACE TEST**

Fieldwork cancelled.

352 **Engineering****Graburn, Larry**

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File No: 12 406 032**Licence No:** 13793**Region:** IN**Location:** All major watercourse crossings located on the proposed pipeline right-of-way, and at Pete's Creek, in the Inuvialuit Settlement Region

2005 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM IN THE INUVIALUIT SETTLEMENT REGION

The 2005 Spring Break-up Watercourse Investigation Program in the Gwich'in Settlement Area (GSA) was a helicopter-based program that was conducted in two phases to observe the break-up conditions at the major watercourse crossing locations along a proposed pipeline corridor. The overall purpose of the program was to acquire information necessary for the engineering design and operation of the proposed Mackenzie Valley Pipeline at each of the crossing points and as input to the project cost estimate. The objectives of the program were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed watercourse crossing points. The program consisted of a pre-break-up phase and a break-up phase, and took four days to complete between May 23 and May 27, 2005.

The first phase of the program was conducted in the GSA, Sahtu Settlement Area (SSA) and the Deh Cho Region (DCR) between April 14 and April 22, 2005. In this phase all the required break-up conditions were observed. The second phase was conducted only in the Inuvialuit Settlement Region to meet the late break-up conditions in the Mackenzie Delta. The required observations were made at all proposed crossing locations in this area as the break-up was underway.

There was no known interaction with any wildlife, during the ground portion of the Program. Helicopters were contracted with companies designated by Imperial Oil Resources Ventures Limited, based on Access and Benefits considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The program operating plan was developed to assign a helicopter company and community monitors to each program and to each community area of the respective regions.

353 **Graf, Linda** **Engineering**
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File No: 12 406 038 **Licence No:** 13890
Region: IN **Location:** Sump sites Ikhil A-01, Ikhil I-37, Kilagmiotak M-16, Kilagmiotak F-48, Ogeoqeqoq J-06, Onigat C-38, Onigat D-52, Reindeer F-36, Reindeer A-41, Sholokpaoqak P-60, Shakqatlatachiq D-50

INVENTORY AND ASSESSMENT OF DRILLING WASTE SUMPS IN THE MACKENZIE DELTA OF THE INUVIALUIT SETTLEMENT REGION

In 2004, several oil and gas industry member companies collaborated on an initiative to catalogue and conduct preliminary assessments of heritage drilling sums in the Inuvialuit Settlement Region (ISR). Prior to the 2004 field season, industry representatives formed a technical committee to develop a standardized sump assessment protocol to be applied to all sites included in the industry- and research-sponsored programs. Representatives from Indian and Northern Affairs Canada (INAC) and the Inuvialuit were also part of the technical committee.

This study was conducted over two years and involved field visits during the summers of 2004 and 2005. As one of the industry sponsors for this program, ConocoPhillips Canada contributed 11 heritage drilling sump sites (seven situated on Crown Land and four, on Inuvik 1(a) lands) to be catalogued and assessed during the 2005 field season. Komex International Ltd. (now WorleyParsons Komex) and IEG Environmental (now Klohn Crippen Berger) conducted the assessments at these sites.

The primary objective of this study was to develop and field-verify appropriate methods to inventory and assess environmental conditions at a selection of heritage drilling sump sites in the ISR. The scope of the work involved identifying, testing, assessing and reporting on the environmental conditions of drilling waste

sumps in accordance with the "Protocol for the Assessment of Drilling Mud Sumps". The protocol requires data collection/compilation from existing sources as well as site-specific field survey information. The existing source information includes: site identification and location; site history; supplementary physiography/geology/climate/ecology data; and previous site assessment reports.

The site-specific field survey information collected in 2005 comprised: site description (infrastructure, slumping, ponding, soil staining, etc.); a photographic record of site conditions (ground and aerial); an active layer thickness survey; soil and surface water sampling and chemical analysis; a site survey with GPS coordinates for sump perimeter, sample points, well centre, etc.; terrain conductivity (EM38) surveys; and a vegetation assessment (qualitative). Based on the 2004 findings, the 2005 program methodology reduced the number of active layer measurements taken on the lease and adjacent undisturbed terrain to ten for each category, and only the EM38 was utilized for the 2005 geophysical surveys.

The following are some general observations based on the 2005 survey results. Four sites had salt staining/crusting present on or immediately adjacent to the survey area described in the field as having an areal extent of <20% of the site area. Six sites had surface water bodies within approximately 500 m. Four sites had portions of the sump collapsed with surface water ponding, with an additional four sites showing minor subsidence. Soil and/or water samples from three sites were analyzed for hydrocarbons; soil analytical results from these sites reported detectable levels of F2, F3 and F4 hydrocarbons. The surface water sample from Ikhil 1-37 reported detectable ethylbenzene, xylenes and F2 hydrocarbon concentrations. Additionally, debris was reported at five sites, and pilings, at four sites.

354 **Engineering**

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File No: 12 402 751

Licence No: 13809

Region: DC

Location: Pointed Mountain Plant Site, WNW of Fort Liard (60° 23'N, 123° 49'W)

PHASE II ENVIRONMENTAL SITE ASSESSMENT AT POINTED MOUNTAIN GAS PLANT AND ASSOCIATED FACILITIES

This program is part of ongoing surface water, groundwater and soils investigations associated with the decommissioning of the Pointed Mountain Gas Field. Alpine Environmental Ltd., through Nahendeh Land and Environmental Services, conducted fieldwork in August and December of 2005 on various locations within the gas field.

Surface water and groundwater sampling and monitoring were conducted on Sites A1, A2, A3, A4, the Pointed Mountain Plant Site and airstrip. Surface water samples were collected from Fisherman Lake, unnamed creeks located near the A2 wellsite and airstrip and the A2 spring.

The surface water and groundwater results are generally consistent with results from previous years.

355 **Engineering**

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Licence No: 13760
Location: N-01 wellsite south-east of Fort Liard

SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE ASSESSMENT, N-01 WELLSITE

The purpose of this work was to add to the previous environmental assessments done in 2002-2004 at the N-01 wellsite and associated facilities. Additional vertical and horizontal delineation of environmental impacts; installing two additional groundwater monitoring wells; field screening the soil; obtaining samples of the soil and/or groundwater for laboratory analysis; and reporting findings along with recommendations were projected for this phase of the assessment. Groundwater monitoring will be part of the overall assessment project later this year.

356

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File No: 12 402 709
Region: DC

Licence No: 13840
Location: F-36 wellsite 30 km south of Fort Liard, along the Shiha Pipeline

F-36 ENVIRONMENTAL SITE ASSESSMENT 2005

The objective of the fieldwork was to assess conditions at the F-36 wellsite. Soil or surface water identified as a concern was sampled, using a shallow hand auger, for laboratory analyses. The final report will provide a comparative analysis of the findings from the 2004 and 2005 assessments.

357

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File No: 12 402 709
Region: DC

Licence No: 13841
Location: O-35 wellsite 30 km south of Fort Liard, along the Shiha Pipeline

O-35 ENVIRONMENTAL SITE ASSESSMENT 2005

The objective of the fieldwork was to assess conditions at the O-35 wellsite. Soil or surface water identified as a concern was sampled, using a shallow hand auger, for laboratory analyses. The final report will provide a comparative analysis of the findings from the 2004 and 2005 assessments.

358

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File No: 12 402 709
Region: DC

Licence No: 13842
Location: M-25 wellsite 15 km north of Fort Liard, along the Chevron Pipeline

M-25 ENVIRONMENTAL SITE ASSESSMENT 2005

The objective of the fieldwork was to assess conditions at the M-25 wellsite and associated remote sumps. Soil or surface water identified as a concern was sampled, using a shallow hand auger, for laboratory analyses.

359

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File No: 12 402 709

Licence No: 13843

Region: DC

Location: K-29 wellsite 15 km north of Fort Liard, along the Chevron Pipeline

K-29 ENVIRONMENTAL SITE ASSESSMENT 2005

The objective of the fieldwork was to assess conditions at the K-29 wellsite and associated remote sumps. Soil or surface water identified as a concern was sampled, using a shallow hand auger, for laboratory analyses.

360

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File No: 12 402 709

Licence No: 13844

Region: DC

Location: O-80 wellsite 15 km north of Fort Liard, along the Chevron Pipeline

O-80 ENVIRONMENTAL SITE ASSESSMENT 2005

The objective of the fieldwork was to assess conditions at the M-25 wellsite and associated remote sump. Soil or surface water identified as a concern was sampled, using a shallow hand auger, for laboratory analyses.

361

Engineering

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Licence No: 13845

Region: GW

Location: Along the proposed pipeline survey corridor within the Gwich'in Settlement Area

2005 ROUTE AND SITE RECONNAISSANCE IN THE GWICH'IN SETTLEMENT AREA

Fieldwork cancelled.

362

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Licence No: 13849

Region: IN

Location: Along the proposed pipeline survey corridor within the Inuvialuit Settlement Region

2005 ROUTE AND SITE RECONNAISSANCE IN THE INUVIALUIT SETTLEMENT REGION

Fieldwork cancelled.

363**Engineering****Povey, Andrew**

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apovey@teraeenv.com**File No:** 12 402 670**Licence No:** 13882**Region:** SA**Location:** Along the proposed pipeline study corridor within the Sahtu Settlement Area**2005 ROUTE AND SITE RECONNAISSANCE IN THE SAHTU SETTLEMENT AREA**

Fieldwork cancelled.

364**Engineering****Quaife, Ron**Imperial Oil Resources
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ron.r.quaife@essco.ca**File No:** 12 406 039**Licence No:** 13892**Region:** IN**Location:** Sump sites Ellice O-14, Hanson G-07, Itrilek B-52, Kurk M-39, Langley E-29, Louth K-45, Mallik L-38, Mallik J-37, Maillik P-59, Napartok M-01, Tununuk K-10**INVENTORY AND ASSESSMENT OF DRILLING WASTE SUMPS IN THE MACKENZIE DELTA OF THE INUVIALUIT SETTLEMENT REGION**

In 2004, several oil and gas industry member companies collaborated on an initiative to catalogue and conduct preliminary assessments of heritage drilling sums in the Inuvialuit Settlement Region (ISR). Prior to the 2004 field season, industry representatives formed a technical committee to develop a standardized sump assessment protocol to be applied to all sites included in the industry- and research-sponsored programs.

This study was conducted over two years and involved field visits during the summers of 2004 and 2005. As one of the industry sponsors for this program, Imperial Oil Resources contributed 11 heritage drilling sump sites (nine situated on Crown Land and two, on Inuvik 1(b) or Tuktoyaktuk 1 (a) lands) to be catalogued and assessed during the 2005 field season. Komex International Ltd. (now WorleyParsons Komex) and IEG Environmental (now Klohn Crippen Berger) conducted the assessments at these sites.

The primary objective of this study was to develop and field-verify appropriate methods to inventory and assess environmental conditions at a selection of heritage drilling sump sites in the ISR. The scope of the work involved identifying, testing, assessing and reporting on the environmental conditions of drilling waste sums in accordance with the "Protocol for the Assessment of Drilling Mud Sumps". The protocol requires data collection/compilation from existing sources as well as site-specific field survey information. The existing source information includes: site identification and location; site history; supplementary physiography/geology/climate/ecology data; and previous site assessment reports.

The site-specific field survey information collected in 2005 comprised: site description (infrastructure, slumping, ponding, soil staining, etc.); a photographic record of site conditions (ground and aerial); an active layer thickness survey; soil and surface water sampling and chemical analysis; a site survey with GPS coordinates for sump perimeter, sample points, well centre, etc.; terrain conductivity (EM38) surveys; and a vegetation assessment (qualitative). Compared to 2004, the 2005 program methodology reduced the number

of active layer measurements taken on the lease and adjacent undisturbed terrain to ten for each category, and only the EM38 was utilized for the 2005 geophysical surveys.

The following are some general observations based on the 2005 survey results. All sites had surface water receptors estimated to be within 500 m of the drilling sump or lease site. Two sites had salt staining described in the field as having an areal extent exceeding 20% of the site. Two sites had salt or iron staining described in the field as present but having an areal extent of < 20% of the site. Six sites had ponded water on the sump or lease area with chloride concentrations exceeding 250 mg/L; of these sites, two had chloride concentrations approximately twice (or greater) that of background concentrations. Five sites had at least portions of the sump collapsed with surface water ponding; an additional four sites reported minor subsidence. Approximately seven sites had terrain conductivity (EM 38) readings on or adjacent to the drilling sump measuring more than twice the background. No sites were reported to have surface soil hydrocarbon staining. Debris was present at five sites, and pilings, at one site.

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File No: 12 406 041**Licence No:** 13921**Region:** NS**Location:** Dettah sewage lagoon**ENHANCED SEWAGE TREATMENT USING AERATION TECHNOLOGY**

Fieldwork cancelled.

366**Engineering****Wiatzka, Gerd**

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File No: 12 406 037**Licence No:** 13871**Region:** SA**Location:** Port Radium Mine site**ASSESSMENT, REMEDIATION AND ASSOCIATED SERVICES FOR FORMER URANIUM MINES**

In July 2005, SENECS Consultants Ltd. conducted an environmental assessment/monitoring at and in the vicinity of the former Port Radium Mine on Great Bear Lake. The work was conducted at the request of the Contaminants and Remediation Directorate of Indian and Northern Affairs Canada (INAC).

The objective of the program was to supplement the information collected during previous assessments, for the purposes of characterizing the existing environment and refining remediation plans for the site. Particular emphasis was placed on the assessment of impacted areas adjacent to the Port Radium site that had not been evaluated in previous programs (e.g., Echo Bay Mines, Cross Fault Lake and the "tower area"). The major components of the 2005 program included: 1) water quality sampling in Great Bear Lake, McDonough Tailings Containment Area, Cross Fault Lake and Glacier Lake; 2) sampling of surface soils for the presence of designated substances (e.g., asbestos) and hydrocarbon products; 3) vegetation surveys; 4) characterization of mine openings, structures and debris; 5) identification and characterization of potential borrow sources; and 6) roving gamma surveys of previously unsurveyed areas.

Findings from the 2005 assessment/monitoring activities will be issued in an assessment report scheduled for

completion in June, 2006. The report will be provided to the Department of Indian Affairs and Northern Development (DIAND).

367

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File No: 12 406 036

Licence No: 13739

Region: IN

Location: Niglintgak Field Development Facilities site in the Mackenzie Delta

2005 WINTER FIELD GEOTECHNICAL INVESTIGATION PROGRAM, NIGLINTGAK FIELD DEVELOPMENT FACILITIES

Information with respect to subsurface conditions at the Niglintgak flow line, well pads and proposed land and barge landing sites was collected as part of the 2005 Niglintgak Winter Field Geotechnical Investigation Program. The program began on February 13 and was completed on April 1. Camp Farewell was closed on April 3.

Twenty-six boreholes were drilled to depths ranging from 16, 20 and 25 m for the land-based sites and up to 50 m in the Kumak Channel. The purpose of drilling was to characterize subsurface soil and ice conditions; delineate the thickness of the permafrost active layer and any interfaces between frozen and unfrozen ground; collect undisturbed samples of both frozen and unfrozen soil; obtain ground temperature data and install ground temperature monitoring equipment and obtain data on drill penetration rates under various subsurface conditions. In addition to the geotechnical investigations, ground-penetrating geophysical surveys were also conducted as part of the program. A total of 57.8 ha of new overland access to boreholes and 1.80 ha of new access for geophysical testing lines were used during the program. Program activities also included: the construction of an access ramp from Kumak Channel onto the Niglintgak site using snow and river channel water; surveying and staking of proposed access lines (width of 6m) to borehole locations and geophysical lines; packing of snow on access lines with the use of snowmobiles and tracked equipment (while ensuring that adequate snow cover was present); and mobilization and siting of a survival shack on the channel ice to support the drilling operations. Existing permitted camp facilities at Camp Farewell provided accommodation and fuel storage for subcontractors and Shell personnel during the program.

Specific site visits were conducted by Canadian Wildlife Service representatives on February 22 and Indian and Northern Affairs Canada representatives on February 22 and March 18. Wildlife sightings that were observed during the program included two foxes, one wolverine, five reindeer and a number of ptarmigans. Due to the timing of the program, migratory birds were not observed.

FOSSILS

368**Fossils****Johnson, Art**

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File No: 12 402 753**Region:** GW**Licence No:** 13831**Location:** Sites in the Gwich'in Settlement Area, located at approximately 67° 45.570N, 133° 53.151W and 68° 06.565N, 133° 28.538W**FOREST RESEARCH IN THE MACKENZIE RIVER DELTA**

In the summer of 2005, forest scientists from the University of Pennsylvania began a project aimed at determining the annual productivity of a forest located on the banks of the Rengleng River, within the Gwich'in Settlement Area (GSA). The annual productivity of a forest is the amount of wood and foliage (leaves and needles) produced by trees each year, and is reported in units of mass per area (in this case Mg/ha-yr). As a general guide to forest productivity worldwide, cold region forests, like the majority of the spruce forests around Inuvik, have annual productivities in the range of 1-3 Mg/ha-yr, while mid-latitude forests fall in the range of 5-12 Mg/ha-yr. The primary goal of this study was to find a forest as similar as possible to the two million-year old spruce-dominated fossil forests that grew along what is now Ballast Brook on Banks Island to determine its productivity. The research team joined the Franklin and Marshall College group on Banks Island, where they excavated and measured buried logs of ancient spruce along the banks of Ballast Brook. From the diameters and tapers of these fossil logs, it was possible to calculate that those trees were 24-30m in height, and were adding wood at a rate of about 3 Mg/ha-yr. Along the Rengleng River, the parts of white spruce trees of about the same size were dissected and weighed to determine the weight of needles and wood produced annually. The modern riparian forest produced about 3-5 Mg of needles per hectare per year, and 2.5-3.5 Mg of wood. This is expected to be a reasonable estimate of the productivity of the ancient spruce forests of Banks Island. It is also of note that riparian forests in the area around Inuvik are as productive as many mid-latitude forests. The riparian forests grow quite fast due to the lack of permafrost, access to stream or ground water throughout the growing season, and the long period of sunlight.

369**Fossils****Williams, Christopher**

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File No: 12 402 750**Region:** IN**Licence No:** 13807**Location:** Ballast Brook, Banks Island (74°20' N, 123°10' W)**PAST CLIMATES OF ANCIENT FORESTS ON BANKS ISLAND**

Abundant fossil plant remains are preserved in the mid-Miocene-aged deposits of the Ballast Brook Formation on Banks Island. Intact cones, logs, and stumps preserved in situ as mummified remains presented an opportunity to reconstruct the composition, structure, and productivity of a forest that once grew north of the Arctic Circle. The research team mapped and measured 76 tree stumps exposed in three dimensions on a 0.12 ha coal deposit. Pines and spruce dominated the forest. Stump diameters ranged from 6 cm to 56 cm (average = 30 cm). Estimates suggest that average tree height of the Miocene forest was 14 m and the largest diameter trees were approximately 22 m in height. Stem volume equalled 430 m³ ha⁻¹ and stem biomass (assuming a wood density similar to modern spruce of 450 kg m⁻³) equalled 193 Mg ha⁻¹. On a stand-average

basis, the annual ring width of the stem wood sampled in the field equalled 1.5 mm. Based on this ring width, a preliminary estimate for carbon sequestered aboveground as wood in these forests is 3.1 Mg ha⁻¹ yr⁻¹. Thus, these were moderate biomass forests with moderate productivity typical of forests growing in cool temperate climates

GEOLOGY

370**Geology****Duk-Rodkin, Alejandra**

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File No: 12 404 606**Region:** DC**Licence No:** 13835

Location: The area from Dahadinni River to the confluence of the Trail and Mackenzie Rivers, and in the mountains west of Wrigley Lake

SURFICIAL GEOLOGY OF THE MACKENZIE CORRIDOR

The Southern Mackenzie region has a complex glacial history. The region was glaciated by two ice masses from two different sources the mountains to the west and the plains to the east. Stratigraphic and geomorphologic evidence indicate that the two glaciers occupied this region at a slightly different time during the Late Pleistocene. The eastern continental ice sheet (Laurentide) advanced over the foothills and up major valleys before montane valley glaciers reached their maximum or during their initial stages of development ca. 30 ka. This pattern of glaciation is the same one that affected central and Northern Mackenzie Mountains in the Late Pleistocene. However, while areas north of the 64th parallel have an excellent geomorphic and pre-Late Pleistocene stratigraphic glacial record, the southern areas have an excellent geomorphic and stratigraphic Late Pleistocene record. No old glaciation record has been found except in old glacial cirques developed in the outer ranges filled with Late Pleistocene Laurentide sediments. Ice provenance in the mountains were from various sources, valley glaciers from the continental divide, local ice caps developed in montane tops risen above the snow line during glaciation and from the Cordilleran ice sheets of Cassiar and Selwyn mountains. Ice provenance from the east (Laurentide) moved into the region in lobes and sub-lobes that moulded over the very irregular foothills to mountains topography.

The two ice masses caused major changes to the landscape of Southern Mackenzie region. The Laurentide Ice Sheet blocked the drainage of South Nahanni River causing the formation of a glacial lake that inundating approximate maximum area of 6 000 km² with an outlet to the south-west into Yukon Territory and the Pacific Ocean. Preliminary recordings of the thickness of lacustrine sediments at various sites east of Virginia Falls were observed to be between 110 to 120 m. The ice sheet reached Virginia Falls and lower Flat River. Shield granite erratics were found over 100 km behind the mountain front. During retreat of the continental ice sheet and advance of montane ice glacial, Lake Nahanni cut an outlet to the East at the locality of First Canyon. This outlet joined the north flowing drainage that eventually reached the Arctic Ocean. Another example of a major change was the damming of Redstone River. This occurred close to 22 ka BP which caused the eastern flowing river to change its course to the north. The channel incised through a highly folded and faulted terrain triggering landsliding that continues until today. The stratigraphic record of the region shows glacial lacustrine and deltaic sediments formed by the pre-advancing Laurentide Ice Sheet deposited over pre-Late Pleistocene east-flowing fluvial deposits containing organic rich over-bank deposits. A re-advance subsequently occurred in which westward and northward Laurentide tillites were overlapped by lacustrine sediments and another Laurentide till. In turn, a local montane till, devoid of shield erratics that extended as piedmont glaciers over Laurentide sediments, developed. Lacustrine and deltaic sedimentation of glacial Lake Mackenzie then occurred. Other montane glacier data suggest several inter-bedded local tills in middle North Nahanni Valley overlapped by a major outwash unit. No paleosols are present at their upper contacts; only a change in colour and flow direction has been observed to count for a different provenance.

371**Geology****England, John**

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File No: 12 404 141**Licence No:** 13865**Region:** IN**Location:** Melville Island, Eglinton Island, Walker Inlet, Prince Patrick Island, and Banks Island**ENVIRONMENTAL CHANGE IN THE WESTERN ARCTIC**

During the 2005 field season, four camps were established on the Western Arctic islands to gather geological data that would help clarify the histories of sea level, glaciation and deglaciation both during, and after, the last glacial maximum (LGM) around 18 000 years ago. From July 1 – 30, 2005, two camps were established on north-east Banks Island. A group of researchers surveyed landscape features relating to former ice margins, such as moraines and melt-water channels, and former positions of sea level, such as raised beaches and deltas. Fossil shell material for radiocarbon dating was collected from these landforms and deposits that enabled the construction of a detailed chronology of events spanning the last 30 000 years. Though preliminary, results suggest that Banks Island was subjected to far more extensive glaciation during the past 30 000 years than had previously been envisaged. The distribution of abandoned ice-marginal meltwater channels, both mapped from air-photos and on the ground, suggests an integrated pattern of ice retreat across the whole landscape of northeastern Banks Island as opposed to only limited glaciation along the coastal margins. During deglaciation sea levels were as much as 80m higher than present along the north-western coast of Prince of Wales Strait due to the land having been depressed by the load of glacial ice.

From July 9 – August 2, 2005, another group of researchers conducted fieldwork out of two camps in the western Queen Elizabeth Islands: one located on northern Eglinton Island and the other in Marie Bay, Melville Island. Meltwater channels and other glacial landforms (e.g. moraines) were mapped on air photos and in the field and the provenance of glacial sediments (till) and erratics were assessed. Raised marine shorelines and sediments were also mapped and dated if they contained fossil marine shells or driftwood, especially those observed to be in contact with glacial landforms. Preliminary results suggest that Eglinton Island was indeed glaciated during the LGM, but additional field surveys are required on southern Eglinton Island to confirm this hypothesis. The composition of glacial sediments suggest that the source of LGM ice on Eglinton Island was not the western Melville Island Ice Cap, but rather a combination of the north-west sector of the Laurentide Ice Sheet to the south and local, island-based glaciers. Deglaciation began by ~12 000 years before present, and from ~12 000 – ~5 000 years before present, relative sea level fell, reflecting crustal rebound following deglaciation. From ~5 000 years ago to the present, relative sea level has been rising and continues to do so today. Seven fossil bivalve samples related to raised marine shorelines (11-30m above modern sea level) were collected and radiocarbon dated from Marie Bay. Together with the other ten radiocarbon dates collected from western Melville Island in 2003 and 2004, a detailed story documenting the timing and pattern of deglaciation and sea level change from LGM to present can be developed (to be discussed in C. Nixon's Ph.D. dissertation). Based on the radiocarbon dates from Marie Bay alone, sea level change from LGM to present was similar to that which occurred on northern Eglinton Island. Shorelines of the same age are higher on western Melville Island than they are on northern Eglinton Island however, suggesting some additional crustal rebound, most likely from the Melville Island Ice Cap. Additional surveying of raised marine shorelines on southern Eglinton Island is required to further develop this interpretation. Driftwood collected from Marie Bay ranged widely in age range and was more abundant than anywhere else on western Melville Island. This shows that Marie Bay is experiencing a rising sea level similar to the rest of the study region, and may also suggest that it became ice-free earlier than other locations, allowing mobile pack-ice to enter the bay and deliver driftwood from the Arctic Ocean.

372**Geology****Falck, Hendrik**

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File No: 12 404 593**Licence No:** 13839**Region:** SA, DC**Location:** Greater Nahanni ecosystem, in the south-western part of the Sahtu Settlement Area and the north-western part of the Deh Cho Region**NAHANNI MINERAL AND ENERGY RESOURCE ASSESSMENT (MERA) 2**

The second and final field season of research into the Mineral and Energy Resources of the proposed expansion of the existing Nahanni National Park Reserve has been completed. Federal Government policy requires that a Mineral and Energy Resource Assessment (MERA) study be carried out for every new national park proposal. Four components to the project were completed.

A team of field workers used a helicopter to collect samples of stream and river sands and mud. Over 1 400 samples were collected from the Nahanni area and analyzed for 52 different elements. The chemistry of the sample when analyzed can give a summary of the rocks in the valley. For the second part of the study, a geologist collected water spring samples from 78 sites. The water composition carries clues as to what minerals the water dissolved along its path. The third part of the study was an airborne geophysical survey over three small portions of the Greater Nahanni Ecosystem: Prairie Creek area, Caribou River Area and the Cantung deposit area. The surveys help in mapping the geology of the area because the rocks host metal deposits that often have minerals that can be recognized due to their magnetic, conductive and radioactive qualities.

A total of 40 mineral showings were also examined by a geologist to identify and classify the different types of metal deposits in the region. The results of these studies will be published by the Geological Survey of Canada as an Open File scheduled for completion by October 2006.

373**Geology****Grasby, Stephen**

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File No: 12 404 634**Licence No:** 13798**Region:** DC**Location:** North-western shore of Great Slave Lake near Windy Point**SEARCH FOR SPRINGS REPORTED BY MCCONNELL IN 1890**

Fieldwork cancelled.

374**Geology****Jackson, Valerie**

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File No: 12 404 554**Licence No:** 13821**Region:** NS**Location:** 240 km NNW of Yellowknife

SOUTHERN BEAR PROVINCE GEOLOGICAL MAPPING PROJECT

The Southern Bear Geological (bedrock) Mapping Project is focussed on an area ~240 km north of Yellowknife. It is planned that in three to four years, most of the ground within NTS map sheets 085B/4 and 5 and 086C/1-8 will be mapped under the project. The 2005 field season, the second for the project, started on June 12 and ended on August 25. Field mapping was focussed in the middle of the project area, and was completed out of three main base camps— on a lake due east of De Vries Lake (June), Mattberry Lake (July), and on a bay of Ingray Lake (August). In the approximately 10.5 weeks, ~30 % of the project area was mapped.

Rocks within the project area can be subdivided according to age: Archean rocks, older than 2.5 billion years and found mainly in the east, and younger Proterozoic rocks, between 2.5 and 0.6 billion years old, found in the west. Samples weighing about 20-25kg were collected to get precise ages on these rocks. Some of the Proterozoic rocks in eastern parts of the area, for example at Norris and Ingray Lakes, possess rusty zones (called gossans) that contain sulfide minerals. Other Proterozoic rocks near DeVries Lake contain alteration zones that elsewhere in the NWT are associated with copper, silver, and gold. Samples (about 1-2 kg) of the gossans and alteration zones were collected to see if they contain appreciable amounts of precious metals. To date, some of the samples have been found to contain elevated concentrations of Cu, W, Co, Ag, and Mn. These concentrations are reported in NWT Open Report 2006-002 available through the NWT Geoscience Office website. Technical results from the bedrock mapping project are presented at the Geoscience Forum held every November in Yellowknife, and are posted on the NWT Geoscience Office website.

In 2005, the project supported three B.Sc. thesis studies (University of Alberta, Carleton University and University of Ottawa) and a post-doctoral study (Memorial University).

375	Geology
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File No: 12 404 651	Licence No: 13878
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Region: GW	Location: Peel Plateau and Plain
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REGIONAL GEOSCIENCE STUDIES AND PETROLEUM POTENTIAL OF THE PEEL PLATEAU AND PLAIN

The Peel Plateau and Plain has widespread hydrocarbon potential, and yet, it is under-explored and its geological history, poorly understood. The primary objective of this four-year project is to improve knowledge of the regional geology, including stratigraphic relationships, depositional and tectonic histories, basin evolution, and petroleum potential. This project is significant because much of the geological mapping in the area dates back to the 1960s and new geological knowledge in the North is necessary to stimulate petroleum exploration, industry investment, and economic development for the benefit of Northerners.

Ten days of geological reconnaissance work was conducted from July 27 to August 5, 2005 by geologists from the NWT Geoscience Office, Geological Survey of Canada and the Yukon Geological Survey. The first phase of research focussed on the examination of the geology exposed along the Dempster Highway, from Inuvik, NWT to Eagle Plains, YT. The survey gave an overview of rocks that range in age from Proterozoic Eon (1 billion years ago) to Cretaceous Period (142 to 65 million years ago), as well as landscape features created by Quaternary age (2 million years to 10 000 years ago) glaciations. Along the highway, the geology of 25 stops was documented in order to update data for a now out-of-print geological guide for the Dempster Highway. In addition, Paleozoic carbonates exposed in the Campbell Uplift around Inuvik were examined at quarries and on the north-west and south-east sides of Campbell Lake. Representative lithological samples of formations were collected and Paleozoic carbonates were sampled for microfossils.

Helicopter reconnaissance work covered four main map-areas: Trail River (NTS 106L), Snake River (NTS 106F), Ramparts River (NTS 106G) and Sans Sault Rapids (NTS 106H) along the western and southern edge of Peel Plateau (Richardson and Mackenzie Mountains, respectively). In total, 17 stratigraphic sections were examined spanning 16 different formations, ranging in age from Mesoproterozoic (900 million years ago) to Cretaceous (100 million years ago). Six of the sites represented type localities where formations were originally defined. During flight time, coordinates of several other sections were determined for future work. Preliminary collections from the key sections included: 1) representative lithological samples; 2) carbonate rock for microfossil analysis; and 3) black shale for organic geochemistry analysis. Collection of marine limestone for conodont microfossils provides data necessary to accurately date the different formations examined and improve correlation of rocks within the sedimentary basin. Analysis of the total organic carbon content of shale will provide a preliminary assessment of the hydrocarbon potential of different formations.

The entire rock succession represents different paleoenvironments that changed through time and space. In general, the older part of the succession up to about 380 million years ago represents deposition along a continental margin edge, where the ancient Pacific Ocean deepened westward toward the Richardson Mountains. After this, two mountain-building events created a foreland basin setting across the Peel Plateau and Plain region. Preliminary results from the microfossil and geochemical analyses are expected in late 2005 and these data and interpretations will be presented at future conferences including the Yellowknife Geoscience Forum.

376**Geology****Kershaw, Peter**

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File No: 12 404 116**Region:** SA**Licence No:** 13838**Location:** Along the Canol Trail between Macmillan Pass at the Yukon border and the north-eastern edge of the Mackenzie Mountain barrens**LONG-TERM ECOLOGICAL AND GEOMORPHOLOGICAL INVESTIGATIONS IN THE ALPINE TUNDRA OF THE MACKENZIE MOUNTAINS, NWT**

Approximately six days were spent in the field area in 2005. The main activities in the vicinity of Macmillan Pass and Camp 222 on the Tsichu River were to retrieve stored information from the five automated microclimate stations established in 1990, and check the depth of thaw on five permafrost landforms. One permafrost landform has dramatically deeper thaw depth and this feature is rapidly melting. Others have stable thaw depth on top but are melting from their edges. Based on these studies it is evident that the permafrost is warming (~0.8 to 1°C), and melting continues at a rate of -1% of the area of permafrost landforms each year.

HEALTH

377**Health****Becker, Gisela**

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File No: 12 408 135**Licence No:** 13804**Region:** SS**Location:** Fort Smith

WOMEN'S EXPERIENCES OF CULTURALLY-SAFE BIRTHING WITH A MIDWIFE IN A REMOTE NORTHERN COMMUNITY

This research investigated women's experiences of culturally-safe birthing with a midwife in a remote northern community. The study took place during a time of change in the community, namely during a renewal of community birthing and re-emergence of midwifery practice. An ethnographic approach was used to examine the research topic; unstructured and semi-structured interviews were conducted with women, specific to their personal experiences and understanding of childbirth. The study found that women's experiences were considerably influenced by the realities of remote living. For women who left their home community to deliver in the regional centre, birth developed into a stressful event. The reported stresses were related to a number of reasons: uncertainties with regard to care received at the regional centre, separation from support systems and the home community, and an increased financial load. Other findings from the interviews included an awareness of risks and risk assessment, interviewees' acknowledgement of their remote location, and the importance of having a local birthing program and midwifery care in the community. The study identifies the need to support and sustain community birthing programs and maternity care providers in remote settings. Multidisciplinary collaborative care models and a developing midwifery profession are key strategies to improve the sustainability of remote maternity care programs.

378**Health****Edge, Dana**

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HEALTH RESEARCH: ACCESSIBLE, APPLICABLE AND USEABLE FOR RURAL COMMUNITIES & PRACTITIONERS

During the fall of 2005, eight interviews were conducted in Rae-Edzo among volunteer community members and health professionals. The interviews were conducted by Theresa Belcourt (under the direction of Pertice Moffitt, RN, MN, Aurora College Health Program Instructor).

The interviews from Rae-Edzo were part of a larger study being carried out across the following two territories and five provinces: NWT, Nunavut, British Columbia, Alberta, Manitoba, Nova Scotia, and Newfoundland and Labrador. Interview participants were asked about: internet availability in their communities; how they access health information; how they define research; and whether the available health research is relevant and accessible to them.

The interviews are currently being transcribed from audiotapes to paper and will be analyzed for common themes by the research team. Once the interviews have been fully examined, a final report will be produced

and disseminated to participants, health agencies and the public. The larger study will be completed in 2008, with a final report released by 2009.

379 **Health**

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Region: SA

Location: Deline

CULTURAL MODELS, CONCEPTS, AND PRACTICES IN DENE HEALTH AND HEALING

This community-university research partnership was initiated by the Deline Uranium Team. The Deline Land and Financial Corporation, Deline First Nation and ?ehtséo Ayha school are partners and supporters. The project involves working to understand Sahtúot'ine concepts of health, healing traditions, and how they can be better integrated into community planning, education and policy. University researchers and students worked in close collaboration with Délîne researchers, Elders and youth to document local plant medicine knowledge and practice. A four-day "Plants for Life!" camp was held at Russel Bay, where the research team recorded information shared by elders about several plants (including their traditional medicinal uses) found along the shores of Great Bear Lake. Approximately 35 people, both young and old, attended all or part of the "Plants for Life!" camp. More than 15 hours of video footage was taken during the summer, including recordings of stories related to plants and the use of plant medicines both on the land and in the community of Deline. It is hoped that these stories will aid in better understanding the knowledge connected with plant medicines as well as how they are prepared and used.

380 **Health**

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Region: IN

Location: Inuvik

SURVEILLANCE AND MANAGEMENT OF CLIMATE CHANGE IMPACTS IN THE NORTH: IMPLICATIONS FOR NORTHERN PUBLIC HEALTH POLICY AND INFRASTRUCTURE

Funded primarily by ArcticNet, this action research project focuses on the four Canadian Inuit regions (Nunatsiavut, Nunavik, Nunavut and the Inuvialuit Settlement Region). The theme of the project is the protection of human health from the impacts of climate change (e.g., influence of climate change on key animal populations which people harvest for food; "transport" of certain diseases into the region by insects and animals; instable shorelines on which people build their houses; and the more direct effects of extreme, unpredictable and highly changing weather conditions). More specifically, the project seeks to work with Northern managers, organisations and individuals to assess the current state of, and then build the capacity of, the public health surveillance system in response to climate change-induced health effects.

The project has experienced some significant delays and is currently on hold.

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Region: NS **Location:** Rae-Edzo

GENETIC STUDY OF BARDET-BIEDL SYNDROME AND RELATED DISORDERS

Fieldwork cancelled.

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Region: NS **Location:** Ndilo and Dettah

COMMUNICATION AND UNDERSTANDING OF HEALTH RISKS IN NORTHERN ABORIGINAL COMMUNITIES

The study was undertaken to develop better insights into the communication and understanding of various types of health risks in the Yellowknives Dene First Nation communities of Ndilo and Dettah. A participatory approach was used that included community members as partners. Information was collected using both questionnaires administered by trained community fieldworkers and photovoice.

Results show that people are concerned about a number of things that may be affecting their health or the health of the people in the community. The risks regarded as most dangerous are those involving alcohol, drugs and tobacco. People are also concerned about contamination of their land and water, particularly from mining activities, and do not always trust the sources where they obtain most of their health information. It would seem that other than requiring better information about risks, people also need to find ways to deal with risky behaviours (such excessive drinking, drug abuse and smoking) and risks stemming from changes to their environment. The results of the study were provided to the study participants, the Yellowknives Dene First Nation Band Council and the communities of Ndilo and Dettah in April 2006.

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Region: GW **Location:** Fort McPherson

GWICH'IN TRADITIONAL FOOD FOR HEALTH

This is Year 1 of a three-year research project, focusing on young women and children. The main intent of the study is to create a sustainable, community-driven base of activities that will support improving the diet of the entire Tetlit Gwich'in community. The questions this study addresses are: Can the diet be improved over a two to a two and a half-year program of food-based interventions? What impact does this have on the

health of the community? 3) What activities can be implemented that will enhance use of traditional food? What activities can be implemented that will improve accessibility and use of good quality market food, particularly perishables such as fruits, vegetables and dairy products? What activities will sustainably reduce demand for low nutrient-dense foods, especially sugary beverages, particularly by young and school-aged children?

Data collected during the research will be returned to the community for their assistance in interpretation. A one-page plain language summary will be prepared in both English and Gwich'in for community residents. The researchers will follow usual community protocols for sharing project results.

384	Health
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Region: DC

Location: Hay River

HEALTH BEHAVIOUR IN SCHOOL-AGED CHILDREN SURVEY

The survey consists of a national unweighted sample of students in Grades 6-10, and requires one class in each of the grades from the NWT, and the initial sample included two schools, Princess Alexandra School and Diamond Jenness Secondary School, to make up the five classes.

As anticipated, the communication at the school level was quite drawn out, subsequent to receiving the licence to perform the research work in the NWT. Initially, Princess Alexandra School declined to participate in the survey; however, the school finally returned six completed photocopied questionnaires to the research team. Communication with Diamond Jenness Secondary School was conducted under an extension to the original licence. Questionnaires were sent out to the school, but near the end of the school year, the research team was informed that they were not completed. This was evidently due to there being some confusion with other research in which the school was involved. Failure to complete the survey was by no means unique to this territory; a number of schools in other jurisdictions also did not complete the surveys after agreeing to do so.

In total, six NWT students are part of the approximately 10 000-participant national sample. Data entry and analysis will be carried out in the summer and fall of 2006.

PHYSICAL SCIENCES

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File No: 12 404 654**Licence No:** 13905**Region:** NS**Location:** Baker Creek, Giant Mine, Yellowknife**SEDIMENT INVESTIGATION OF BAKER CREEK, GIANT MINE**

The aims of the study are to: determine the spatial extent of sediments enriched by tailings solids; characterize the physical and geochemical characteristics of contaminated sediments in Baker Creek; and determine the extent to which arsenic and other elements of concern in these materials can be remobilized into the water column. The Giant Mine project website and the Giant Mine Community Alliance will assist in communicating the results of this investigation. Other communications efforts include ongoing public information sessions, technical workshops, a display in a Yellowknife shopping mall, educational materials and an extensive public reference library. Information generated from the investigation will be available to the public through the Giant Mine Remediation Project.

386**Physical Sciences****Biggar, Kevin**

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File No: 12 402 745**Licence No:** 13758**Region:** IN**Location:** Kendall Island Bird Sanctuary, Mackenzie Delta region**ENVIRONMENTAL SOIL CHEMISTRY AT ABANDONED DRILLING MUD-SUMPS IN THE KENDALL ISLAND BIRD SANCTUARY, MACKENZIE DELTA REGION**

Fieldwork cancelled.

387**Physical Sciences****Blasco, Steve**

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File No: 12 404 576**Licence No:** 13866**Region:** IN**Location:** Beaufort Shelf (survey area bounded by: 131°W to 141° W and 69°30'N to 71°N)**BEAUFORT SHELF SEABED MAPPING PROJECT**

In August-September 2005, the Geological Survey of Canada in collaboration with the Canadian Hydrographic Service conducted a seabed mapping program from the Canadian Coast Guard vessel NAHIDIK. Research was focused on investigating geoenvironmental and engineering issues related to offshore hydrocarbon exploration and transportation. Of the 212 new ice scours mapped on the seabed in 2005, nine were extreme events with scour depths ranging from 2 to 3.4 m and 15 were generated by large

pressure ridges with keel depths of 25.1 to 27.1 m. Gas vents first mapped in 2001 were observed to be infilled in 2004. The resurvey in 2005 revealed the vents to be active again as the infill had been blown out. Comparison of mud volcanoes mapped in 2004 and remapped in 2005 indicated that at least one of the 97 features grew by 30 cm over the last year. Whale maw marks in the seabed indicate possible bottom feeding by bowhead whales in the same area as the mud volcanoes. The abandoned artificial island, Nipterk L-19, was first surveyed in 2001 then again this year. Resurvey results indicate the island is still actively eroding after 20 years and has migrated 32m southeastward in the last four years. A new digital multichannel receiving array successfully imaged both shallow gas and permafrost in the sediments below seabed. The marine mammal monitoring program resulted in only a few sightings.

388**Physical Sciences****Blowes, David**

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File No: 12 404 653**Licence No:** 13908**Region:** NS**Location:** Lac de Gras/Diavik**WASTE ROCK STUDIES AT A DIAMOND MINE SITE**

The discovery of diamonds in Canada's North has led to renewed interest in the development of mining properties in the Arctic. At the Diavik Diamond Mine, open pit mining will lead to the development of two 200 Mt permanent stockpiles of waste rock. The study involves the construction of two large-scale experimental waste rock piles (15 m in height \times 60 m \times 50 m) to measure water flow, water chemistry, rock temperature, and how the waste rock changes over time. In 2005, the initial stages of constructing these test piles were completed. Construction of the test piles will be completed in 2006. Both test piles will contain rock with very low concentrations of sulfide minerals, typical of the rock present at the Diavik site. One test pile will contain rock with a sulfide content of < 0.04 wt% S and the other test pile contains rock with > 0.8 wt% S. Laboratory studies involving small test samples have also been initiated. The results from this five-year study will assist mining companies and regulators in evaluating current waste rock pile designs.

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File No: 12 404 618**Licence No:** 13822**Region:** SA**Location:** Flybye Springs**MINERAL PRECIPITATES AT FLYBYE SPRINGS, NWT**

Fieldwork at the Flybye Springs (64° 17.8', 130° 33.2') was conducted on August 23, 2005. Spring water temperature, pH, dissolved oxygen content and conductivity were measured in situ. Water, mineral and microbial samples were collected in sufficient number to represent the variability, observed at the spring site and to allow comparison with samples collected in 2004. On August 24, the field team, accompanied by GNWT Department of Environment and Natural Resources wildlife technician, Richard Popko, toured other springs in the Sahtu region to investigate locations for future research. One water sample and 1–5 mineral samples were collected from Bifort Springs (64° 38.9', 129° 12.4'), Moonscape Springs (64° 31', 129° 15'), Landing Strip Springs (64° 17.1', 129° 42.8'), Tuitye Springs (63° 08', 129° 51'), Sculpin Springs (63° 56', 129° 18') and Lymnae Springs (64° 08', 128° 25').

Water and gas samples were analyzed by mass spectrometry; mineral and microbial samples are undergoing

light and scanning electron microscopy, electron microprobe and neutron activation analysis. Preliminary results of this research were presented at the 1st International Travertine Symposium in Denizli, Turkey. A research poster summarizing these findings has been prepared for the Sahtu Renewable Resources Board. Geochemical and mineralogical data have been forwarded to the Sahtu Environment and Natural Resources Department in Norman Wells.

390**Physical Sciences****Burn, Chris**

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File No: 12 404 325**Licence No:** 13784**Region:** IN, GW**Location:** Garry Island, Illisarvik, and air-temperature stations at Red Lake, Seal Lake, Bar C, and Dennis Lagoon**PERMAFROST INVESTIGATIONS IN WESTERN ARCTIC CANADA**

In 2005, work in the Western Arctic was concentrated at four locations— Garry Island, Herschel Island, Illisarvik, on Richards Island and near Paulatuk. At both Garry and Herschel islands, ground temperature was collected from a series of sites along hill slopes to measure the annual temperature in permafrost at places where the snow depth is different. The snow depths are usually low at the top of these slopes and much deeper at the foot of the slopes. Results from Garry Island show that the permafrost has warmed by about 1°C since the 1970s, the increase being greatest where there is less snow. These measurements will be continued next year. Due to climate change, it is expected that the snow depth will increase in the Western Arctic, so by collecting data this way, it might be possible to predict how much warmer the ground will become. Results from Herschel Island show that deep ground temperatures, well below the depth where temperature varies each year, have warmed up by about 2°C since 1970.

The research team continued to work at a site on the Dempster Highway near the Inuvik Airport, where the movement of the ground as it warms and cools over the year is being studied. In June 2004, a ground monitoring temperature cable was installed at the site, which will also assist in monitoring changes in ground temperature as the climate changes. It seems that the ground temperature near Inuvik is close to, but above, -2°C, about 5 °C warmer than at the coast. In the delta near Inuvik, the ground is cooler at sites where the trees close the canopy and the snow is not deep in the winter.

At Paulatuk, the researchers finalized some studies of the wind-blown rocks. A paper discussing these observations, which Dr. Ross Mackay started 52 years ago, will be ready for publication next year.

391**Physical Sciences****Chen, Wenjun**

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File No: 12 404 631**Licence No:** 13873**Region:** NS**Location:** Ingraham Trail**MAPPING AND MODELING CARBON FLUX IN NORTHERN CANADA RELATED TO LAND USE CHANGE**

During the summer of 2005, scientists from the Earth Sciences Sector, Natural Resources Canada carried out field measurements of land use change and carbon stock around the Yellowknife and Lupin Gold Mine areas. These field data, with those obtained along the Dempster Highway in the summer of 2004, were used to calibrate and validate the estimation of land use change and associated greenhouse gas removal/emission over

Canada's North. The northern areas cover about half of Canada's landmass and store a huge amount of carbon, the release of which could significantly accelerate climate change. The Intergovernmental Panel on Climate Change (IPCC) "Good Practice Guidance for Land Use, Land Use Change and Forestry" recommends nations to report greenhouse gas inventories for all lands. Due to lack of data, Canada's previous United Nations Framework Convention on Climate Change (UNFCCC) reports did not include a greenhouse gas inventory for areas north of the forest line. This research filled the information gap, and was included in Canada's 2006 report to the UNFCCC. Details of this study were described in the two final reports to the Greenhouse Gases Division (Chen et al., 2006; Fraser et al., 2006).

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File No: 12 404 645**Licence No:** 13826**Region:** SS**Location:** Deep basins of Great Slave Lake**GLACIAL HISTORY OF GREAT SLAVE LAKE, NWT, CANADA**

The aim of this research project is to reconstruct the glacial history of Christie Bay, which is the deepest sector of the Great Slave Lake. This is of particular interest to the researcher due to the possibility that the deepest part of the lake once contained a large subglacial lake, formed during the last glacial period when a thick ice dome covered the Slave region. Subglacial lakes are mainly known from the Antarctic continent, which has remained glaciated for millions of years. Glaciologists are interested in subglacial lakes because they may be an important part of the growth and collapse of ice sheets. They may also contain unique and unknown ecosystems.

In the summer of 2005, the research team conducted a seismic survey in Christie Bay. Acoustic sounding was used to obtain information about the vertical and horizontal distribution of glacial sediments in the deep trough. Several hundred metres of fine-grained lake sediment was discovered; the origin of the sediment is thought to be related to a subglacial lake.

Next year, the research team plans to conduct further geophysical surveys, which are needed in order to understand the physical diversity of the fine-grained lake sediment. With these new data, and detailed topographic mapping of the lake floor, it will be possible to confirm the presence of a subglacial lake 20 000 years ago. The research team also intends to use posters to communicate the results of this scientific study with the Lutsel K'e community.

393**Physical Sciences****Couture, Réjean**

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File No: 12 404 647**Licence No:** 13852**Region:** GW, SA**Location:** along the proposed gas pipeline route between Norman Wells and Inuvik**REGIONAL TERRAIN HAZARDS MAPPING**

This project, which focuses on regional landslide hazards mapping, is intended to: 1) provide baseline knowledge on types, regional distribution, and control of landslides through a compilation of existing and new information; 2) assess the potential impacts of hydrocarbon development on slope stability conditions and occurrence of landslides and the influence of landslides on infrastructure and critical facilities; 3) monitor

zones of potentially unstable slopes along the pipeline route using remote sensing technologies; and 4) assess the potential influence of environmental factors (e.g., climatic parameters, forest fires) and recent climate variability on the frequency and magnitude of landslides. The study area encompasses a corridor extending 20 km to either side of the proposed pipeline route between Inuvik and Norman Wells for a length of 540 km and an area of 24 000 km². The study area also includes the Rampart Zone (south-west of Fort Good Hope) and the Thunder River region, both known for widespread landsliding. The study area is characterized by cold winters with low precipitation and relatively warm summers with moderate precipitation.

Using classical photo-interpretation techniques, a preliminary inventory of over 1 800 landslides and other natural terrain hazard features (e.g. karstic sink holes, rock glaciers) has been created for the study area. At present, about 40% of the study area has been mapped using 665 colour air photos (scale of 1:30 000) acquired in 2004. For all of the 1 800 landslide entries in the landslide database, the following attributes were recorded: landslide type and size; location; morphological parameters; surface tone and texture; vegetation re-growth in landslide scar; relative age; activity; material type; flight line; air photo number; and topographic map sheet number. A collection of several hundreds of photographs of landslides, taken while carrying out field campaigns, completes the database. From the database attributes, desktop landslide mapping and statistical analyses as well as detailed investigations at eight landslide sites throughout the valley were performed to characterize the landslide distribution. Preliminary results indicate an average density of one landslide per 5 km² and show that the dominant landslide types are retrogressive thaw flows (28%) and active layer detachments (26%). Rock falls (11%), debris flows (10%), earth slides (9%), and retrogressive thaw slides (5%) are second in order of importance. About 47% of all landslides took place in morainic deposits. The relative age of landslides was estimated based on tone, texture, and vegetation re-growth parameters, where 38% were classified as old (>50 years old), 40% intermediate (10-50 years old), and 22% recent (<10 years old).

394
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File No: 12 404 321

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Region: NS

Location: Carat Lake Esker and delta, Izok Lake Esker, BHP Koala Airstrip Esker, Misery Lake Esker, Diavik (East Island)

MASSIVE ICE IN GRANULAR DEPOSITS- SHIELD SITES

Fieldwork cancelled.

395
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Region: NS

Location: Snare and Yellowknife basins

AIRBORNE PASSIVE MICROWAVE SURVEYS OF THE SNARE AND YELLOWKNIFE BASINS TO ESTIMATE SNOW WATER EQUIVALENT

Surface snow measurements and airborne passive microwave data were acquired during April 2005 in order to develop methods to convert satellite passive microwave measurements into snow water equivalent (SWE)

estimates. SWE represents the amount of water stored by the snowpack that is eventually released during spring melt. Very few SWE measurement sites exist across high latitude regions of Canada, so satellite data represent the only means to acquire this information. Airborne data from a Twin Otter aircraft were acquired over the Snare and Yellowknife river basins. At the same time, detailed ground measurements of snow depth, density, water equivalent, and grain size were made at points along the flight lines. Personnel from Environment Canada, NWT Power Corporation and Indian and Northern Affairs Canada participated in making the ground measurements. Relationships between the snow cover properties and airborne data are presently being explored, and these results will subsequently be applied to satellite measurements. The satellite data extend back to 1978, so progress in developing these datasets will produce a historical record of SWE that will show variability and change in snow cover over time.

396**Physical Sciences****Edinger, Evan**

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File No: 12 404 552**Licence No:** 13806**Region:** IN**Location:** South-west coast of Banks Island**EFFECTS OF CLIMATE CHANGE ON COASTAL GEOMORPHOLOGY AND BENTHIC BIOTIC COMMUNITIES, SOUTHWESTERN BANKS ISLAND**

This project assessed effects of climate change on coastal erosion and nearshore marine biology on southwestern Banks Island. Coastal surveys in 2005 included 31 coastal and bathymetric profiles, from Cape Kellett to Sachs Harbour. Coastal bluffs are undergoing retreat, particularly west of Sachs Harbour, where the bluffs are exposed to higher energy conditions and sediments are finer grained. Thermal erosion plays a major role in coastal retreat, as melting ground ice causes slumping and creep of material to the base of slopes. A small rain/wind/wave event caused a minor increase in overland flow-induced sedimentation, but a much larger event would be necessary to remove slumped material from the base of cliffs. Bluffs in the eastern section of the Sachs Harbour hamlet area are also eroding.

Marine biological surveys from 70 stations were used to construct a shallow marine habitat map. Shallow (<10 m) nearshore highly mobile rippled sand sheets with low benthic abundance and biodiversity were the dominant habitat in Thesiger Bay. Deeper (10-30 m) offshore or gravel environments hosted a more diverse fauna of clams, worms, and sand dollars. The most diverse environments in the study area were deep (>20 m) lake basins in Sachs Harbour itself, which hosted tube-dwelling anemones in addition to tunicates, bivalves, polychaetes, and echinoderms. Deep (>20 m) poorly circulated basins in the Sachs Harbour estuary were anoxic, and were devoid of benthic life.

397**Physical Sciences****English, Michael**

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File No: 12 404 555**Licence No:** 13771**Region:** NS**Location:** Exeter-Daring-Yamba Lake catchment, Coppermine River Basin**ASSESSING SNOWPACK WATER EQUIVALENT DISTRIBUTION IN THE EXETER-YAMBA-DARING LAKE CATCHMENT, COPPERMINE RIVER BASIN, NWT, USING IN-SITU SNOW SURVEYS AND VARIOUS SCALES OF PASSIVE MICROWAVE REMOTE SENSING DATA**

During the April 2005 field campaign, surface, airborne and satellite passive microwave datasets were

acquired with spatially and temporally correspondent snow cover data. This unique, multi-scale data set represents a key contribution to the development of a tundra snowpack water equivalent (SWE) retrieval algorithm. Data were acquired along a gridded pattern of flight lines over an area that corresponded to a single spaceborne passive microwave grid cell. By flying the same lines at three heights, a dataset with three spatial resolutions was collected (~50 m; ~250 m; ~500 m), ideal for examining scaling relationships between surface terrain types and satellite brightness temperatures. Airborne data were also acquired along regional flight lines surrounding the grid experiment site. These lines were selected because they characterized regional terrain and land cover surface conditions. Ground radiometers identical to those on board the Twin Otter aircraft were deployed in the vicinity of Daring Lake. Low-level flights were conducted over selected radiometer locations for both radiometer calibration purposes, and to further address scaling issues. Ground measurements of snow cover properties were acquired in conjunction with each of the four airborne datasets outlined previously. At fixed intervals along flight lines, and at specifically defined points of interest, SWE and bulk snowpack density measurements were taken using ESC-30 snow cores. Snow depth was characterized with randomly located (within-site) probe measurements, and a snow pit was excavated to determine vertical density profiles, snow crystal types and size, and snowpack stratigraphy.

Surface water sampling to understand and quantify the spatial and temporal contribution of snowmelt water to surface water bodies was also initiated in April 2005. Samples were taken from each of the primary contributing sub-basins and major lakes in the 2 500 km² in the Exeter-Yamba-Daring Lake study basin. These samples are currently being analyzed for stable isotopes of hydrogen ($\square\text{D}\text{H}$) and $\square\text{O}\text{18}\text{O}\text{en}$. Snowpack samples from several sites within the large basin were also extracted and are being analyzed for $\square\text{D}\text{H}$ and $\square\text{O}\text{18}\text{O}$. At the latitude of the study basin there is recognized significant difference between the stable isotope ratio of the snowpack and the pre-melt event surface water. The Water Survey of Canada continuously monitors the discharging river draining this basin. As such, it is possible to mathematically separate the snowmelt water component from the total basin discharge. In-situ snow surveys conducted in April 2005 will enable a reasonable estimation of the total SWE in the basin before the melt period. This, combined with stable isotope data, makes it possible to quantify the annual fraction of snowpack water retained on the terrestrial portion of the system.

398

Physical Sciences

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File No: 12 404 648

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Region: IN

Location: Musko D-37 and Parker River J-72 sump sites on Banks Island

HISTORIC SUMP SITE ASSESSMENT

The objective of this program was to assess the environmental conditions of two drilling waste sumps located in the north-eastern area of Banks Island. The locations are known as Parker River J-72 and Musko D-87, originally drilled in 1979 and 1981, respectively.

On August 8, 2005, the Parker River J-27 site was assessed using the Environmental Studies Research Funds (ESRF) "Protocol for the Assessment of Drilling Waste Sumps." Activities included: surface water and soil sampling; site photography; active layer measurements; and physical assessment of the site conditions. The overall condition of the site and associated drilling sump was positive. There was no evidence to suggest or confirm that the sump had failed or that there was any loss of containment.

The original plan was to assess the Musko D-87 site the following day. Unfortunately, due to poor weather, the site could not be accessed and the assessment could not be completed. The project team was, however, able to visually inspect the site from air and obtain site photographs. Overall, the site looked positive. There

was no evidence to suggest sump failure or loss of containment from the sump, the overall visual appearance of the site seeming favourable.

No further work in this area is planned for 2006. A summary report on the overall condition of these two locations, once finalized, will be sent to the Aurora Research Institute.

399
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File No: 12 404 399

Region: IN

Licence No: 13759

Location: Western Arctic coastline, including the mainland coast and Mackenzie Delta, Banks Island, Victoria Island, Prince Patrick Island, and Melville Island

HAZARDS, SEA-LEVEL RISE, AND CLIMATE CHANGE IMPACTS ON ARCTIC COASTS

Coastal surveys were undertaken at Sachs Harbour, Tuktoyaktuk, Shingle Point and at several locations along the Mackenzie Delta front in the vicinity of proposed industrial development. Coastal change was measured at these sites for comparison with data from previous years in order to monitor the impacts of changing environmental conditions. High-resolution digital topographic data were validated and used for flood risk assessment at Aklavik, Tuktoyaktuk, Shingle Point, and the outer delta. These data provide a baseline for measuring impacts of development and provide information for emergency planning. Data have been provided to the RCMP at Tuktoyaktuk and will be transferred to communities when validation has been completed. Sidescan sonar and swath bathymetry data were acquired in very shallow water along the delta front and are being used to assess the risks to nearshore pipelines in anticipation of offshore development. Synthetic aperture radar was used to map nearshore water depths to map channels and over-wintering fish habitat. GPR was acquired in the shallow delta-front area to better understand how shoals form and erode in the delta region. Ground temperatures are being recorded in zones of bottom-fast ice to assess the extent of seabed permafrost growth and degradation.

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File No: 12 404 652

Region: IN

Licence No: 13888

Location: Mackenzie Shelf–Amundsen Gulf area

ARCTICNET THEME 1: INTEGRATED REGIONAL IMPACT STUDY OF THE COASTAL WESTERN CANADIAN ARCTIC

The main objective of ArcticNet's 2005 research expedition in the Western Canadian Arctic was to service and redeploy oceanographic moorings in the Amundsen Gulf/Mackenzie Shelf region. Some of these moorings have been deployed since 2002 as part of the Canadian Arctic Shelf Exchange Study (CASES). Each of the four mooring lines successfully deployed in September 2005 was fitted with instruments designed to gather continuous records of currents, temperature, conductivity, turbidity, dissolved oxygen and the vertical flux of carbon and contaminants. Two moorings were also equipped with autonomous hydrophones to record the acoustic background and the vocalizations of marine mammals. As part of ArcticNet, these moorings are intended to be deployed until 2018. The data from these long-term marine observatories will provide in-depth information on the annual cycle of biological productivity, on the processes (e.g. timing of ice break-up, Mackenzie River runoff, winds) that regulate the offshore fluxes of carbon and contaminants

from the atmosphere to the deep ocean and on the diversity and distribution of marine mammals within the study area. A myriad of physical, biological and geological measurements was also taken at sampling stations distributed throughout the coastal Western Arctic. Between stations, the ship's continuous sampling equipment assured the monitoring of surface water properties, sea surface microwave and optical properties, zooplankton and fish abundance, water depth and atmospheric contaminants and herbicide levels. From viruses to whales and from the upper atmosphere to beneath the ocean floor, the diversity of data amassed in 2005, in years past and in years to come is sure to provide added insight into how the Arctic Ocean is responding to climate change.

401**Physical Sciences****Grasby, Stephen**

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File No: 12 404 634**Region:** IN**Licence No:** 13799**Location:** Prince Patrick Island, at two sites located at about
76°08'00"N, 120°03'10"W, and 76°12'22"N, 120°07'30"W**EXAMINATION OF CARBONATE MOUNDS ON PRINCE PATRICK ISLAND, NWT**

Fieldwork was successfully conducted in July 2005 on Prince Patrick Island. A small two-man camp was established from which the fieldwork sites were visited by foot. The goal of this work was to examine carbonate mounds previously reported in the Walker River area. A traverse was made to the reported location of the northern mound, but as extensive snow banks covered it, work on that mound had to be abandoned. The southern mound was well-exposed and the excellent weather conditions allowed a thorough study of it. The area was measured and described in detail. Initial results suggest that these mounds represent an ancient deep-water methane seep similar to those found on the Gulf of California in present times. Numerous samples representing key aspects of the carbonate mound were also collected. The samples are being processed for analyses, and will be stored as part of the Geological Survey of Canada's collection. Results of the analyses may take another year to finalize.

402**Physical Sciences****Guo, Laodong**

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File No: 12 404 629**Region:** IN, GW**Licence No:** 13791**Location:** East Channel of Mackenzie River near Inuvik**CLIMATE GEOCHEMISTRY**

The purpose of the 2005 field season was to collect two riverine organic carbon samples (in three different phases: dissolved, colloidal, and particulate) from the Mackenzie River. One sample was obtained from beneath the river ice and the other, in June/July when the river was ice-free. Determination of the concentrations of these organic carbon species in the Mackenzie River waters have been made, along with other water chemistry parameters; characterization of stable isotope composition has been completed, including stable carbon and nitrogen isotopes as well as radiocarbon abundance to determine their radiocarbon ages. In addition, examination of the source and transport mechanism of these organic carbon species in the Mackenzie River during frozen and open seasons will be examined. The results from the Mackenzie River samples will be compared to results from the Yukon River and other northern Alaska arctic river water samples, with the aim of studying the organic carbon dynamics in the Arctic river basins and

fluxes across the arctic land/ocean interface in a changing climate. The research team plans to continue sampling in the Mackenzie River Basin if funds are available in the coming years. Preliminary results have been presented at the 2006 American Geophysical Union's Western Pacific Geophysical Meeting and the Earth System Science Partnership Global Environmental Change Open Science Conference in Beijing.

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File No: 12 404 619**Licence No:** 13761**Region:** DC**Location:** Hay River, approximately from Enterprise to the Town of Hay River**HAY RIVER ICE JAM STUDY**

The research program in 2005 involved field observations along the Hay River, and in and around the town of Hay River during the period of river ice breakup (April 20 to 26). Water levels were measured along the river bank at key sites, and the instrument set-up at the Town's fire hall last year measured the intensity of sunshine occurring in Hay River (important to the nature of river ice breakup). Video and photographs were taken to document the breakup progression both from the ground and from a small plane (chartered locally). River breakup in 2005 involved a number of ice runs and the formation of ice jams in both the East and West Channels. In August 2005 river channel surveys were conducted with help from the Department of Fisheries and Oceans (DFO), and with advice and cooperation from the Hay River Dene Band. Excellent data was obtained from the fieldwork as well as from the Flood Watch Committee for the computer model the research team is developing. Data from the river channel surveys was particularly valuable in considering the historical and current water and ice flow patterns in the various sub-channels of the East Channel, and to begin exploring the issue of sedimentation in the West Channel. This survey is estimated to be completed in the summer of 2006.

404**Physical Sciences****Karunaratne, Kumari C.**

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File No: 12 404 603**Licence No:** 13886**Region:** NS**Location:** Ryan Lake, Pontoon Lake, Cameron River, and Tibbet Lake**THE EFFECT OF GREAT SLAVE LAKE ON AIR AND SURFACE TEMPERATURES IN PEATLANDS NEAR YELLOWKNIFE**

The objective of this Ph.D. project is to determine the effect of Great Slave Lake on air and surface temperatures, and permafrost conditions. In 2005, the study sites along the Ingram Trail that were instrumented with air and surface temperature sensors during the summer of 2003 were revisited. At each site, data loggers were downloaded, re-launched and the batteries, replaced. Active-layer depths were measured and the thermal properties of the ground monitored. Snow surveys were conducted in six-week periods during the winter of 2005/2006 to determine the depth and density of the snow pack.

405**Physical Sciences****Koerner, Roy M.**

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File No: 12 404 515
Region: IN

Licence No: 13763
Location: Melville Island Ice Cap

MASS BALANCE OF ARCTIC GLACIERS

A part of an ongoing program that began in the early 1960s, this study is concerned with glacier health and climate change monitoring in the High Arctic. Fieldwork was conducted on the Melville Island Ice Cap for a duration of three days. Poles drilled into the ice were measured to detect the changing level of ice and snow, and a year-round record of temperature and snowfall was obtained from an automatic weather station on the ice cap. Additionally, small samples of snow (~ 100 g) were collected from different locations on the ice cap to check for acid/pollutants in the snow.

406

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File No: 12 404 545
Region: IN

Licence No: 13748
Location: Kendall Island Bird Sanctuary, Mackenzie Delta region

ENVIRONMENTAL CONDITIONS AT ABANDONED DRILLING MUD-SUMPS IN THE KENDALL ISLAND BIRD SANCTUARY, MACKENZIE DELTA REGION

In March and August 2005, environmental information was collected from seven abandoned drilling-mud sumps in and adjacent to the Kendall Island Bird Sanctuary, Mackenzie Delta region. Snow cover, vegetation cover, ground ice, and ground thermal data were collected to investigate potential relationships amongst these variables and to determine the effect of vegetation on winter snow accumulation and ground thermal conditions.

Preliminary results of the field investigations show that: 1) sump caps are positive relief features that promote the accumulation of snow at the perimeter; 2) the growth of tall standing vegetation (shrubs) on the sump cap will promote snow accumulation; 3) there is a relationship between snow depth and temperature at the bottom of the snowpack at the study sites— in March 2005, snow depths greater than about 100 cm were associated with subnivean temperatures warmer than -5.0°C; and 4) thick snow accumulation can retard ground-heat loss in winter— perennial snow accumulation around the perimeters and on the tops of sump caps with tall shrubs can warm the permafrost and increase thaw depth.

Data collection will continue in 2006, with field programs scheduled for March and August. The collection and subsequent analysis of this data will provide additional insight into the long-term terrain and ecological responses to disturbance which may occur as a result of development in the Mackenzie Delta region.

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Licence No: 13897
Location: Mackenzie Delta

ENVIRONMENTAL STUDIES ACROSS THE TREELINE, MACKENZIE DELTA REGION

Data regarding snow properties and vegetation characteristics was collected at eight sites, along a 130 km transect from Inuvik to the Beaufort Sea coast in March and August of 2005. Six of the eight sites are

instrumented to record near-surface ground temperatures at 5, 10, 50, and 100 cm below the ground surface. Preliminary results are interesting in two regards: 1) snow and vegetation properties are closely related, both snow depth and the height of vegetation decreases along the transect, the largest changes in snow depth and vegetation characteristics occurs between Inuvik and the north end of Noell Lake. A steep decrease in snow depth and vegetation height occurs between these two areas; and 2) Ground temperatures decrease along the transect, the largest differences in ground temperature occur between sites with the largest differences in snow depth. These results are significant as the proposed Mackenzie Gas Pipeline will cross the identified ground temperature gradient close to the study area.

Water samples were obtained from a total of 60 lakes between Inuvik and the Beaufort Sea Coast. Chemical analysis of water samples obtained from the lakes indicates that thermokarst slumping has a significant impact on the water quality of tundra lakes in Mackenzie Delta region. Mapping of disturbances also shows that the aerial extent of thermokarst has increase over the last 5 decades. These data sets provide insight into the natural spatial variability in water quality characteristics of undisturbed lakes, and contribute baseline information that will assist in developing an aquatic effects monitoring program required to assess impacts of the proposed Mackenzie Gas Project.

408**Physical Sciences**

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Licence No: 13789

Region: NS

Location: Within 4 km of the Tundra Ecosystem Research Station at Daring Lake

CANADIAN TUNDRA CLIMATE EXCHANGE PROJECT

During the period May 10 to August 31, 2005, the research team ran a field campaign of environmental measurements at the Daring Lake research site. The main measurements, related to carbon dioxide exchange (CO₂) between the tundra and atmosphere, were performed using two methods. One was through a central instrument tower where the CO₂ exchange was measured over a large patch of mixed tundra. The second was by a chamber system that measured the exchange of CO₂ from small plots (0.75 m x 0.75 m) established in different tundra types. Both of these methods are supported by other environmental measurements such as air and soil temperatures, soil moisture and sunshine amount. Data from the 2005 summer field season will be compared with that taken in 2004. Preliminary results suggest that the earlier snowmelt in 2005 had a profound effect on CO₂ uptake by the tundra.

Some long-term manipulation experiments have also been established at the site to test the effects of global warming (simulated by small greenhouses) and increased precipitation (simulated by snow fences trapping greater snow depth). Measurements of plant species, biomass and abundance were taken in each of the manipulations. These will be monitored over several years to determine the tundra vegetation response to global climate change.

409**Physical Sciences**

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Licence No: 13812
Location: Mackenzie Delta in the vicinity of Inuvik

BIOGEOCHEMISTRY OF LAKES IN THE MACKENZIE DELTA

This project is ongoing, with a long-term goal of developing a biogeochemical model for lakes in the Mackenzie Delta, and ultimately, a more general ecosystem model for lakes in the floodplains and deltas of major world rivers that could help assess the effects of multiple stresses on rivers as a result of global change. Specific goals for the 2005 season included: 1) investigating the sources and fates of dissolved organic carbon (DOC) in aquatic food webs of the Mackenzie Delta; 2) assessing photobleaching rates in lakes with differing compositions of coloured and non-coloured DOC; and 3) assessing the removal of nutrients and DOC from Mackenzie River water during its flow through the Mackenzie Delta.

In June through August, water samples were collected weekly in a set of six lakes to assess sources of DOC within the delta, and samples of algae, aquatic plants, zooplankton and bacteria were taken from this same set of lakes three times over the summer to determine the contribution of DOC to delta food webs. Early results from this work show different sources of DOC (from aquatic plants, river water and permafrost slumping) across delta lakes. Lake water samples collected for experimental measurements (at the Inuvik Research Centre) showed that delta lakes can photobleach rapidly, but that their potential to do so varies depending on the source of DOC (coloured or non-coloured) to these lakes.

The research project on the removal of nutrients and DOC from Mackenzie River water was completed this year, with the submission of C. Emmerton's M.Sc. thesis. Results from earlier work on the delta (zooplankton: Riedel, Lesack and McQueen; hydrogen peroxide: Febria, Garies, Lesack and Bothwell) were submitted for publication to major scientific journals. An internet web page summarizing the biogeochemistry of lakes work in the Mackenzie Delta, including a list of research team's most recent publications can be found on the Simon Fraser University limnology website.

410

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File No: 12 404 262

Region: NS

Licence No: 13788

Location: Two small lakes located 5–7 km south-west of Back Lake (approximately 63.42 N 109. 20 W)

2 000 YEARS OF CLIMATE CHANGE AT TREELINE NORTH OF YELLOWKNIFE

In order to reconstruct changes in summer temperature and changes in vegetation at the northern treeline zone, sediment cores were obtained from two small lakes located north-west of Yellowknife. The two small lakes are unnamed on maps and are located about 5 km south-west of Back Lake at 63° 43' 07 N (Lake S41) and 109° 19' 07 W (Lake S42). The lakes are in the tundra zone, but not far from the scattered spruce trees (*Picea*). The lakes were reached using a Jet Ranger helicopter from Yellowknife. The cores were taken on April 27, 2005 by Glen MacDonald (UCLA) and Dave Porinchu (Ohio State University). The lakes had about 2 m of ice and were 2.4 and 2.6 m deep. A hand-powered Livingstone corer was used to collect 45 cm and 52 cm of sediment from Lake S41 and Lake S42 respectively. The sediment was organic-rich lake silts with some fragments of wood and other plant remains. The wood fragments are near the bottom of the cores, suggesting that the area around the lakes once had forests. Radiocarbon dating indicates that lake-bottom sediments in Lake S41 are 2 340 years old while those in Lake S42 are 4 830 years old. Further analysis, using fossil insects and geochemistry, is being done to reconstruct the climate and vegetation changes at the lakes.

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File No: 12 404 378**Region:** IN, GW**Licence No:** 13764**Location:** Trail Valley Creek and Havikpak Creek, in the vicinity of the AES Upper Air Station near the Inuvik Airport; northern Richards Island, Zed Creek, Hans Creek**SNOW ACCUMULATION/RUNOFF IN HIGH LATITUDE PERMAFROST BASINS**

Field studies were conducted in the Inuvik area during 2005, looking at the factors controlling the movement of energy and water between the land surface and the atmosphere during the spring snowmelt period. These factors control both the supply of energy and water to the atmosphere, as well as snowmelt, and therefore, spring runoff in the streams and rivers. The long term objective of these studies is to improve the ability to predict weather, climate, and water resources. With future uncertainties in climate, and with potential development projects, such improved predictive ability is essential in order to properly manage future environmental change and to adapt to such changes. The 2005 fieldwork concentrated primarily on measuring total basin snowfall (by the middle of April), as well as performing the usual automated measurements of solar radiation, air and ground temperatures and summer rainfall.

Ongoing work will compare results from a number of different years so that the variation from year to year can be understood. Results from areas on either side of the tree-line will also be compared. This work provides important data needed to test computer models, which are used to predict the impact of climate warming on these environments. In addition to this ongoing study, the research team began new work on lakes of the outer Mackenzie Delta which involved the measurement of energy fluxes, standard meteorological components, as well inflow/outflow to the lake, and water depth and temperature.

412**Physical Sciences****McCarthy, Daniel**

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File No: 12 404 650**Region:** DC**Licence No:** 13876**Location:** North Moraine Hill Glacier, headwaters of the Brintnell Creek and/or other glacier forefields in the Ragged Range**GLACIOLOGICAL INVESTIGATIONS IN THE RAGGED RANGE**

The objectives of this study are to: 1) inventory the size and morphometry of glaciers in the Ragged Range; 2) survey North Moraine Hill and/or other large glaciers so as to provide a benchmark against which future change can be detected; 3) find and document geological and botanical evidence of former glacier activity; 4) develop a chronology for Holocene glacier activity in the Ragged Range; and 5) develop one or more growth curves for lichens growing on carbonate and/or silicate rocks.

In July 2005, a reconnaissance trip was made to the headwaters of the Brintnell and Bologna creeks in the Ragged Range, an area being considered for inclusion in an expanded Nahanni National Park Reserve. The fieldwork was done to collect geopositional data for two icefronts, to examine evidence for the Little Ice Age and more recent glacial activity in the area, and to evaluate the feasibility of establishing a glacier monitoring system in the region.

General observations point to the retreat of the Brintnell Glacier front several hundred metres upslope from the location seen in the 1949 aerial photography. This rapid retreat has exposed large areas of lichen free

bedrock, and no obvious lichen trimlines were seen at the glacier. The modern icefront is atop a series of steep bedrock cliffs. The cliffs, a fast flowing stream and waterfalls would make it difficult to study both sides of the forefield. However, several stands of trees in the Upper Brintnell Valley seem to have been untouched by the forest fires that travelled through the Rabbitkettle area in the 1940s. Lichen covered moraines, and trimlines were seen at high elevation cirque glaciers elsewhere in this valley, which suggests that lichens are also established on older surfaces in the Brintnell Glacier forefield. The glacier is close to the park boundary and its meltwaters flow into Glacier Lake. Thus, it might be possible to relate the retreat/advance of this ice to the sediment record preserved in Glacier Lake. Potential for dendroclimatological work in the Brintnell Valley exists as some of the mature tree cover in this valley might be accessible via canoe from Glacier Lake. Such a record could be used to reconstruct climate for the last few centuries.

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File No: 12 404 538**Licence No:** 13880**Region:** IN**Location:** North shore of Liverpool Bay (approximately 2 km south-west of Johnson Bay) and the Mason Bay area, on north-east Richards Island**SAND-WEDGE DEVELOPMENT, TUKTOYAKTUK COASTLANDS**

During cold spells in winter, the permafrost of the Tuktoyaktuk region may crack. Today, the cracks usually fill in spring with water from melting snow that refreezes to form a vein of ice within the permafrost; after many years, the addition of numerous ice veins produces an ice wedge. During the last ice age, however, such cracks in-filled with windblown sand, due to the Tuktoyaktuk region being, at that time, a sandy polar desert with little or no vegetation and little snow cover in winter. The sand-filled cracks formed geological structures known as "Sand wedge". Fieldwork in July and August 2005 near Johnson Bay on north-east Tuktoyaktuk Peninsula and near Mason Bay on northern Richards Island identified a variety of sand wedges. These structures are very useful to geologists because the age of the sand can be determined by measuring the amount of light that it emits when it is exposed to heat or light. If the age of the sand is known, it would be possible to reconstruct the ice age history of the permafrost and of the Tuktoyaktuk polar desert. Sand samples collected from the field sites are currently being dated.

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File No: 12 404 649**Licence No:** 13868**Region:** IN**Location:** Mackenzie Delta, Caribou Hills**SPATIAL VARIABILITY OF ACTIVE LAYER THICKNESS AND SURFACE CHARACTERISTICS**

Permafrost terrain consists of a seasonally thawed active layer, underlain by perennially frozen ground. The thickness of the active layer depends on ground surface temperature and soil thermal properties. Since these vary in space, due to climatic and microclimatic factors and soil materials, the active layer thickness (ALT) is also variable. In order to characterize the spatial variability of the ALT across the treeline, data were collected during mid to late August 2005 at four sites in the uplands east of the Mackenzie Delta. These hummocky sites consist of 100 x 100 m grids within which the ALT was measured every 10 m at 121 points. Statistical analyses reveal no significant trend in the mean ALT across treeline. However, statistical differences in thaw depth were found between the tops and troughs of hummocks at each site.

Spatial analyses of the data collected revealed that sampling grids larger than 100 x 100 m will be required to characterize the variability of ALT for three sites. In addition, the statistical differences in ALT between the tops and troughs of hummocks mean that future sampling for the determination of spatial variability of ALT will have to be restricted to either the tops or troughs of hummocks for comparison purposes.

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File No: 12 404 642**Region:** IN, GW, SA**Licence No:** 13813

Location: About 10 km NW of Noell Lake (Inuvialuit Settlement Region), 20 km east of Travaillant Lake (Gwich'in Settlement Area), 125 km NW of Fort Good Hope (Sahtu Settlement Area), near proposed pipeline corridor

MACKENZIE VALLEY LANDSLIDE GEOTECHNICAL INVESTIGATION

In 2005, a corridor approximately 20km wide by about 750km long, from near the Beaufort Sea to south of Tulita, was visually inspected from the air via helicopter. After this inspection, it was determined that work in 2005 would be focussed on landslides in the Inuvialuit Settlement Region (ISR) and the Gwich'in Settlement Area (GSA). Numerous landslide sites were visited for visual inspections at a closer range. The geometry of the landslides was recorded, as well as thaw depth, vegetation thickness, soil types, and water/ice content of the soil.

Test pits were excavated at a number of sites. Soil samples were obtained using hand tools for laboratory testing. In some of the test pits, testing was carried out using a hand-held shear vane to measure the strength of the soil. All test pits were backfilled upon completion. Two sites were identified as suitable locations for test plots: on Crown Land on the west side of East Round Lake ($N68^{\circ}41.3' W133^{\circ}54.1'$) in the ISR, and the other, on private land south-east of Travaillant Lake ($N67^{\circ}40.0' W131^{\circ}31.8'$) in the GSA. Preliminary soil sampling was done in test pits at these two sites. Future work at these sites will involve installing instruments to monitor ground condition changes.

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File No: 12 404 398**Region:** DC, GW, IN, SA**Licence No:** 13782

Location: Approximately 60 sites between Fort Simpson and the Beaufort Sea Coast

ACTIVE LAYER MONITORING NETWORK IN THE MACKENZIE VALLEY

During August and September 2005, the fifteenth annual survey of the active layer monitoring system in the Mackenzie Valley was completed from Fort Simpson to the Arctic coast. Sites now number 51, about half in the Mackenzie Delta. Ten sites have been selected for the Circumpolar Active Layer Monitoring program of the international Permafrost Association.

Along this 1 400 km transect, active layer thickness varies more as a result of local factors, related to situation, than to regional climate associated with latitude. Though both air and ground thawing degree days increase from arctic through subarctic to boreal environments, active layer development is surprisingly similar, except where local factors override regional patterns. The thaw of 1991, the greatest yet recorded, in keeping with record warm temperatures while thaw in 1996 north of Norman Wells and in the current century at many

sites was notably less than during the late 1990s, also associated with temperature and season length significantly less than normal. The widespread response to these events builds confidence in the utility of the instrumentation for measuring response in the ground to atmospheric change. Data from this monitoring has been used for the Mackenzie Gas Pipeline designs and will assist in environmental assessment of proposals. In the longer term, measurements from this transect will be used to help model climate change impact on near-surface permafrost in this fragile environment.

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File No: 12 404 640**Licence No:** 13756**Region:** IN**Location:** Mackenzie Delta**HOLOCENE ENVIRONMENT CHANGE ACROSS TREELINE, MACKENZIE DELTA REGION**

Between March 21 and 27, 2005 lake sediment cores were collected from seven lakes located north of Inuvik in the vicinity of Noell Lake and Swimming Point. Lake sediment cores were recovered from the lake bottoms in one-metre sections using a modified Livingston piston coring system. All coring took place from the ice cover on the lakes at the time. The lakes varied in depth from 3.31 m to 10.4 m. The sediment cores varied in length from 103 cm to 346.5 cm. Coring was hampered by the cold air temperatures and in the deepest lakes, by the water depth. The use of plastic casing would have aided in the coring process but the need for it was not anticipated. To date, few analyses have been carried out on the lake sediment cores. Radiocarbon dates have been obtained for two of the lakes. All radiocarbon dating was carried out at IsoTrace Laboratories at the University of Toronto. Preliminary sedimentological analyses will be commenced in the spring of 2006. Each core will be analysed for Loss-on-ignition (550°C and 950°C) and magnetic susceptibility. Macroscopic charcoal will also be analysed for each of the sediment cores.

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File No: 12 404 321**Licence No:** 13753**Region:** IN**Location:** Richards Island, Lousy Pt, Swimming Pt, Tuktoyaktuk granular sources, Peninsula Pt, Parsons Lake**MASSIVE ICE STUDY IN GRANULAR DEPOSITS**

The study of massive ice in granular deposits is the basis of G. Pascale's M.Sc. thesis at McGill University. The research focuses on the nature and occurrence of massive ice in sands and gravels. Many theories on massive ice formation suggest that the ice should not be present in these materials. However, there are several places in the NWT where there is massive ice in sand and gravels. This research will attempt to explain the origins of the massive ice in sands and gravels in order to be able to predict ice in the future. In March 2005, winter roads and skidoo trails were used to access some of the sites, including sites on Richards Island (Ya-Ya esker) and the granular borrow sites east of Tuktoyaktuk Harbour. Geophysical surveys using a capacitive coupled resistivity system (CCR) were used to help in assessing the ice conditions in the granular borrow sites. The geophysical data is also being used to map and explain the origins of the ice and the reasons for the presence of ice in certain locations and not in others. Preliminary results suggest that both buried glacier ice (Ya-Ya esker) as well as intrasedimental massive ice are found in some of the granular deposits of the

Mackenzie Delta region. The researchers have made a conscious effort to interact with the local communities through presentations given at the Aurora Research Institute and Aurora College during 2005.

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Licence No: 13754

Region: IN

Location: A series of lakes north of Inuvik, east of Mackenzie River, on Crown Land

SENSITIVITY OF HIGH-LATITUDE LAKES TO CLIMATIC & DEVELOPMENT DISTURBANCES

The first full-scale sampling for this project was completed in 2005, following preliminary work in 2004. The goal of this work is to understand the effects of permafrost degradation on the supply of nutrients to tundra lakes, and on the biological communities within the lakes. Bathymetric measurements, catchment snow surveys, and meteorological instrument installations were completed to study the lakes' hydrological regimes. Samples of water column algae and zooplankton were collected between March and September. Lake water samples were analysed for major nutrient content, and other aspects of water quality.

Analyses of lake water indicate that permafrost degradation is introducing a significant and distinct supply of carbon to these lakes. Biological production estimates and plankton abundances indicate that the effects of permafrost disturbance on the lakes alter primary (plant) production in a manner capable of altering energy flow and interactions within the food web. Analyses are ongoing, and should provide both important baseline information on the microclimate, bathymetry, and biological production in the lakes, and novel information regarding the impacts of permafrost degradation on the nature of relationships between nutrients and biological production.

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Region: IN, GW

Location: East Channel of the Mackenzie River at the boundary of the Inuvialuit Settlement Region and Gwich'in Settlement Area

EVALUATION OF EXTREME EVENTS (ICE JAMS) AND DEEP SCOUR HOLES ON MACKENZIE DELTA CHANNELS

The objective of the 2005 field campaign was to continue investigations of channel morphology downstream of Mackenzie River at Arctic Red, which was initiated the previous year. Several cross-sections upstream and downstream of the Water Survey of Canada hydrometric stations located near the town of Inuvik and Tsigehtchic were surveyed during the summer. This field information will be used in the development/calibration of a hydraulic model of ice jamming in the Mackenzie Delta. In addition, Scour Hole #10 (situated on the East Channel south of the town of Inuvik) was revisited to complete the detailed bathymetric surveys using traditional survey methods and GPR. The bathymetric information of this anomalously deep scour hole, which is ~30 m deep or five to six times the average channel depth, will be compared to previous surveys by Lapointe (1986) and Fassnacht and Conly (1992) to determine rates of movement, which is of practical concern in designing pipeline crossings and may have significant impacts on fisheries (e.g., over-wintering areas).

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File No: 12 404 570**Licence No:** 13786**Region:** DC**Location:** The drainage area of Scotty Creek (61 ° 18' N, 121 ° 18' W)**MODELLING THE FLOW AND STORAGE COMPONENTS IN THE LOWER LIARD RIVER VALLEY**

Canada's boreal forests contain ca. 15% of the world's freshwater supply. However, the boreal forest in north-western Canada has experienced some of the greatest warming in the world over the last few decades, and the effect of this warming on the water resources of this region, is of major concern. The central Mackenzie Basin is an extensive flat headwater region, with a high density of open water and wetlands that occupies the zone of discontinuous permafrost. Discontinuous permafrost terrain is particularly sensitive to the effects of climatic warming, because pronounced changes in water storage and runoff pathways could occur with small additional ground heating. The major peatland types of this region include channel fens, flat bogs and peat plateaus. Peat plateaus play a key role in the generation of runoff because of their relatively deep snowpack, limited water-storage capacity and relatively high slope gradient.

The objective of this research is to develop computer models to estimate the volume and timing of runoff from wetland-dominated basins near Fort Simpson from; 1) the properties of peat plateau soils; and 2) physical attributes of the basin peat plateau cover. This model will help to reduce the uncertainties regarding the influence of climate warming on the future availability of Canada's northern water resources. It will also be a valuable tool in predicting hydrological consequences of human activities (e.g. resource development), which can alter the quantity and quality of runoff (including sediments, pollutants, nutrients, and biota) at hill-slope to basin scales, and can therefore influence the health of downstream aquatic and terrestrial ecosystems, and municipal water supplies.

Recent advances in the research include: 1) field studies at Scotty Creek have enabled the development of a computer model that predicts runoff from the peat plateaus. The performance of the model is currently being evaluated; 2) new techniques have been developed to evaluate key soil properties including the evaluation of the size and connectivity of soil pores using image analysis;

3) an improved understanding of the major factors controlling the volume and timing of stream flow in the Fort Simpson region - this understanding has formed the basis of a new computer model (under development) that will predict stream flow from the wetland-dominated basins (e.g. Scotty Creek, Jean-Marie, Birch, Willow and Blackstone rivers); 4) conducting a highly-detailed landscape classification (because of the importance of the relative proportions of channel fen, peat plateau and flat bog to the volume and timing of stream flow) from high-resolution satellite imagery for a 22 km² area of Scotty Creek. Areal photographs for the same region taken in 1948 have also been acquired and are presently being analysed to evaluate the change in land cover over the ca. 50 year period. Preliminary results indicate a 20-50% reduction in the cover of permafrost (peat plateaus).

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File No: 12 404 655**Licence No:** 13909**Region:** SA**Location:** Chick Creek, Oscar Creek, Canyon Creek, Helava Creek near Norman Wells

SEDIMENT TRANSPORT PROCESS IN A SUB-ARTIC STREAM

Fieldwork in 2005 was carried out from August 23 to August 30 by a three-person crew. This work was Phase 1 of a three-phase field project to characterize sediment transport and channel dynamics in a subarctic stream. Phases 2 and 3 are scheduled for 2006.

All fieldwork was carried out at Canyon Creek, 12 km north-east of Norman Wells. Site access was by ATV, and a temporary camp was set up for the duration of the fieldwork. The following field activities were completed: long profile survey along 1.4 km of the river channel; 13 cross-section surveys spanning the channel, spaced 100 m apart; installation of fixed benchmarks to allow repeat surveys in 2006; mapping of habitat units along 1.4 km of the river channel and measurement of water depth; installation of 20 scour chains at random locations within the surveyed area to measure depth of bed scour due to flooding (follow-up sampling in 2006); insertion of 700 tracer stones in the bed to measure gravel transport distance due to flooding (follow-up sampling in 2006).

All fieldwork was successfully completed and the camp site was returned to its original condition. Data is being stored electronically, with data analyses and the writing of the final report to take place upon completion of the fieldwork in 2006.

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File No: 12 404 563**Licence No:** 13774**Region:** SA**Location:** Lionel Island in the Keith Arm of Great Bear Lake**MODELLING THE EVAPORATION AND HEAT BALANCE OF GREAT BEAR LAKE**

The goals of this project are to define the temperature structure of central Great Bear Lake, in order to understand the lake's interactions with the atmosphere above, in terms of its energy and water balance. A comparison of these data for Great Bear Lake will be made with those of its high latitude twin, Great Slave Lake.

Lake temperatures in the central Keith Arm of Great Bear Lake were substantially cooler in 2004 and 2005. In 2004, lake temperatures did not exceed 4° C at any depth until August 11, and generally, during the course of summer, temperatures did not exceed 6° C. In 2005, Great Bear Lake started warming two weeks earlier and by August 11 had achieved temperatures of 6 to 7° C in the upper 15 m layer, warming to 8+ ° C in late August. In both years these temperatures were high enough to promote deep vertical overturning in the central Keith Arm. The temperatures in 2004 were substantially cooler than for Great Slave Lake (three year average) but in 2005, they were only a little cooler. The impact of very warm summer conditions in 2005 is evident in Great Bear Lake.

Analysis to date indicates some important features of the vertical moisture (evaporation) and heat (sensible heat) exchange between surface and atmosphere. Firstly, both exchanges follow the daily solar cycle, increasing and decreasing with the sun's intensity. Secondly, the amount of energy used in evaporation and sensible heat exchange are of the same magnitude. This is in distinct contrast to Great Slave Lake, where the evaporation and sensible heat cycles last about three days and where the heat used in evaporation greatly exceeds that used in sensible heat transfer. Great Slave Lake appears to evaporate much more water than Great Bear Lake. The reasons for this tentative observation are currently being investigated; generally, it has many implications with respect to climate warming.

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File No: 12 404 643**Region:** IN**Licence No:** 13818**Location:** Mackenzie Delta: Reindeer Channel Route, Camp Farewell docking site, Niglntgak barge site, Kumak Channel, and Kittigazuit "S-bends"**NIGLINTGAK FIELD DEVELOPMENT 2005 BATHYMETRY RESEARCH STUDY**

The 2005 Shell Canada bathymetry program consisted of surveys in four key areas: Kittigazuit Bay, Kumak Channel, Middle Channel near Camp Farewell and Shallow Bay. Bathymetric surveying in Kittigazuit Bay was conducted to investigate the changes in the bottom morphology over one year (i.e., through comparison of the 2004 survey results with those of the present year). The surveying in Kumak Channel was conducted to obtain a detailed assessment of the water depths around the potential set-down location for Shell's gas conditioning facility. Middle Channel near Camp Farewell was surveyed to investigate the approach to Camp Farewell from the Mackenzie River. Reconnaissance surveying in Shallow Bay was conducted to investigate the potential for a large-scale barge to enter the Mackenzie Delta through Shallow Bay without the need for dredging. The crew conducted the surveys on board specialized bathymetric survey vessels especially equipped for the unique conditions associated with the Mackenzie Delta. Accommodation was provided through tent camp or facilities at Camp Farewell.

The 2005 bathymetric program was very successful at achieving all the planned objectives. However, the reconnaissance in Shallow Bay was not completed and has been proposed as part of a 2006 bathymetry survey program.

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File No: 12 404 623**Region:** IN, GW**Licence No:** 13817**Location:** In the immediate vicinity of Inuvik and Tuktoyaktuk where patterned ground and thermokarst are present**LANDSCAPE OF THE MACKENZIE RIVER DELTA AND THE TUKTOYAKTUK PENINSULA AS POSSIBLE ANALOGUES FOR THE STUDY OF MARTIAN LANDFORM DEVELOPMENT**

Polygonal patterned-ground and polygon juncture-ponds dot the landscape surrounding Inuvik and Tuktoyaktuk. Both landforms are underlain by ice wedges and surrounded by ice-rich permafrost. Using high resolution images of the Martian surface, the research team has identified polygonal patterned-ground and polygon juncture-pits that are roughly similar in size, shape and possible origin to the arctic landforms noted above. During the month of June 2005, basic field data (trough depth [to ground ice], width and length; pond diameter and depth [to ground ice]) were collected at the site of drained thermokarst lakes (alases). Polygonal-patterned ground and polygon juncture-ponds are commonplace in these former lakes. Comparing the Arctic and Martian data, it could be argued that the similarities between the two data sets are consistent with a similar origin. Next year, GPR will be used to map the pattern of ice wedges and ice-rich permafrost in the alases.

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File No: 12 404 601**Licence No:** 13859**Region:** IN**Location:** Reindeer Station**MONITORING PERMAFROST DEFORMATION IN THE MACKENZIE DELTA**

The objective of this research is to establish the abilities of the radar method to detect vertical land deformation compared to traditional methods. Fieldwork in 2005 concentrated on measuring the topography of a target area (1km²). This was done by placing four to five survey targets in the area and establishing the topography of the surrounding area from these points. During those months, radar images of the same area were also captured. Four aluminum reflectors were placed around the area to return an intense signal to the radar satellite to help in the analysis of the resulting images. The topographical measurements will be compared to the radar images to determine the effectiveness of the radar method.

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File No: 12 404 639**Licence No:** 13750**Region:** IN**Location:** Melville Island**CLIMATE FORCING FACTORS AND THE RECORD OF CLIMATIC VARIABILITY IN THE WESTERN CANADIAN ARCTIC DURING THE PAST 2 000 YEARS**

Fieldwork cancelled.

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File No: 12 404 646**Licence No:** 13836**Region:** DC**Location:** Wrigley Airport**INVESTIGATION OF GROUNDWATER CONDITIONS AND THE FATE OF FUEL SPILLS IN THE SUBSURFACE, WRIGLEY, NWT**

There is an information gap regarding groundwater quantity and quality along the Mackenzie pipeline corridor in the NWT, and how the groundwater is influenced by permafrost. A groundwater research site was established by Environment Canada at the Wrigley Airport in October 2005. Eight boreholes were drilled to depths of 18 to 31 m. Monitoring wells were installed in five boreholes, and a string of eight thermistor sensors was installed in another. Samples obtained during drilling indicated a discontinuous upper unit of fine sand, underlain by sand, gravel, pebbles and cobbles, with a silty clay unit at the base of drilling. No evidence of permafrost was observed during the drilling. This was confirmed by thermistor data, which indicated seasonally fluctuating temperatures in the uppermost several metres, below which temperatures declined with depth to a minimum of approximately 2°C at 30 m. The water table was encountered in four wells, at depths of approximately 25 to 26 m below ground. Unconfined groundwater flow was in a north-westerly direction. Benzene was not detected (> 0.1 µg/L) in groundwater sampled from the wells.

Maximum concentrations of the following hydrocarbons in groundwater were: toluene, 0.3 µg/L; ethylbenzene, 3.3 µg/L; m,p-xylene, 6 µg/L; o-xylene, 0.1 µg/L.

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File No: 12 404 622**Licence No:** 13814**Region:** IN**Location:** Mould Bay on Prince Patrick Island and Green Cabin on Banks Island**BIOCOMPLEXITY OF FROST-BOIL ECOSYSTEMS**

Small-patterned ground features such as frost boils, earth hummocks, and small polygons are common landforms in most arctic landscapes. They are a product of frost heaving, cracking, and other processes related to frozen ground. This project examined the complex links between climate, vegetation, soils, and geomorphic processes related to patterned ground formation along the complete Arctic bioclimate gradient, from treeline to the coldest parts of the Arctic. The work conducted at Isachsen in 2005 is part of a larger research effort along a south-north transect of sites from the Alaska North Slope to Prince Patrick and Ellef Ringnes islands.

Information was gathered on the following: vegetation (species, cover, leaf area, reflectance, biomass); climate (air temperature, soil temperature, soil moisture); active layer depth; ground heave; vegetation insulation effect; soil (soil type, physical and chemical characteristics); nitrogen mineralization; soil respiration; and soil invertebrates.

Preliminary results quantify the differences between bare and vegetated-patterned ground. These data are also being used to calibrate models of frost heave and vegetation distribution. In 2005, of the 25 people conducting studies as part of this project, four were students participating in an Arctic Field Ecology course, five were graduate students and one was a post-doctoral student.

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File No: 12 404 613**Licence No:** 13796**Region:** IN**Location:** Within 10 km of Tuktoyaktuk in the inner Kugmallit Bay area**PARTICLE DYNAMICS ON THE MACKENZIE SHELF (CASES SUBPROJECT)**

Sampling was conducted in Kugmallit Bay in the eastern channel of the Mackenzie River, 20 km south-west of Tuktoyaktuk during May 2005. An ice hole large enough for deployment of instruments was made by drilling several holes together using an ice drill. Depth to the bottom was 3.5 m and ice thickness was 1.3 m, giving a water column depth of just 2.2 m. The tidal range of Kugmallit Bay is small, with a mean of 0.3 m and a maximum of 0.5 m at Tuktoyaktuk. Sampling was conducted using snowmobiles chartered locally in Tuktoyaktuk. Under the shallow land-fast ice of Kugmallit Bay, the field team observed and measured the timing of increased chlorophyll a concentrations, suspended particulate matter fluxes, sedimentation rates and sediment characteristics during early spring, prior to the onset of break up of land-fast ice in Kugmallit Bay. These results were compared with data collected from the same site during the previous summer. The changing biological and oceanographic variables beneath land fast-ice, suggest the onset of a spring melt occurring hundreds of kilometres further south in the Mackenzie Valley.

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File No: 12 404 599**Licence No:** 13801**Region:** SS**Location:** Slave River Delta, in the vicinity of Fort Resolution**PRESENT AND PAST HYDROLOGY, ECOLOGY AND CLIMATE OF THE MACKENZIE BASIN DELTAS**

The research program focuses on high-resolution reconstruction of past changes in hydrology, ecology and climate of the Peace-Athabasca (PAD) and Slave River (SRD) deltas in northern Canada. Data from natural archives, including lake sediments and tree rings, supported by comprehensive field-based studies of modern hydrology, limnology and aquatic ecology are employed in the reconstruction. The PAD and SRD have broad ecological and cultural significance and are ecosystems highly sensitive to prevailing climatic and hydrological conditions. Changing delta lake levels impact aquatic and terrestrial ecosystems, wildlife habitat, and traditional First Nations communities who have an historical connection with the PAD and SRD and its resources. Results are addressing concerns related to the potential environmental impact of river regulation, resource development and climatic variability on the PAD and SRD. Knowledge of present and past hydroecological and climatic variability is vital for effective multi-stakeholder environmental stewardship of the PAD and SRD in light of multiple stressors that may affect these internationally recognized northern ecosystems.

Field activities during 2005 focused on continuing multi-year studies of the modern hydroecology of the SRD. The aim of this research is to improve knowledge of changes in lake water balance and chemistry and the subsequent responses of aquatic communities and habitat over seasonal and inter-annual time-scales under varying climatic and hydrological conditions. Graduate student-led field research in the SRD focused on continued hydrological and limnological process studies and monitoring of several lakes from May-September 2005. As in previous years, lake water samples were collected for analysis of oxygen and hydrogen isotope composition, major ions, dissolved organic carbon, nutrients and total suspended solids. Measured limnological variables included lake depth, water transparency, pH, conductivity, and water temperature. Data loggers were installed to obtain continuous records of lake-level fluctuations. Stable isotope and water level data are being used to quantify seasonal variations in lake water balance using isotope-mass balance models which will then be related to seasonal variations in limnological parameters using statistical techniques. Aquatic macrophytes were collected along transects to assess species biomass and associated epiphytic diatoms, and to establish relationships between hydrolimnological conditions and aquatic habitat. Detailed sampling and monitoring efforts were placed into a regional hydrological context generated from three helicopter-based water sampling campaigns for stable isotope composition and total suspended solids. Community outreach efforts included graduate student-led presentations to the Fort Resolution Environmental Working Committee (FREWC) and classes at Fort Resolution Deninu School. In addition, a field trip was conducted for high school students and a member of the FREWC was trained to operate a meteorological station established by the research team at the local airport from May to September.

SOCIAL SCIENCES

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File No: 12 410 656**Licence No:** 13891**Region:** NS**Location:** Yellowknife and Rae-Edzo**NORTH OF 60: ARCHITECTURE, PLACE AND IDENTITY**

This research effort explores the role of architecture in the adult learning experience in northern Canada. Unlike many previous design proposals for the North that have been imposed from the outside, this project greatly relies on the experiences of northern students, teachers and leaders at the Yellowknife Campus of Aurora College as well as in the broader Yellowknife community.

Through a series of on-site interviews, meetings and talking circles, participants in the study shared their perceived needs, concerns and visions for future adult learning developments in their community. These visions for the adult learning experience, along with an exploration of past educational approaches and a study of traditional northern architectures, culminated in a series of design propositions for the Yellowknife adult learning community. These design proposals were not viewed as conclusive; rather they served as a point of departure as architectural opportunities for this adult learning environment to continue exploring.

It is hoped that the thesis findings and design propositions will inspire conversation and spark debate within the Aurora College campus and among northern leaders (as well as local designers) as they continue to explore the various future development opportunities for this northern college community.

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File No: 12 410 645**Licence No:** 13787**Region:** NS**Location:** Aurora College (Yellowknife Campus)**IMPLEMENTATION OF CONCEPT MAPPING AS A TEACHING STRATEGY TO PROMOTE MEANINGFUL LEARNING IN CLINICAL PRACTICE WITH BACCALAUREATE NURSING STUDENTS**

One weekly concept map per second year nursing student was selected during the six-week practice course in May and June 2005 to measure progress over time. The sample consisted of 14 students. The difference between the first and last concept map scores achieved by the same group of students was analyzed. The results showed that the concept map scores increased significantly from the first to the final concept maps. Twelve of the 14 students who signed the consent forms completed the student evaluation scale. The overall response for scale items indicated satisfaction with concept mapping.

434**Social Sciences****Brownlee, Keith**

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Region: NS, SS, DC

Licence No: 13833
Location: Dettah, Fort Providence, Rae-Edzo, Fort Resolution, and Hay River

LOCALIZATION OF SOCIAL WORK IN NORTHERN CANADA

This research examined how social work practitioners have to adapt their social work knowledge in order to practise effectively in northern contexts. The participants were identified by key informants as experienced social service practitioners from communities in north-western Ontario and the NWT. In-depth interviews were conducted with 37 practitioners (11 from the NWT and 26 from north-western Ontario), most of whom had 15 years or more experience providing service in northern settings. The findings revealed that there are many issues and dilemmas that social work practitioners face in northern contexts. Foremost amongst these issues are visibility, multiple and multi-dimensional relationships, community acceptance and the need for flexibility as well as community involvement and cultural understanding. Greater linking of services and community partnering were also discovered to be essential in a northern context.

435

Social Sciences

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Location: Gahcho Kué (Kennedy Lake)

2005 SOCIO-ECONOMIC BASELINE STUDIES FOR THE GAHCHO KUÉ (KENNADY LAKE) AREA

Between August and mid-December 2005, AMEC staff visited communities that would be potentially directly affected by the proposed Gahcho Kué Diamond Project to conduct interviews as part of the project's Socio-Economic Baseline Study. These communities were Lutsel K'e, Gameti, Whati, Wekweeti, Behchoko, Dettah, N'dilo and Yellowknife. Face-to-face interviews were conducted with service providers and other knowledgeable individuals in order to confirm the accuracy of data gathered from secondary sources (mainly government statistics) and their interpretation by AMEC personnel. In Lutsel K'e, the proximal community to the proposed Gahcho Kué site, AMEC personnel undertook a research program in cooperation with the Lutsel K'e Dene First Nation. In November and early December, AMEC personnel worked with an aboriginal assistant on interviews with service providers and residents who were former or current diamond mine workers. The questions posed during interviews in all of the communities related to the following valued components (which feature in the subsequent analysis and assessment of project effects): population, employment, economic activity, health and well-being, family and social issues, education, language and culture, and community infrastructure. Information was also sought on what interviewees believed were the key socio-economic effects of diamond mining in their community.

436

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Location: Ulukhaktok (Holman), Deline, Wha Ti, Hay River Reserve

SPORTS VOLUNTEERISM IN SMALL COMMUNITIES IN THE NWT

The purpose of the study was to examine sport volunteerism in small communities in the NWT. Specific objectives were to examine the barriers that prevent participation in sport volunteering, including personal, social, economic and cultural barriers, and to develop a set of recommendations that might assist in increasing volunteerism in sport in small communities.

Data collection occurred in the communities of Deline, the Hay River Reserve, Ulukhaktok and Wha Ti. A questionnaire survey and focus group were conducted with a total of 52 research participants. Afterwards, several drafts of the report were written and jointly edited by the team, with input from the Knowledge Development Centre in Toronto. Findings indicate that the respondents volunteered in sport to help other people because they believed in the cause, wanted to have fun, promote sport and recreation, and find application for their skills and knowledge. Many respondents regarded sport as part of a larger social and cultural context, linked to the development of youth and the community, and felt that without the contributions of the dedicated volunteers, community sporting opportunities would be greatly diminished. The final report is due to be published in the spring of 2006, and will include a discussion of the barriers to volunteering and 14 recommendations.

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File No: 12 410 643**Region:** NS**Licence No:** 13744**Location:** Rae-Edzo**THE ROLE OF SCHOOL IN THE LIVES OF NORTHERN ABORIGINAL YOUTH**

It is estimated that less than 30 % of aboriginal students finish high school in Canada and in light of the strong link between education and health, this is a significant public health concern. Although educational disengagement research has been undertaken for more than 30 years, relatively little about how community or environmental factors impact educational pathways. These research gaps are significant, particularly in relation to aboriginal youth in northern communities where rapid transition is occurring due to cultural and environmental change, resource development and the establishment of self-governance structures. This study used ethnographic methods to explore environmental influences on the relationship between youth and school in a northern aboriginal community.

The fieldwork for this study was undertaken in 2005 at Chief Jimmy Bruneau School in Behchoko. Results from participant-observation, field notes and in-depth interviews indicate that factors such as the physical location of the school, specific events in the school's history, cultural symbols and certain administrative practices are key influences on the educational engagement of local students. Preliminary reports were brought back to the community for feedback in October 2005. The final report of this research will be ready by early 2007.

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File No: 12 410 655**Region:** SA**Licence No:** 13884**Location:** Deline**CO-OPERATIVE MEMBERSHIP AND GLOBALIZATION: CREATING SOCIAL COHESION THROUGH MARKET RELATIONS**

This research project is nearing completion. In addition to preparing a research guide for the community at Great Bear Co-operative in Deline, and describing the research team, sponsors and partners, purpose, scope,

and methods, the researchers have produced two research newsletters and presented on preliminary research findings at the annual general meeting of Arctic Co-operatives Ltd. (ACL) in May 2003, 2004, and 2005.

Since finishing a project report in June 2005, the research team has worked on interview transcriptions, finalizing the community review and verification of transcribed interviews, and conducted a second round of interviews. The results from this phase of the project will be presented at the ACL AGM in May 2006. By September 2006, the researchers aim to have completed the review and verification of the second set of transcribed interviews and the writing and distribution of final reports with the co-operative board and members.

Copies of the final reports and publications will be shared as they become available. So far, W. Wuttunee has written "Lessons in Northern Co-operation", a chapter to appear in the forthcoming (2006) University of Toronto Press publication, *Hidden in Plain Sight* (vol. II). In addition to conference presentations, other publications are planned.

439 **Social Sciences**

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Location: Inuvik

"THICK DESCRIPTION" OF THE CHANGE OF CANADA'S FIRST NATIONS TRADITION IN HISTORY: A DISCUSSION OF CLIFFORD GEERTZ'S ANTHROPOLOGICAL APPROACH BASED ON FIELD STUDIES IN NORTHERN CANADA

This Ph.D. project reflects upon Clifford Geertz's method, "thick description", which unlike data based on interviews, polls or surveys, generates data that can give an in-depth understanding of the complexity of culture. This method was chosen in order to develop a holistic, non-judgemental and empathetic manner of getting to know other cultures, in this case, the Inuvialuit and Gwich'in communities of Inuvik. The researcher spent six weeks in the summer of 2005 volunteering at events such as the First Inuvik Summer Games and Great Northern Arts Festival to acquaint herself with members of these communities. Discussions held with people centred on how the Inuvialuit and Gwich'in understand their present-day lives, particularly in the midst of change. Themes arising from the discussions include: feelings of 'in-betweenness' as people try to come to terms with what it means to be aboriginal in today's world; the importance of traditional symbols and rituals; pride of belonging to a unique culture; and the impacts of change over the last 50-70 years on the lives of people (e.g., loss of cultural and personal identity, the introduction of the wage economy and quantified/Western time, etc.).

440 **Social Sciences**

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Location: Fort Smith, Yellowknife and Inuvik

IMPLICATIONS OF INDUSTRIAL DEVELOPMENT FOR COURSE OFFERINGS AT AURORA COLLEGE, NWT

The purpose of the study is to understand, from the perspective of those given authority and responsibility for developing policy on behalf of northerners as well as those affected by such policies, the local realities of labour market-influenced educational policy and its implications on policy process and practice.

Primary data was collected using semi-structured interviews and informal discussions. A total of eight interviews were conducted in July, 2005 with Aurora College personnel and several people involved with northern development. College personnel were interviewed at the three regional campuses located in Inuvik, Yellowknife and Fort Smith, with non-college interviews occurring in Yellowknife. A visit to Fort Smith is planned for March 2006, during which time informal discussions will be held with college personnel.

Interview findings provide insight into the key issues and priorities shared by respondents. These findings can be broadly clustered into the following categories: 1) college mandate and community relations: meeting high community expectations to provide a wide variety of programming in response to perceived needs; and 2) priorities, partnerships and funding: responding to the challenges of providing programming in an increasingly market-driven, globalized world while operating within fiscally-tight parameters.

These findings will be used to support theory covered in a literature review. The thesis will be completed by the fall of 2006.

441 **Social Sciences**

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YOUNG CANADIANS IN A WIRED WORLD (YCWW) - PHASE II - FIELD SURVEY

“Young Canadians in a Wired World” (YCWW) is the most comprehensive and wide-ranging study of its kind in Canada. Building on baseline research conducted in 2001, the study looks at the online behaviours, attitudes, and opinions of more than 5 200 students in Grades 4 to 11. The participants represent each province and territory, English and French-language schools, and urban and rural environments. The majority of schools from the 2001 survey participated in the 2005 study. Conducted by ERIN Research for Media Awareness Network and funded by the Government of Canada, the study offers insights into current trends, highlights key changes since 2001 and provides recommendations for parents, educators, and others working with young people.

Among YCWW key findings are: 1) young Canadians are more connected than ever; 2) children are active users of the technology; 3) parental involvement has increased over the past four years; 4) internet rules make a difference; 5) young people say their online experiences are generally positive and socially rewarding; 6) children use the internet to extend existing social networks and develop new ones; 7) mainstream websites expose young people to inappropriate content, risky situations and privacy invasions; 8) the internet is their main choice for completing schoolwork but students want better research skills; 9) for some young people, the internet is a vehicle for bullying and sexual harassment; and 10) young people are aware of privacy issues but often give out personal information online.

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DOGRIB VERBAL PARADIGMS

This project was an investigation of verb forms in the Weledeh dialect of Dogrib language, spoken in Dettah and N'dilo. The research was conducted in collaboration with the Goyatiko Language Center in Dettah. The researcher worked with native speakers individually to collect examples of both noun and verb forms in Dogrib, for example, bòkàeh'tè, bòkà_t'è, bòkàet'è, "I cook, you cook, he/she cooks." These data were analyzed in two ways. The first line of research sought to explain the phenomenon of "split subject agreement," where the morphemes within the verb meaning "I," "you," "they," etc. occur in two different positions. In Split Subject Agreement in Northern Athabaskan and Split Subject Agreement and Morphological Typology, it can be argued that the position of these affixes within the verb results from conflicting pressures to express information (Contrast), be brief (Alignment), and have only a single affix for each meaning (No-Allomorphy). A second line of research concerned the lengthening of stem-initial consonants. Phonetic measurements were conducted which showed that some consonants, especially l, n, and m, are 1.7-1.8 times as long before the stem than elsewhere in the word. This pattern is described in the paper, "Syllable Weight in Dogrib".

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File No: 12 410 599**Licence No:** 13819**Region:** IN**Location:** Holman**LONG-TERM COPPER INUIT - EUROPEAN INTERSOCIETAL INTERACTION**

A third year of sociocultural investigations was initiated and completed between July 21 and August 16, 2005, in the Hamlet of Holman, Victoria Island. A series of interviews with elders was conducted with excellent results in Holman. Jack Kataoyak of Holman and the staff of the Holman Community Corporation provided superb assistance in organizing and translating interviews. All interviews were initiated and carried out according to strict professional and ethical standards/protocols and are now being analyzed according to project plans and schedule.

Additionally, a formal presentation, organized by the Holman Community Corporation and the Olokhaktomiu Hunters and Trappers Committee, of project findings and activities to date was delivered to board members and staff of the Holman Community Corporation on August 8, 2005. The presentation (which included viewing of selected artifacts, documents, photographs and digital images) was well received. Both organizations have agreed (pending appropriate permitting, plans, etc.) to support further collaborative efforts between the researcher and community including: 1) a long-term archaeological project cataloguing archaeological sites; 2) hosting a three-week field school taught by the researcher; and 3) efforts by the researcher to obtain grant monies for the conservation of cultural collections located in local school.

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THE CONSTRUCTION OF COMMUNITY-BASED NATURAL RESOURCE MANAGEMENT: SOCIAL PERCEPTION AND COGNITION IN THE DEVELOPMENT OF NEW RESOURCE MANAGEMENT INSTITUTIONS IN DELINE, NWT

This research project explores the perceptions and understanding of community-based natural resource management within increasing political devolution, such as self-government, in the NWT. This research is important as it examines the relationship between a science-based process of resource management planning and local aboriginal resource management practices. The questions addressed in the research are: in the development of new resource management institutions, how do outside organizations (such as the Department of Indian Affairs and Northern Development) perceive local resource management systems and their practices? At the same time, how do local organizations and their members (such as the Deline Renewable Resource Committee) perceive those outside organizations that are responsible for the management of lands and resources for the benefits of all Canadians?

Participant observation has been used in the research, where research notes have been taken and project-related materials collected during the Great Bear Lake Watershed Management Planning and Sahoyúé-Ɂehdacho Protected Areas candidate program meetings and related activities. At this stage of the research project, the organization of interviews with project participants has begun. These interviews will be conducted from December 2005 to August 2006.

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FAMILY VIOLENCE PROTOCOL DEVELOPMENT AND TOOLKIT

The objectives of this project were to: 1) collect inclusive community feedback on service gaps and better response procedures throughout the community of Yellowknife; 2) increase awareness of family violence issues, preventions, and response procedures; 3) build community partnerships among agencies and departments responding to family violence; 4) develop an integrated response to family violence through service providers and government departments.

While the project envisioned developing a protocol to improve responses to adult victims of family violence in Yellowknife, Fort Resolution and Norman Wells, time and resources were insufficient to accomplish the four objectives in more than one community. Three Yellowknife Interagency Family Violence Protocol documents (due in 2006) will report on the process and outcome of this work for the Yellowknife community.

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ARTISTIC AND ARCHITECTURAL EXPRESSIONS OF THE CHRISTIAN/TRADITIONAL RELIGIONS IN NORTHERN (SUBARCTIC/ARCTIC) COMMUNITIES OF CANADA

In 2005, the researcher conducted her doctoral fieldwork on the range of Christian/traditional artworks,

crafts and architectural structures found in NWT Christian churches. Photographic documentation (slides and prints) was obtained for all churches, with the exception of two churches in Yellowknife and one in Tuktoyaktuk (these churches were photographed externally to confirm their physical presence).

Archival research pursued at the Roman Catholic and Anglican diocesan offices and interviews conducted with congregation members and clergy yielded interesting data on church artworks, crafts and architecture. It is evident that people have pride in their churches and in their own contributions of varying artistic abilities. The works documented in this research reveal influences from both northern indigenous and Christian traditions, illustrating a fascinating variety of materials, techniques, colour usage and presentations. The churches contain a wide range of creative works produced from such materials as plastic flowers, lace, sealskin altar cloths (Tuktoyaktuk churches), narrative art (the Stations of the Cross in Our Lady of Victory Church, Inuvik), handcrafted crosses (the Armenian cross in St. Patrick's Parish, Yellowknife and the diamond willow cross in the Holy Trinity Anglican Church, Yellowknife), etc.

The fieldwork has shown that creatively active elements are located in Canada's Subarctic and Arctic churches, and presents solid, creative data for thesis discussion.

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File No: 12 410 662**Licence No:** 13923**Region:** DC**Location:** Princess Alexandra School, Hay River**SEEKING THE VOICE OF NWT YOUTH: USING PHOTOVOICE TO EXPLORE HEALTHY CHOICES**

This research project explored what healthy choices mean to NWT pre-teens. Reports have called for a greater focus to promote healthy lifestyles, prevention of illness, and development of individual responsibility for well-being. If youth are encouraged to make positive lifestyle choices early in life, this may aid in improving their health status as they age and in avoiding lifestyle-related diseases.

The territorial government business plan (2004) identified an outcome of people educated in how to pursue healthy lifestyles—they contribute and take advantage of life's opportunities. This study supports current efforts to understand the way healthy choices are made and approached from a phenomenological perspective. Participants used cameras to record their life experiences, and this recording of stories through photovoice served as a creative tool and conduit for the participants to partake in discussions and empower them to take action pursuant to healthy lifestyle choices.

Sharing of the stories helped the pre-teen participants to identify what was most important to them about healthy choices and to make meaning of this phenomenon.

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CROSS-CULTURAL DIFFERENCES IN EVALUATING AND INTERPRETING THE INUVIALUIT FINAL AGREEMENT

Despite having been signed over 20 years ago, the Inuvialuit Final Agreement (IFA) remains a powerful and influential force in much of the NWT. This Bachelor's- level study investigated the perception of the IFA among both the Inuvialuit and white communities of Inuvik. Brief interviews were conducted with 26 participants who were asked about the perceived efficacy of the IFA as well as the quality of life in the North. The combined responses from all participants were analyzed to determine if any differences existed between Inuvialuit and white views of the IFA. Overall, no differences were found between how the Inuvialuit and whites responded to the questionnaire. However, conclusions were limited by the low number of participants who agreed to be interviewed. The final report discusses the results with reference to several prominent social psychological theories.

449**Social Sciences****Pearce, Tristan D.**

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File No: 12 410 650**Licence No:** 13832**Region:** IN**Location:** Holman, Inuvik**ENVIRONMENTAL CHANGE, RISKS, MANAGEMENT AND INFRASTRUCTURE IN OLOKHAKTOMIUT (HOLMAN)**

This Master's-level research project was conducted with the community of Uluhaktok to characterize vulnerability to climate change. In collaboration with local people, 62 interviews were conducted in Uluhaktok to identify those conditions that the community is vulnerable to and outline opportunities for adaptation policy. Local people were active partners in all stages of the research process, including research design, informant selection, data collection and dissemination of results.

Results indicate that a combination of changing environmental conditions and changes in livelihoods has altered and often increased the exposure of community members to risks associated with climate change. These changes have affected harvesting activities by: 1) increasing the risk of travelling on the land; 2) compromising travel routes to harvesting grounds; and 3) affecting the health and availability of some wildlife species. As a result, people are spending less time on the land and are acquiring less country foods which have implications for community livelihoods.

Community members are currently employing adaptive strategies to deal with these changes, including taking extra precautions when travelling, travelling by alternative routes, and sharing harvesting resources. Key determinants of adaptation are access to income and the strength of local food and knowledge sharing networks. It was identified that by addressing current social problems in the community, such as unemployment and drug and alcohol abuse, the community is also enhancing its ability to cope with and adapt to environmental changes which are affecting harvesting activities.

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File No: 12 410 652**Licence No:** 13834**Region:** All**Location:** Inuvik, Fort McPherson, Norman Wells, Fort Simpson, Hay River, Rae-Edzo, Ndilo, Dettah, Yellowknife, and Fort Smith**DESIGNING APPROPRIATE DISPUTE RESOLUTION PROCESSES FOR USE IN CIVIL MATTERS IN THE NWT**

Fieldwork cancelled.

451**Social Sciences****Ritchie, Douglas**

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File No: 12 404 656**Licence No:** 13912**Region:** All**Location:** Communities in the NWT**COMMUNITY-BASED CLIMATE CHANGE IMPACTS AND ADAPTATION WORKSHOPS**

On September 20-21 and October 18-19, 2005, two Community Climate Change Impacts and Adaptation workshops were held in West Point (Hay River) and Aklavik, respectively. The West Point workshop was mainly attended by elders from West Point and Fort Providence whereas the Aklavik workshop included a mix of elders, adults and high school students.

West Point participants reported many concerns about what appears to be an environment heavily impacted by climate change. Elders however were reluctant to specify any one of their concerns as a priority for study. To develop research priorities, workshop facilitators suggested focussing future climate change research on key areas critical to community well-being, namely water quality, and fish, animals and plants that are harvested. The facilitators noted that on the surface not all of the concerns appeared to relate directly to climate change. However, in order to manage the impacts of climate change and the process of adapting to it, communities cannot ignore other factors that may be affecting their ability to meet their basic needs.

Aklavik participants identified flood prediction as one of their highest research priorities. They were also interested in ensuring that adequate emergency measures were in place for when flooding occurs. Living costs were another major concern that was highlighted and participants were interested in finding ways to help reduce them. Approaches that were suggested included: increased gardening; direct access to the Dempster Highway; increased housing; and the building of energy efficiency standards. Additional concerns that were raised included: water quality, water level changes, caribou- and bear-human interactions, and the impact of activities in upstream watersheds in British Columbia.

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File No: 12 410 611**Licence No:** 13757**Region:** IN, GW**Location:** Inuvik**A COMMUNITY-BASED PARTICIPATORY ACTION RESEARCH VIDEO-MAKING PROJECT TO CELEBRATE AND PROMOTE FAMILY LITERACY IN THE WESTERN ARCTIC**

The main goal of this project is to create a locally-produced video featuring local people. The open-ended interview format is designed to allow community members to have the chance to tell their stories and express their views about how education and learning are an important part of their families. The goal is to celebrate the learning that is already happening in the community and to promote greater participation in family literacy. This project is ongoing. Interviewing has concluded and the community video viewing and feedback process will begin in the fall of 2006.

453**Social Sciences****Salokangas, Raila**

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File No: 12 410 618**Licence No:** 13808**Region:** GW**Location:** Inuvik, Aklavik, Fort McPherson, and Tsuigehtchic**GWICH'IN VIEWS ON THE MACKENZIE GAS PROJECT, GWICH'IN SETTLEMENT AREA, NWT, CANADA**

Gwich'in beneficiaries in the Gwich'in Settlement Area were interviewed during the summer of 2005. The study concentrated on Gwich'in hopes and concerns related to the Mackenzie Gas Project's (MGP) potential social, cultural, economic and environmental impacts. The study results show that in the summer of 2005, the Gwich'in were divided in their opinions as to whether it was the right time to go through with the MPG. The participants who wanted the MGP to materialize believed that the project would bring employment and education opportunities, and financial benefits. The participants who wished for the reverse were concerned about possible negative environmental and social impacts, and a low level of education that would prevent the Gwich'in from benefitting from possible job and business opportunities. Clearly, the participants believed that the most negative social impact of the project would be an increase in substance abuse. The biggest environmental concern for the participants was spills, which they feared might affect wildlife habitat and the food web.

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File No: 12 410 210**Licence No:** 13911**Region:** NS**Location:** Rae-Edzo, Wha Ti, Gameti**DOGRIB TEXTUAL STUDIES**

Work continued on the projects associated with this study, including tape digitizing and summarizing (Behchokö), phonetics research (University of Victoria and Massachusetts Institute of Technology), and work on stories (Behchokö and University of Victoria). Work on the Spelling Manual for Tâchô Yatiì is nearing completion. This book, which will likely be published by the Tâchô Community Services Agency, includes a number of written stories and recordings related to the research.

Presentations on topics related to this research were made at three conferences: 1) (with Joseph Martel) "Vowel length neutralization in Dogrib stems: An acoustic study", Society for the Study of the Indigenous Languages of the Americas Annual Meeting (Oakland, CA, January 2005); 2) (with Mary Adele Mackenzie, Aliki Marinakis and Joseph Martel) "Dogrib Stories of Travel: Collaborating on Language and Culture", 12th Annual Stabilizing Indigenous Languages Symposium (Victoria, BC, June 2005); 3) (with Aliki Marinakis) "History of a history: Perspectives on Petitot's transcription of Tâchô Godiì", Dene Languages Conference (Victoria, BC, June 2005). Presentations were also made at the University of British Columbia — (with Joseph Martel; invited lecture by Leslie Saxon) "Vowel length neutralization in Dogrib stems: An acoustic study" — and at the Tâchô Language and Culture Camp, held at Enèego, a fishing spot near Whatì — (with Rosa Mantla and Philip Rabesca) "Research on Stories".

455

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Location: Stanton Hospital, Yellowknife

THE TRANSITION INTO NURSING FOR NEW GRADUATE NURSES IN THE NWT: A GROUNDED THEORY STUDY

The purpose of this study is to discover a substantive theory that explains how new graduates nurses begin to practice in the NWT. At present, the interviews and data collection are completed, including the interviews to confirm and review findings with participants. The data has been transcribed, coded and analyzed. The researcher is currently in the process of writing her thesis. An initial draft is under review by her thesis committee. Grounded Theory is employed as a research method, and therefore requires the integration of current literature as the final step in the study. Thesis completion will occur within the 2006/2007 academic year, following which study findings will be presented and circulated.

456

Social Sciences

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File No: 12 410 653

Licence No: 13867

Region: IN

Location: Tuktoyaktuk

LIVING WITH CHANGE: COMMUNITY EXPOSURES AND ADAPTATIONS IN TUKTOYAKTUK, NWT

Fieldwork cancelled.

TRADITIONAL KNOWLEDGE

457**Traditional Knowledge****Armitage, Derek**

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File No: 12 410 594**Licence No:** 13802**Region:** SS**Location:** Fort Resolution**FLOOD HISTORY AND CLIMATE CHANGE IN THE SLAVE RIVER DELTA: A TRADITIONAL KNOWLEDGE STUDY**

Field activities in 2005 involved extended trips to Fort Resolution (May-September and December), to build on preliminary work carried out in 2004. A number of activities were undertaken in collaboration with community members, including: multiple meetings with the Fort Resolution Environmental Committee; six guided trips on the land during various seasons; four aerial flights over the delta; 30 semi-structured interviews with community leaders, harvester and elders; five scenario-based focus groups; two open-house community presentations; a climate change workshop; and many informal discussions.

A wealth of information about past, current and potential future changes and vulnerabilities, both environmental and socio-cultural, was collected. An important outcome from these activities was the recognition that land and water resources continue to provide a significant food source for residents, and access to traditional harvesting areas remains important for social and cultural integrity. In this region, the simultaneous occurrence of environmental and socio-cultural changes has made these human-environment relationships more complex; linkages among environmental changes, related human impacts, and past adaptations are not linear. Local adaptations have altered resource use pressures and caused strain on the socio-economic system, and shifting social relationships continue to affect the potential for adapting to future changes. These factors indicate the need for targeted strategies to build capacity and plan effectively for continued adaptation at multiple levels.

458**Traditional Knowledge****Chambers, Cynthia**

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File No: 12 410 658**Licence No:** 13895**Region:** IN**Location:** Holman**RESEARCHING FORMS OF LITERACY IN A NORTHERN (NWT) COMMUNITY**

During 2005, the community-based researchers for the project continued to gather information on traditional forms of literacies from elders. New topics included: drum dances and songs, and clothing. In the coming year, the focus will be on collecting the life histories of elders. This information will allow the development of a context for the use of the literacies. As well as contextual information, the interviews will provide extensive and rich Inuinnaqtun terminology related to traditional literacies, which is being documented in a terminology bank. Preliminary interpretation of the topic data continues. Significant themes emerging from the data include the: continuing centrality of orality to the formation of Inuit identity; process and role of migration; significance of place; importance of genealogy in traditional literacies; process and stages of memory; process and stages of teaching and learning (passing on knowledge); significant time referents (in the absence of Western calendars); and merging and influence of different groups (western, Central and Qablunaaq) in a single community.

459**Traditional Knowledge****Hart, Elisa**

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Region: IN

Licence No: 13919
Location: Tuktoyaktuk

TUKTOYAKTUK PLACE NAMES PROJECT

The Tuktoyaktuk Place Names Project is completed. The final work consisted of verifying information with elders in Tuktoyaktuk in December of 2005. Elders reviewed the traditional place names and their locations on maps, listened or read along as sections of text were read out, and assisted in identifying people and places in photographs. The verification of the pronunciation of many names was done so that they could be written in the Committee for Original Peoples' Entitlement (COPE) standard orthography. Updates on the project were presented at meetings of the Tuktoyaktuk Hamlet Council, Tuktoyaktuk Elders Committee, Tuktoyaktuk Hunters and Trappers Committee, and the Tuktoyaktuk Community Corporation. As of June 2006, a few of the tapes from the work in December are being translated. Satellite imagery needs to be created for the book, for use in showing the place names. After that the text will be copyedited and sent for graphic design and printing. The book should be ready for printing by late fall.

460**Traditional Knowledge****Lyons, Natasha**

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File No: 12 410 647
Region: IN

Licence No: 13795
Location: Aklavik, Inuvik, and Shingle Point

PUBLIC ARCHAEOLOGY FOR THE 21ST CENTURY: COLLABORATION WITH AN ARCTIC COMMUNITY

In June and July 2005, a public archaeology project was initiated in the Western Arctic. Public archaeology is a type of archaeology that emphasizes community outreach and involvement. The main goal of this project is to work collaboratively with the Inuvialuit community and to collect information that is useful to them. Several community organizations saw the need to gather Traditional Knowledge from elders about the land and how people once traveled on it and used its resources. To this end, interviews will be conducted with 25 elders, including 16 from Aklavik and nine from Inuvik, in the summer of 2006. Elders will be asked to identify and describe a series of artifacts from the early to mid 20th century that were collected in the Yukon North Slope area in present-day Ivvavik National Park. The information gathered by this project will ultimately be used to develop resources geared towards teaching Inuvialuit youth about their elders' way of life.

461**Traditional Knowledge****Maraj, Ramona**

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File No: 12 402 743
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Licence No: 13751
Location: Aklavik

GRIZZLY BEARS ON THE YUKON NORTH SLOPE - TRADITIONAL AND LOCAL KNOWLEDGE COMPONENT

The North Slope Grizzly Bear Study, which began in 2004, is a seven-year project aimed at gathering the

knowledge of hunters. The research team worked with a GNWT biologist to review the 1998 GNWT Department of Environment and Natural Resources (ENR) interviews with hunters. The interview information was also checked to ensure that it was correctly coded. Contained in the interviews was information provided by 23 hunters on each hunting trip they made to the North Slope in 1996, 1997 and 1998. Information on route and each bear seen during the trips was recorded. The researchers did find that some of the mapped information had not been properly coded and worked to fix the databases.

In February 2005, a group interview was held with four bear hunters. They identified a set of current and future decision topics where information on bears would be necessary, and suggested products that would be needed to support the decisions. These ranged from decisions about summer tourism to buildings at Shingle Point to possible bear-viewing and access roads. These views were presented to the Aklavik Hunters and Trappers Committee.

462 **Traditional Knowledge**

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Licence No: 13863

Region: NS

Location: Lac de Gras

2005 TRADITIONAL KNOWLEDGE STUDY

The Environmental Monitoring Advisory Board (EMAB) held three workshops in 2005 on: water quality monitoring (July 2005), caribou monitoring (August, 2005) and fish palatability and texture (August 2005). Diavik Diamond Mines Inc (DDMI) provided the necessary funding under a program specifically created for the affected communities to use the community-based monitoring camp. Participants of the workshops represent four of the five aboriginal parties to DDMI's Environmental Agreement (EA).

Three sampling sites were chosen by last year's participants for the water quality monitoring. These sites were deemed important relative to depth, currents, and man-made physical features within the lake (e.g., dike). They are located around the Diavik Mine and are not monitored under DDMI's Aquatic Effects Monitoring Program. Participants conducted biophysical profiles, and collected three water samples at 2 m below the surface, mid water column depth, and 2 m from the lake bottom. They also collected sediment specimens, and sampled and screened benthic invertebrates. Data will continue to be collected annually, and will be used to help detect whether there is any change to Lac de Gras. The water quality data from the 2005 monitoring will be added to the 2004 baseline data for analysis at future EMAB water quality workshops. Benthic and sediment data will be used as a baseline for future EMAB workshops. DDMI will also use the data from the EMAB sites to complement their existing water quality program. EMAB is currently looking into options for data analysis.

During the caribou monitoring workshop, participants received information on DDMI's caribou monitoring programs in the Lac de Gras area, and regional monitoring programs from the territorial government department, Environment and Natural Resources. They toured the mine to gain a better understanding of on-site caribou movement, on-site monitoring programs, and to view the temporary diversionary fencing set up to deflect caribou from the Processed Kimberlite Containment area. Finally, they discussed company and government monitoring efforts in the context of aboriginal involvement in monitoring, with a view to improving caribou monitoring. Participants also discussed the caribou-related recommendations in EMAB's Wildlife Effects Monitoring Program (WEMP) review. They developed key recommendations regarding caribou monitoring for consideration by EMAB, that is, the use of caribou tracking collars and aerial surveys. Participants agreed that the number of caribou collars used on the Bathurst herd should remain as is for now, and that joint aerial surveys by DDMI and BHP Billiton Diamonds Inc. could be expanded. They, however,

insisted that any changes (redesign) that might be made to aerial surveys or to any other monitoring effort needed to be made in consultation with the aboriginal people. The group also noted that youth should be involved in redesign to facilitate involvement in future monitoring. To improve caribou monitoring and aboriginal involvement, participants made the following decisions. Firstly, that a small, mobile two-person camp is set up where the caribou are present, for both Zone of Influence monitoring and regional monitoring (close to the mine and control sites far away from the mine) during the spring migration as well as the fall migration. Participants agreed that this could be a way for DDMI to do its caribou scanning as required by the WEMP. Secondly, that an aboriginal person be present at the Diavik Mine site to monitor caribou and report to the communities. Thirdly, that anyone passing through the area and sights caribou should report on what is sighted to one of the central agencies. The group also suggested that EMAB host a workshop that will bring together government and aboriginal groups to discuss cumulative effects.

During the fish palatability and texture workshop, participants collected and tasted fish from Lac de Gras. In addition, fish samples were collected for analysis to monitor fish populations and indices of fish health. As per subsection 35(2) 9 of the *Fisheries Act*, DDMI, in cooperation with its aboriginal partners and DFO, developed and conducted fish palatability and texture studies at the Diavik Mine site on Lac de Gras in 2002, 2003 and 2004. DFO requires that this study is repeated every five years, with the 2002 data used as a baseline; however, the study may be done more often depending on requests from the aboriginal participants. Two gillnets were set, one close to the community-based camp and one close to the Diavik Mine's A514 dike. Over the fishing period between August 16 and August 18, participants caught 34 lake trout. All four groups agreed that the taste of the fish in Lac de Gras continues to be good. DDMI provides a separate report with scientific data and results.

463**Traditional Knowledge****Povey, Andrew**

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Earth and Environmental Division
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File No: 12 402 670**Region:** DC**Licence No:** 13765**Location:** Wrigley**2005 TRADITIONAL KNOWLEDGE STUDIES IN WRIGLEY**

Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. A final report was completed in August 2005. These activities were conducted by Pehdzech Ki First Nation under contract to Imperial Resources Ventures Ltd. All activities complied with licence conditions.

464**Traditional Knowledge****Povey, Andrew**

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File No: 12 402 670**Region:** IN**Licence No:** 13775**Location:** Tuktoyaktuk, Inuvik, Aklavik**2005 TRADITIONAL KNOWLEDGE STUDIES IN THE INUVIALUIT SETTLEMENT REGION**

Inuvialuit communities within the Traditional Knowledge (TK) Study area for the Mackenzie Gas Project include Aklavik, Inuvik and Tuktoyaktuk. In 2005, the TK study activities focussed on conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. This work was

directed by an Inuvialuit Settlement Region TK Study Working Group that was formed in 2003 and consists of representatives of Hunters and Trappers Committees, Community Corporations and Elders Committees in each of the study area communities. All activities complied with licence conditions.

465**Traditional Knowledge****Povey, Andrew**

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File No: 12 402 670**Licence No:** 13776**Region:** GW**Location:** Aklavik, Fort McPherson, Inuvik, Tsiiigehtchic and traditional lands in the Gwich'in Settlement Area susceptible to effects from the Mackenzie Gas Project**2005 TRADITIONAL KNOWLEDGE STUDIES IN THE GWICH'IN SETTLEMENT AREA**

Gwich'in communities within the Traditional Knowledge (TK) Study area for the Mackenzie Gas Project include Aklavik, Fort McPherson, Inuvik and Tsiiigehtchic. In 2005, activities were geared towards conducting interviews with holders of TK, analyzing the collected data and report writing. Final report was completed in July 2005. The research was conducted by the Gwich'in Social and Cultural Institute, under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

466**Traditional Knowledge****Povey, Andrew**

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File No: 12 402 670**Licence No:** 13777**Region:** DC**Location:** Fort Simpson and traditional lands susceptible to effects from the Mackenzie Gas Project**2005 TRADITIONAL KNOWLEDGE STUDIES IN FORT SIMPSON**

The Traditional Knowledge (TK) study activities in 2005 focussed on analyzing previously collected TK and report writing. A draft report was completed and a final report is pending. These activities were completed by the Lidlii Kue First Nation, under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

467**Traditional Knowledge****Povey, Andrew**

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File No: 12 402 670**Licence No:** 13778**Region:** DC**Location:** Jean Marie River and traditional lands susceptible to effects from the Mackenzie Gas Project**2005 TRADITIONAL KNOWLEDGE STUDIES IN JEAN MARIE RIVER**

Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. A final report was completed in May 2005. These activities were conducted by Jean Marie River First Nation under contract to

Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

468

Traditional Knowledge

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File No: 12 402 670

Licence No: 13779

Region: DC

Location: Kakisa Lake and traditional lands susceptible to effects from the Mackenzie Gas Project

2005 TRADITIONAL KNOWLEDGE STUDIES IN KAKISA

Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. A final report was completed in April 2005. These activities were conducted by Kaa'gee Tu First Nation under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

469

Traditional Knowledge

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File No: 12 402 670

Licence No: 13872

Region: DC

Location: Fort Providence

2005 TRADITIONAL KNOWLEDGE STUDIES IN FORT PROVIDENCE

Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. A final report was completed in November 2005. These activities were conducted by Fort Providence Resource Management Board, under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

470

Traditional Knowledge

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File No: 12 402 670

Licence No: 13879

Region: SA

Location: Tulita

2005 TRADITIONAL KNOWLEDGE STUDIES IN THE TULITA DISTRICT OF THE SAHTU SETTLEMENT AREA

Traditional Knowledge (TK) study activities focussed on conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. This work was directed by an Inuvialuit Settlement Region TK Working Group consisting of representatives from the Ernie MacDonald Land Corporation, Tulita Dene Band Council, Fort Norman Metis Local No. 60, Tulita Municipal Land Corporation and Deline Land Corporation. All activities complied with licence conditions.

471**Traditional Knowledge****Smith, Barney**

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File No: 12 402 744**Licence No:** 13752**Region:** IN**Location:** Aklavik**MARMOTS ON THE YUKON NORTH SLOPE - TRADITIONAL AND LOCAL KNOWLEDGE COMPONENT**

Marmots are members of the squirrel family that are the size of house cats. Little is known about: which species are found in the North Yukon (and the NWT), where the marmot colonies may be located, and how the animals are faring. This is Year 2 of a seven-year project being done in collaboration between Yukon Environment, Parks Canada, the Wildlife Management Advisory Committee (North Slope), the Aklavik Hunters and Trappers Committee, Vuntut Gwitchin First Nation, the Canadian Wildlife Service, and the University of Alaska. In 2005, the research team interviewed and obtained oral history and other information from the Vuntut Gwitchin First Nation, Inuvialuit people from Aklavik, and generally, people working and travelling in this area in the summer when marmots are active in mountain areas. One recent marmot colony location in the northern Richardson Mountains and five other old colony locations were obtained from the Vuntut Gwitchin First Nation and Aklavik Inuvialuit respectively. These locations will be explored in the coming years. Interviews also revealed that some Inuvialuit families, prior to the 1960s, regularly trapped a few marmots a year for food and parka trim.

472**Traditional Knowledge****Vincent, Bruce**

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File No: 12 410 661**Licence No:** 13916**Region:** DC**Location:** Fort Simpson Metis traditional lands**2005 TRADITIONAL KNOWLEDGE STUDY WITH THE FORT SIMPSON METIS**

Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and writing a draft report. These activities were conducted by Fort Simpson Metis, under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

473**Traditional Knowledge****Vincent, Bruce**

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File No: 12 410 661**Licence No:** 13918**Region:** DC**Location:** Katlodeeche First Nation traditional lands**2005 TRADITIONAL KNOWLEDGE STUDY WITH THE KATLODEECHE FIRST NATION**

In 2005, Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK. These activities were conducted by Katlodeeche First Nation, under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

474**Traditional Knowledge****Wicks, Darren**

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File No: 12 410 644**Licence No:** 13747**Region:** NS**Location:** Rae-Edzo**DENE GAMES: A CURRICULUM TOOL**

The Dene Games website (www.denegames.ca) is intended to facilitate learning opportunities for teachers, recreational coordinators, students and the general population. The scope of the information provided in the website has evolved over the past five years from the researcher's experiences teaching physical education at Chief Jimmy Bruneau Regional High School in Rae-Edzo, NT. The information provided on this website would not have been possible without the generous support of community elders, students and the Tlicho Community Services Authority. It is expected that the website will foster educational opportunities not only for students in the NWT, but for students anywhere that would like to learn a new game, with the possibility of this experience being exercised through schools and community recreation facilities. The aim of this learning tool is to highlight the creativity and spirituality behind the power of the Dene Games, which were developed during a time of powerful medicine power. Often, the games were used to celebrate the coming together of family and culture, and are meaningful performances of strength, courage, power, agility and friendship. With the continued development of Dene Games at both the territorial level and now the Arctic Winter Games level, this site will provide, through stories, rules, performance tactics and video, an opportunity for many people to participate and learn more about the Dene Games and its meaning.

Prince of Wales Northern Heritage Centre

ARCHAEOLOGISTS PERMITS

475

Archaeology

Andrews, Tom

Prince of Wales Northern Heritage Centre
Yellowknife, NT

File No: (NWT Archaeologists Permit 2005-973)

Region: SA **Location:** Mackenzie Mountains

NWT ICE PATCH PROJECT

During summer in the Mackenzie Mountains, caribou spend much of their time sitting on high elevation ice patches seeking relief from summer insect swarms and warm afternoon temperatures. Recent research in the Yukon indicates that this relationship has persisted for millennia and has been recorded in the ice. Ice patches formed as annual net accumulations of snow were gradually compressed into permanent ice lenses and, in the process, the ancient remains of caribou – bone, antler and primarily dung – were incorporated and preserved within the ice. Humans have known of this relationship for millennia and have a long history of hunting caribou on ice patches, sometimes losing or discarding their hunting implements in the process. Currently, with changing climate regimes, melting alpine ice patches in the Yukon are yielding caribou remains and hunting implements, providing a material record spanning the last 8 000 years. This record includes unique examples of Aboriginal hunting implements with preserved organic parts, a remarkable development for the archaeological record of the Subarctic, where the organic components of artifacts are quickly degraded by acidic soils and archaeologists are left to reconstruct past cultures from stone tools. The bone, antler, wood, sinew, and feather components of hunting implements are preserved within ice patches, and these complete artifacts have helped neighbouring Yukon archaeologists to redefine our understanding of the invention and use of various hunting technologies, such as the bow and arrow. Well-preserved biological specimens have also proven invaluable to Yukon biologists for reconstructing past environmental conditions and wildlife population dynamics. For example, pollen trapped in the dung provides a record of past climate and vegetation, and DNA studies on dung pellets have assisted in reconstructing the genetic histories of caribou herds and long-term changes in herd ranges. For Yukon archaeologists and biologists, this multidisciplinary approach has resulted in a unique database that informs important questions of human history and caribou behaviour. Yet, the most critical lesson from the Yukon experience is that new artifacts are melting from the ice patches on an annual basis and that these artifacts, wet, fragile and exposed, require immediate conservation measures to be preserved.

Recent work in the Mackenzie Mountains indicates that this ice patch phenomenon is also present in the Northwest Territories and in need of immediate attention. We initiated a project in 2002 to locate and assess ice patches in the Mackenzie Mountains. Working over three years with satellite imagery and aerial photos – in partnership with the NWT Centre for Remote Sensing – we were able to locate areas in the mountains that had visible summer ice patches. In 2005, working in partnership with Tulita First Nations Band, we conducted a 5-day helicopter survey in the middle Mackenzie Mountains, between Norman Wells and the Yukon border, south to the headwaters of the South Nahanni River, and as far north as the headwaters of the Arctic Red River. Two new archaeological sites associated with ice patches were recorded during this brief survey. One of the sites produced wooden artifacts – possibly fragments of a bow made from willow – and the second yielded broken caribou bone with fracture patterns indicative of human butchering practices. We also collected caribou dung from the second site. Analysis is still underway and includes radiocarbon dating of the cultural remains and bone. NWT biologists are leading the analysis of biological specimens from the sites, which include stable isotope analysis, diet composition and DNA analysis. These analyses will provide information on environmental changes and a comparison of past and present ecology of wildlife in the Mackenzie Mountains. This archaeological and biological work will lead to unique insights into the human

and ecological history of the Mackenzie Mountains and will also extend the geographical range of the ice patch work in the Yukon, providing a broader regional scope to these studies.

476
Archaeology
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 Langley, BC

File No: (NWT Archaeologists Permit 2005-968)

Region: NS **Location:** Kennady Lake

ARCHAEOLOGICAL INVESTIGATIONS CARRIED OUT FOR THE GAHCHO KUÉ PROJECT IN 2005

Points West Heritage Consulting Ltd. conducted archaeological investigations for De Beers Canada Inc. at their Gahcho Kué Project in 2005. The study area is located at Kennady Lake, which is approximately 300 km east/northeast of Yellowknife and 80 km southeast of Snap Lake. Jean Bussey directed the field investigations and was assisted by Olivia Donaher, also of Points West, and Henry Basil and Aaron Catholique of the Lutsel K'e First Nation. The archaeological work was conducted under a Class 2 NWT Archaeologists Permit and was primarily concerned with the assessment of previously recorded archaeological sites associated with a proposed diamond mine and its ancillary facilities.

In 2004, 26 previously recorded sites located within 1 km of the proposed Gahcho Kué mine were relocated and subjected to preliminary assessment. Subsurface testing and/or detailed surface examination was conducted at sixteen of these sites and resulted in a more accurate evaluation of site significance. In the 2004 report it was recommended that the remaining 10 sites be assessed and this site evaluation was completed in 2005. In addition, 10 sites located near two proposed gravel pits were also assessed through intensive surface examination and/or subsurface testing. In the process of accessing previously recorded archaeological sites, three new sites were discovered in 2005. All three were sufficiently near proposed development areas that detailed evaluation was conducted. As follow-up to another 2004 recommendation, an archaeological site located along the winter road route to Mackay Lake was also evaluated. Two previously recorded sites located near possible winter road routes for the gravel pits were revisited, but were not assessed since they are avoidable.

All recorded archaeological sites located within 1 km of proposed development areas associated with the Gahcho Kué project have now been assessed in detail. Sites located along the winter road to camp and near proposed winter roads within the project area have been evaluated for impact potential. The majority of the sites along the roads are avoidable. Sites located near the open pit mines are more likely to be affected and such sites were tested. The number and depth of these tests varied based on the size of the landform, amount of vegetation cover evident, surface yield and characteristics of the subsurface deposits. In the process of site assessment, a number of small surface sites were essentially mitigated, while at other archaeological sites sufficient data was collected to provide suitable mitigation recommendations in the event that avoidance is not feasible.

477
Archaeology
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File No: (NWT Archaeologists Permit 2005-969)

Region: NS **Location:** Kennady Lake

NON-TECHICAL REPORT OF ARCHAEOLOGICAL ACTIVITIES AT THE EKATI DIAMOND MINE

Jean Bussey of Points West Heritage Consulting Ltd. has conducted archaeological investigations for BHP Billiton Diamonds Inc. (BHPB) in its claim block north of Lac de Gras since 1994. Each year, she has undertaken to provide archaeological potential assessments, complete archaeological inventories, assess or

mitigate sites and conduct tours of archaeological resources for interested groups. Archaeological sites located near development areas have been tested and mitigated through systematic data recovery consisting of subsurface excavation and/or surface collection. Sites well removed from such activity areas have been recorded and are periodically revisited, but are otherwise avoided.

The majority of the recorded sites in the BHPB claim block are associated with eskers, but sites are also found on other terrain types, usually near the larger lakes. There are still many portions of the claim block that have not been inventoried because no development or exploration activity has been identified in the vicinity. The majority of the sites near EKATI are best described as lithic scatters, sites that are characterized by unworked flakes of stone with an occasional tool. The most common lithic or stone material is quartz, which is found naturally as veins in the bedrock of the Lac de Gras area. Quartz cobbles are also found naturally in the numerous eskers in the claim block and it is suggested that both sources of quartz were utilized prehistorically for stone tool manufacture. A number of the sites in the BHPB claim block have yielded small chert tools suggestive of the Arctic Small Tool tradition, which may date 2 500–3 500 years before present, but the majority of the archaeological sites probably relate to activities conducted in the last 2 500 years. Although most sites are associated with the prehistoric period, a number of traditional use sites have also been identified. Olivia Donaher, of Points West, and Darcy Ross of the North Slave Metis Alliance assisted with the archaeological field work conducted in July at EKATI. One new archaeological site, an isolated find was discovered in 2005, bringing the total in the BHPB claim block to 199 sites. Field investigations were conducted at 17 proposed exploration locations, along a section of the Ursula West esker, in the area of the Fox open pit and for a proposed winter exploration camp and winter access road.

As part of their ongoing commitment to share information on the archaeological work conducted at EKATI, BHPB requested that Jean Bussey conduct tours in 2005. Three representatives of five different groups attended the three to four day tours. The first group consisted of Mike Francis, Alfred Baillargeon and Noel Doctor representing the Yellowknives Dene First Nation. The second group of participants consisted of Irene Fatt, Delphine Enzoe and Frankie Rabesca from the Lutsel K'e First Nation. Representatives of the North Slave Metis Alliance, Ed Jones, Grant Beck and Ashton Hawker, formed the third group. The fourth group consisted of representatives of the Kitikmeot Inuit Association from Kugluktuk: Joseph Nipitanatiak, Helen Enogloak and Lynn Carter. The final participants were Joe Migwi, Georgina Chocolate and Francis Williah, representatives of the Tlicho Government. During each of the tours, four or five sites were visited on the ground and others were pointed out from the air. Helicopter transportation is the only feasible way of conducting these tours, which is why the tours are limited to three participants. Sites throughout the study area were examined, not just those near existing pits or activity areas. Development areas were also viewed from the air and an explanation of the type of archaeological work conducted at such locations was provided.

478

Archaeology

Bussey, Jean

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Langley, BC

File No: (NWT Archaeologists Permit 2005-970)

Region: NS **Location:** Tibbitt to Contwoyto winter road

ARCHAEOLOGICAL INVESTIGATIONS CONDUCTED ALONG THE TIBBITT TO CONTWOYTO WINTER ROAD

In 2005, Jean Bussey of Points West Heritage Consulting Ltd. conducted archaeological investigations for the Joint Venture that operates the Tibbitt to Contwoyto (formerly the Lupin) winter road. The winter road runs from the south end of Tibbitt Lake near Yellowknife to almost the north end of Contwoyto Lake in Nunavut. Field investigations in the Northwest Territories portion of the winter road involved a multi-disciplinary inspection tour conducted in June and archaeological assessment of a number of proposed developments in July. Olivia Donaher of Points West and Noel Doctor of the Yellowknives Dene First Nation assisted with the July investigations. This is the fifth consecutive year that the Joint Venture has sponsored investigations as part of their commitment to ensure that archaeological impacts are avoided or minimized.

In 2001, an archaeological inventory was conducted and resulted in the discovery of 49 new archaeological sites and the revisit of 14 previously recorded sites near the NWT portion of the winter road. Because the inventory was conducted nearly 20 years after construction of the road, some archaeological sites are near developed areas. In 2002, all sites within 30 m of the winter road or related facilities were revisited and if threatened were subjected to site assessment and/or mitigation or were protected through the erection of markers. As of the 2005 inspection tour, there are six sites in the NWT that are protected by markers.

The major objective of the June 2005 field reconnaissance was to determine if markers had adequately protected sites during the winter when the road was in use. The markers erected at five sites consist of standard four-foot (1.2 m) wooden survey stakes that were pounded approximately 30 cm (1 foot) into the ground. At the sixth site, because of the proximity of a winter road camp (Lockhart Lake Camp), Nuna Logistics arranged to install taller and more permanent metal markers with reflectors. During the June 2005 inspection tour, it was noted that the stakes were primarily intact and no disturbances were evident at the protected sites. The stakes at each site were re-pounded to ensure they would stand for another year. All stakes were sprayed with fluorescent orange paint to make them more visible (Photos 1). Also during this inspection, stakes were erected LeNs-27, a site that was not previously marked.

It is recommended that the status of the markers and their ability to provide site protection be reviewed annually. During this recheck it is recommended that any weakened markers be replaced, loose stakes be re-installed and the tops of all wooden markers be sprayed with orange paint. The second reconnaissance was undertaken in July 2005 to assess the archaeological potential of seven potential repeater stations, a possible gravel pit and proposed revisions to the north end of Portage 28. Six repeater stations and one possible alternate location are located between Yellowknife and the Diavik Diamond Mine and are intended to improve communications. Each location was examined and no archaeological sites were discovered. Subsurface testing and surface examination was undertaken at the proposed gravel pit which is located in West Bay on Gordon Lake. The proposed gravel pit is adjacent to an abandoned one used by a mine that was previously located in the vicinity (Photo 2). This detailed examination did not uncover any archaeological sites.

Safety concerns regarding a sharp corner around a bedrock knoll at the north end of Portage 28 have prompted Nuna Logistics to propose an alternate route in this area. The archaeological investigations in the vicinity of Portage 28 consisted of foot traverses and the examination of natural exposures in all areas that might be affected by the proposed revision. No archeological resources were encountered during this reconnaissance.

No archaeological sites were found during the field inventory conducted in July and the protected archaeological sites revisited in June are intact; markers have been reinforced at each site to assist in protecting these locations.

479

Archaeology

Hanna, Don

Bison Historical Services
Calgary, AB

File No: (NWT Archaeologists Permit 2005-971)

Region: IN **Location:** Richards Island

ENCANA CORPORATION, RICHARDS ISLAND EXPLORATION AND DEVELOPMENT PROGRAMS, 2005 HERITAGE RESOURCES SURVEY

In July of 2005, Bison Historical Services Ltd. and Axys Environmental Inc. carried out a survey for heritage sites on Richards Island in the Mackenzie Delta, NWT, on behalf of EnCana Corporation. Known sites were re-visited to ensure that they had not been damaged by last winter's Umiak N-05 drilling program. We also examined the location of the proposed new Umiak D-16 facility and related access route to ensure that upcoming winter projects would not damage any heritage sites.

Known sites in the close vicinity of the exploratory drilling program were re-visited and successful avoidance was documented at seven known heritage sites located next to the overland access route. Very limited development related disturbances were noted at an eighth heritage site near Corral Bay. At this historic reindeer herding station some damage to a gathering fenceline was documented. No previously un-recorded heritage sites were identified during these investigations.

EnCana also is also contemplating the construction of a facility designated as D-16, northeast of Umiak Lake. This facility will be serviced by a short overland access route connecting to existing access routes. Examination of this proposed new facility location at D-16 and associated access route identified no heritage concerns.

Investigations were carried out by Don Hanna of Bison Historical Services Ltd., assisted by Myles Dillon of Inuvik, who acted as wildlife monitor and local advisor. Fieldwork was based out of Inuvik and carried out by helicopter and on foot. Investigations centered on northern Richards Island, in the interior near Umiak Lake and north towards Mason Bay, and in the vicinity of Corral Bay.

480
Archaeology
Hanna, Don

 Bison Historical Services
 Calgary, AB

File No: (NWT Archaeologists Permit 2005-972)

Region: SA **Location:** Summit Creek, 60 km from Tulita

2005 SUMMIT CREEK HERITAGE SURVEY

In September of 2005, Bison Historical Services Ltd. carried out an archaeological survey for heritage sites in the vicinity of Summit Creek, about 60 km south of Tulita, NWT. These investigations were carried out at the request of Northern EnviroSearch Ltd. on behalf of Husky Energy. Fieldwork was based out of Tulita and carried out by helicopter over-flight and on foot. Investigations were carried out by Don Hanna of Bison Historical Services Ltd. and accompanied by Peter Horassi of Tulita, who acted as guide, advisor and wildlife monitor. Our investigations were aimed at ensuring that previously unrecorded heritage sites will not be disturbed by future developments in the area.

We examined three possible wellsite locations and portions of their connecting access routes. Only one heritage site was identified during this phase of operations. This is a relatively recent traditional land use camp that will not be directly disturbed by development activities. Another objective of our study was to carry out baseline investigations in the area of the proposed Summit Creek 3-D seismic survey. We were hampered in these investigations by bad weather in the high country but were still able to identify four prehistoric campsite or workshop locales in upland settings in the general study area. These sites all contain evidence for the ancient manufacture and use of tools made from a distinctive stone called Tertiary Hills welded tuff.

A final objective of our study was to identify elements of the old "Mountain Dene Trail to the Mountains", portions of which are reported as passing through the project area. We were partially successful in this and were able to identify some portions of a trail system in the low-lying country along Summit Creek, as well as a large, early historic period traditional land-use campsite near the confluence of Summit Creek and the Keele River. Other indications of the trail may be found in the presence of two prehistoric workshops in the high altitude pass that crosses the Flint Stone Range southeast of Ground Squirrel Mountain.

These results indicate that there is considerable potential for more unrecorded heritage sites in this area, and that future developments must be carefully monitored to ensure these sites are not disturbed

481
Archaeology
MacKay, Glen

 Prince of Wales Northern Heritage Centre
 Yellowknife, NT

File No: (NWT Archaeologists Permit 2005-974)

Region: DC **Location:** Trout Lake

TROUT LAKE ARCHAEOLOGICAL SURVEY

Glen MacKay of the Prince of Wales Northern Heritage Centre (PWNHC) conducted an archaeological survey of Trout Lake, NWT under Archaeologist's Permit 2005-974. Tom Andrews of the PWNHC assisted MacKay and Violet Sanguez, a Sambaa K'e cultural specialist with Crosscurrent Associates Ltd., facilitated the field project. Several community elders and students also participated in the fieldwork.

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

We recorded nineteen archaeological sites, including sacred sites, burials, historic cabins and camps, traditional trails and precontact sites, during the Sambaa K'e Archaeology Project. Working in close collaboration with Sambaa K'e Elders, we were also able to document some of the oral histories and traditions associated with these sites. Contextualized in this way, archaeological data illustrates how 'history is written on the land' at cultural places, and how these places are linked with the archaeological sites recorded during the project span several historical periods of Trout Lake. Archaeological site JcRg-1 is an abandoned United States Army Air Force weather station operated at Trout Lake during the Second World War. This station provided daily weather observations for military aircraft flying from Edmonton to the Yukon. This site represents a significant period of cultural contact between the Sambaa K'e Dene Band and the outside world. JdRg-1 is a multi-component precontact archaeological deposit at the confluence of Paradise River with Trout Lake. This site, buried beneath a contemporary fish camp, indicates that people have fished at this locality for thousands of years. Cultural places associated with stories from mythical times were also recorded. For example, JcRi-3 is a small stretch of beach covered in flat brown rocks. An important culture hero carried one of these rocks during his travels around the world and they are thought to contain significant medicine power. Together, these sites and the others recorded represent the beginnings of a culture-history of Trout Lake that incorporates the perspectives of both Aboriginal and Western cultural traditions.

The Sambaa K'e Archaeology Project seeks to integrate cultural and archaeological understandings into an integrated history of the Sambaa K'e cultural landscape. We hope to continue this project in future years.

482

Archaeology

MacKay, Glen

Prince of Wales Northern Heritage Centre
Yellowknife, NT

File No: (NWT Archaeologists Permit 2005-975)

Region: DC, NS **Location:** KM 136.1 of Highway 1; KM 30.1 of the Ingraham Trail

ARCHAEOLOGICAL ASSESSMENT: CULVERT REPLACEMENT; KM.136.1;HWY #1

Glen MacKay, Assessment Archaeologist at the Prince of Wales Northern Heritage Centre, conducted archaeological impact assessments for two GNWT Department of Transportation projects under NWT Archaeologist's Permit 2005-975.

A review of the development plans for the first project – a culvert replacement at KM 136.1 of Highway #1 – indicated that archaeological site JfQe-1 was located less than 30 m from the detour route proposed for the culvert replacement. We decided to facilitate avoidance of JfQe-1 by relocating the site and staking its perimeter.

Archaeological site JfQe-1, recorded by William Noble in 1966, is located on the top of a sand ridge trending northeast to southwest on the east side of the culvert. By the time of Noble's survey, bulldozing in the

highway right-of-way had erased a large section of this ridge, leaving intact portions on either side of the highway demarcated by steep cutbanks of reddish sand underlain by gravel. Noble surface collected several artifacts, including lithic debitage, fire-cracked rock and a large circular quartzite cobble chopper, in the exposed sediments of these cutbanks, indicating that JfQe-1 had once spanned the highway right-of-way. On the south side of the highway Noble found intact subsurface deposits of JfQe-1 on a flat, forested section of the ridge.

Thorough visual inspection of the forested ridge top on the south side of the highway resulted in the discovery of Noble's excavation units from 1966, still visible as distinct depressions on the west side of the forested area. Eighteen shovel tests led to the recovery of one black chert flake. Characteristic of the subarctic archaeological record, JfQe-1 is a low-density lithic scatter located on a raised landform overlooking a small watercourse.

A proposed gravel quarry at KM 30.1 of the Ingraham Trail was the focus of the second archaeological impact assessment conducted on behalf of the Department of Transportation. The proposed quarry is an approximately 100 x 100 m area of exposed bedrock sparsely vegetated with jack pine. The development area was assessed for archaeological resources by thorough visual inspection.

The majority of the proposed quarry, characterized by undulating bedrock with very few flat areas, exhibited low potential for archaeological sites. Several quartz veins were carefully inspected for evidence of precontact quarrying activity and tool manufacture but no definitive quartz artifacts were found; rather, the quartz debris associated with the veins appeared to be the result of natural exfoliation or historic prospecting activities.

The services of the Assessment Archaeologist at the Prince of Wales Northern Heritage Centre are available to all GNWT departments requiring archaeological impact assessment of their development projects.

483	Archaeology
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Prager, Gabriella

Points West Heritage Consulting
Leduc, AB

File No: (NWT Archaeologists Permit 2005-967)

Region: NS Location: Old Discovery Mine, ~85 km north of Yellowknife

TYHEE YELLOWKNIFE GOLD PROJECT

In June 2005, on behalf of Tyhee NWT Corp., Points West Heritage Consulting Ltd. conducted archaeological assessments for the proposed Yellowknife Gold Project. This project is located approximately 85 km north of Yellowknife near the historic Discovery Mine that was abandoned in 1969. The proposed Yellowknife Gold Project is located in the vicinity of Winter Lake, about 3 km southwest of the Discovery Mine, with a possible future development at Nicholas Lake, approximately 12 km to the northeast.

Archaeological assessments were conducted of specific proposed development components identified on plans received in June, 2005. These consisted of:

- A proposed tailings containment area and associated facilities at Winter Lake;
- Potential all weather road route to Nicholas Lake;
- Existing winter road route to Yellowknife;
- Alternative locations for processing plant and camp;
- Preliminary assessment of a possible esker airstrip.

The specific mine area at Winter Lake was examined in 2004. Assessments were completed by a combination of low and slow helicopter overflights and surveys on foot of selected portions of each development area judged to have some potential for archaeological resources. Shovel testing was conducted wherever the

terrain suggested some possibility for past human use, for example, elevated, dry, level ground where people would like to camp.

Heritage resources found in 2005 were associated with hunting camps dating considerably less than 50 years of age. Three such camps were found on Winter Lake (in addition to the exploration camp recorded last year): two on the east shore of the lake and one on the island in Winter Lake. One additional camp was observed on Prosperous Lake. These sites displayed various ways that available resources were used for construction of shelters and other needs. Miscellaneous structural remains and debris related to exploration, mining and gravel extraction were also encountered. Because these remains are all comparatively recent, no further work is recommended.

No archaeological remains were found. It should be emphasized that these conclusions refer only to archaeological resources, that is, remains older than 50 years. The potential for archaeological sites in the specific areas to be affected by the mine and camp facilities is rated as low. Much of the area covered by the development of the Yellowknife Gold Project is characterized by low, waterlogged ground or rocky, irregular terrain, generally considered unappealing for human use. The major terrain features with archaeological potential in this vicinity are eskers but these are of limited extent within the presently proposed development zones. If final plans include use of eskers for borrow or other purposes, additional field assessment will be necessary. Within the remainder of the currently proposed development area, it is considered unlikely to encounter archaeological resources.

484

Archaeology

Thomson, Callum

Thomson Heritage
Calgary, AB

File No: (NWT Archaeologists Permit 2005-976)

Region: NS **Location:** Drybones Bay, Great Slave Lake

NEW SHOSHONI VENTURES ASSESSMENT AT DRYBONES BAY

An archaeological survey and impact assessment was conducted on behalf of New Shoshoni Ventures Ltd. by Callum Thomson and Euan Thomson of Thomson Heritage Consultants, Calgary, and Morris Martin, Yellowknives Dene First Nation, Dettah. The survey took place within New Shoshoni mineral claim blocks on the south side of the mouth of Drybones Bay, an area previously found to be quite densely populated with archaeological and recent sites demonstrating a long history of occupation and land use by Yellowknives Dene and other aboriginal groups. The main focus of the 2005 survey was on terrain in the vicinity of 13 planned drill sites, half of which will be drilled through winter ice on Drybones Bay; most of the rest are on bedrock outcrops close to the shore of the bay.

Thirty-three new archaeological sites were found and recorded within the study area; these and 20 previously-recorded sites were assessed for potential impacts from exploration activities. Most of the sites contained one or more boulder features such as tent rings, where people had camped, hide-drying rings where freshly-skinned moose or perhaps caribou hides had been stretched out to dry, birchbark presses where sheets of bark cut from nearby birch trees were flattened prior to use in making canoes, and hearths or fireplaces. A few other sites contained quartz quarries where veins had clearly been exploited during the pre-contact period and where recognizable tools or tool fragments were sometimes found; scatters of other stone tool-making material such as mudstone and chert were found at several sites. Little evidence was found of any previous disturbance of heritage resources in the New Shoshoni project area. Four sites were identified that may require mitigation if exploration proceeds as planned, as each site is located within 100-150 m of proposed drill sites.

Mitigation measures proposed included detailed inspection of the affected drilling locations, development of site protection procedures such as placement of fences around sites, avoidance of exploration activities within

30 m of site boundaries, and modification of drilling methods, where necessary. It was also suggested that New Shoshoni invite Yellowknives Dene elders and officials to inspect planned drill sites and review proposed mitigation strategies proposed for nearby archaeological sites.

Department of Environment and Natural Resources

WILDLIFE RESEARCH PERMITS

485 Wildlife

Auriat, Denise
Gwich'in Renewable Resource Board
P.O. Box 2240
Inuvik, NT XOE 0T0

File No: 3103 **Region:** IN **Location:** Inuvik region

DALL'S SHEEP HABITAT ECOLOGY PROJECT

Objectives: To conduct a Dall's sheep habitat ecology project.

486 Wildlife

Bayne, Erin
University of Alberta
CW 405, Biological Sciences Centre
Edmonton, AB T6G 2E9

File No: 3044 **Region:** DC **Location:** Across the Mackenzie River, near Fort Simpson, Wrigley and Trout Lake

IMPACTS OF PIPELINE EFGES ON THE PREDATION DYNAMICS OF NESTING FOREST SONGBIRDS

Objectives: To examine linear features created by the energy sector on rates of nest predation and small mammal abundance.

487 Wildlife

Bayne, Erin
University of Alberta
CW 405, Biological Sciences Centre
Edmonton, AB T6G 2E9

File No: 3076 **Region:** DC **Location:** Near Enterprise, Fort Providence, Hay River, Fort Smith, Kakisa

CUMULATIVE EFFECTS AND THE DEVELOPMENT OF MAMMALIAN DOSE-RESPONSE CURVES

Objectives: To conduct ground surveys on boreal mammals in the South Slave and Deh Cho regions.

488 Wildlife

Bollinger, Karen
US Fish and Wildlife Service
11510, American Holly Drive
Laurel, MD USA 20708-4002

File No: 3014 **Region:** DC **Location:** Mills Lake

Objectives: To conduct bird banding at Mills Lake under the Western Canada Cooperative Waterfowl Banding Program.

489 **Wildlife**

Branigan, Marsha

GNWT Department of Environment and Natural Resources
Bag Service #1
Inuvik, NT X0E 0T0

File No: 3108

Region: IN **Location:** Inuvialuit Settlement Region

GRIZZLY BEAR POPULATION STUDY: PHASE 1 SATELLITE TRACKING

No report available.

490 **Wildlife**

Branigan, Marsha

GNWT Department of Environment and Natural Resources
Bag Service #1
Inuvik, NT X0E 0T0

File No: 3112

Region: IN **Location:** Inuvialuit Settlement Region

PORCUPINE CARIBOU BODY CONDITION STUDY

No report available.

491 **Wildlife**

Buckland, Laurie

Golder Associates
1000, 940 - 6 Avenue SW
Calgary, AB T2P 3T1

File No: 3006

Region: SS **Location:** Cameron Hills

WINTER TRACK COUNTS ALONG CAMERON HILLS GATHERING SYSTEM AND TRANSBORDER PIPELINE

Objectives: To conduct winter track counts along the Cameron Hills gathering system and transborder pipeline.

492 **Wildlife**

Buckland, Laurie

Golder Associates
1000, 940 - 6 Avenue SW
Calgary, AB T2P 3T1

File No: 3049

Region: SS **Location:** Fort Liard area

MONITORING MIGRATORY BIRDS ALONG THE FORT LIARD PIPELINE ROW

Objectives: To conduct breeding bird monitoring along Paramount Resources Ltd's Fort Liard Pipeline right-of-way.

493 **Wildlife**

Carriere, Suzanne

GNWT Department of Environment and Natural Resources
600, 5102 - 50 Avenue
Calgary, AB X1A 3S8

File No: 3087

Region: All **Location:** Throughout the NWT

NWT SMALL MAMMAL AND HARE SURVEY

No report available.

494

Wildlife

Carriere, Suzanne

GNWT Department of Environment and Natural Resources
600, 5102 - 50 Avenue
Calgary, AB X1A 3S8

File No: 3088

Region: SA, GW, IN

Location: Mackenzie Valley, from south of Norman Wells to Inuvik

FIVE-YEAR PEREGRINE FALCON SURVEY - MACKENZIE VALLEY 2005

No report available.

495

Wildlife

Catto, Steve

Parks Canada
P.O. Box 348
Fort Simpson, NT X0E 0N0

File No: 3047

Region: SA, DC **Location:** Greater Nahanni ecosystem

DISTRIBUTION AND TRANS-BOUNDARY MOVEMENTS OF GRIZZLY BEARS WITHIN THE GREATER NAHANNI ECOSYSTEM

No report available.

496

Wildlife

Catto, Steve

Parks Canada
P.O. Box 348
Fort Simpson, NT X0E 0N0

File No: 3050

Region: SA, DC **Location:** Greater Nahanni ecosystem

DALL'S SHEEP WITHIN THE GREATER NAHANNI ECOSYSTEM

No report available.

497

Wildlife

Cluff, Dean

GNWT Department of Environment and Natural Resources
P.O. Box 2668
Yellowknife, NT X1A 2P9

File No: 3086

Region: NS **Location:** Alymer and Clinton-Colden lakes, Pellatt Lake, Point Lake, Jolly Lake, Mackay and Walmsley lakes

ECOLOGY AND MOVEMENTS OF TUNDRA WOLVES

Objectives: To conduct studies on wolves, including aerial surveys and carcass collections.

498

Wildlife

Coulton, Dan

University of Saskatchewan
115, Perimeter Road
Saskatoon, SK X1A 2P9

File No: 3090

Region: DC, SA **Location:** Mills Lake, Stage River and Willow Lake

SOURCES OF RECRUITS TO LOCAL MALLARD POPULATIONS IN PRAIRIE CANADA

No report available.

499

Wildlife

Derocher, Andrew

University of Alberta

CW 405, Biological Sciences Building

Edmonton, AB T6G 2E9

File No: 3104

Region: IN, GW **Location:** Inuvik region

ECOLOGY OF GRIZZLY BEARS IN THE MACKENZIE DELTA OIL AND GAS DEVELOPMENT AREA

Objectives: To conduct a grizzly bear ecology study.

500

Wildlife

Dickson, Lynne

Canadian Wildlife Service

200-4999, 98th Avenue

Edmonton, AB T6B 2X3

File No: 3299

Region: IN **Location:** Western portion of Victoria Island

POPULATION SURVEYS OF LONG-TAILED DUCKS AND KING EIDERS

Objectives: To conduct research on king eiders and long-tailed ducks.

501

Wildlife

Elkin, Brett

GNWT Department of Environment and Natural Resources

600-5102, 50th Avenue

Yellowknife, NT X1A 3S8

File No: 3079

Region: Various **Location:** Various locations in the NWT

Objectives: To conduct wildlife health and genetic monitoring by testing samples from sick/dead animals.

502

Wildlife

Elkin, Brett

GNWT Department of Environment and Natural Resources

600-5102, 50th Avenue

Yellowknife, NT X1A 3S8

File No: 3091

Region: Various **Location:** Various locations in the NWT

Objectives: To conduct wildlife health and genetic monitoring by testing samples from sick/dead animals.

503

Wildlife

Ellsworth, Troy

GNWT Department of Environment and Natural Resources

P.O. Box 390

Fort Smith, NT X1A 0P0

File No: 3042

Region: DC, SS **Location:** Liard River Valley, Nahanni area in South Slave

NAHANNI-LIARD BISON POPULATION DEMOGRAPHICS AND BISON DISTRIBUTION ALONG THE LIARD RIVER VALLEY

Objectives: To conduct research on bison in the Liard Valley, including classification surveys to calculate density and distribution.

504

Wildlife

Gunn, Anne

GNWT Department of Environment and Natural Resources
600-5102, 50th Avenue
Yellowknife, NT X1A 3S8

File No: 3080

Region: IN **Location:** Bathurst Caribou herd location

MOVEMENT OF CARIBOU OF THE AHIAK HERD

Objectives: To continue to monitor the movements of the Bathurst Caribou herd.

505

Wildlife

Gunn, Anne

GNWT Department of Environment and Natural Resources
600-5102, 50th Avenue
Yellowknife, NT X1A 3S8

File No: 3081

Region: IN **Location:** Bathurst Caribou herd location

No report available.

506

Wildlife

Haszard, Shannon

Ducks Unlimited Canada
4921, 49th Street
Yellowknife, NT X1A 2P1

File No: 3045

Region: DC **Location:** Sambaa K'e Region

DETAILED MAPPING OF THE SAMBAA K'E REGION FOR POTENTIAL WETLAND AND WATERFOWL CONSERVATION

No report available.

507

Wildlife

Haszard, Shannon

Ducks Unlimited Canada
4921, 49th Street
Yellowknife, NT X1A 2P1

File No: 3089

Region: SA, DC **Location:** Pehdzeh Ki Ndeh region (south of the Sahtu region to Deline extending to the mid Deh Cho region near Fort Simpson

PEHDZEH KI NDEH VEGETATION MAPPING PROJECT

No report available.

508 **Wildlife**

Hines, Jim

Canadian Wildlife Service
301-5204, 50th Avenue
Yellowknife, NT X1A 1E2

File No: 3105

Region: IN **Location:** Anderson River Bird Sanctuary

FACTORS CAUSING DECLINING NUMBERS OF LESSER SNOW AND BRANT GEESE AT ANDERSON RIVER BIRD SANCTUARY
No report available.

509 **Wildlife**

Hines, Jim

Canadian Wildlife Service
301-5204, 50th Avenue
Yellowknife, NT X1A 1E2

File No: 3106

Region: IN **Location:** Inuvialuit Settlement Region

SURVEYS OF GEESE AND SWANS IN THE INUVIALUIT SETTLEMENT REGION
No report available.

510 **Wildlife**

Hines, Jim

Canadian Wildlife Service
301-5204, 50th Avenue
Yellowknife, NT X1A 1E2

File No: 3109

Region: IN **Location:** Wintin Banks Island Migratory Bird Sanctuary #1

SNOW GEESE POPULATION AND HABITAT STUDIES IN THE INUVIALUIT SETTLEMENT REGION

Objectives: To conduct a snow goose survey.

511 **Wildlife**

Hines, Jim

Canadian Wildlife Service
301-5204, 50th Avenue
Yellowknife, NT X1A 1E2

File No: 3111

Region: IN **Location:** Inuvialuit Settlement Region

SURVEYS OF GEESE AND SWANS IN THE INUVIALUIT SETTLEMENT REGION

Objectives: To conduct a swan survey.

512 **Wildlife**

Johns, Brian

GNWT Department of Environment and Natural Resources
P.O. Box 390
Fort Smith, NT S7N 0X4

File No: 3013

Region: SS **Location:** South Slave region outside of Wood Buffalo National Park

WHOOPING CRANE STUDIES BY WOOD BUFFALO NATIONAL PARK

Objectives: To conduct whooping crane monitoring outside of Wood Buffalo National Park.

513 **Wildlife**

Johnson, Deborah
Canadian Wildlife Service
115, Perimeter Road
Saskatoon, SK X0E 0P0

File No: 3007
Region: SS **Location:** Cameron Hills area

BASELINE HEALTH, SURVIVAL AND RECRUITMENT OF BOREAL CARIBOU

Objectives: To conduct baseline health, survival and calf recruitment studies, including radio-tracking on boreal caribou in the Cameron Hills area.

514 **Wildlife**

Johnson, Deborah
Canadian Wildlife Service
115, Perimeter Road
Saskatoon, SK X0E 0P0

File No: 3008
Region: SS **Location:** Slave River Delta

BASELINE CONDITIONS OF MUSKRAT AND PREVALENCE OF TULAREMIA IN SLAVE RIVER DELTA

Objectives: To conduct research on baseline health, body condition, age and sex parameters, seasonal diet and reproductive parameters on muskrat.

515 **Wildlife**

Johnson, Vicky
Canadian Wildlife Service
301-5204, 50th Avenue
Yellowknife, NT X0E 0P0

File No: 3083
Region: IN, GW, SA **Location:** Mackenzie Valley pipeline route and Mackenzie River from Inuvik to Norman Wells

BOREAL SHOREBIRD MONITORING PROGRAM

Objectives: To conduct a shorebird monitoring program as part of the Program for Regional and International Shorebird Monitoring (PRISM).

516 **Wildlife**

Johnson, Vicky
Canadian Wildlife Service
301-5204, 50th Avenue
Yellowknife, NT X0E 0P0

File No: 3107
Region: IN **Location:** Inuvialuit region

ARCTIC SHOREBIRD MONITORING PROGRAM

No report available.

517 **Wildlife**

Lafrance, Michel
Yellowknife Airport
Yellowknife, NT X1A 3T2

File No: 3265

Region: NS

Location: Inuvialuit region

No report available.

518

Wildlife

Larter, Nic

GNWT Environment and Natural Resources

P.O. Box 240

Fort Simpson, NT X0E 0N0

File No: 3040

Region: DC

Location: Deh Cho region

DEPLOYMENT OF SATELLITE COLLARS ON BOREAL CARIBOU: TROUT LAKE LATE WINTER DISTRIBUTION OF BOREAL CARIBOU NORTH OF FORT SIMPSON

Objectives: To capture boreal caribou for the deployment of satellite collars, in order to find migration routes, calving grounds and seasonal differences.

519

Wildlife

Larter, Nic

GNWT Environment and Natural Resources

P.O. Box 240

Fort Simpson, NT X0E 0N0

File No: 3041

Region: DC

Location: Between Ebbutt Hills, Mackenzie River and Edehzhie Protected Area

LATE WINTER DISTRIBUTION OF BOREAL CARIBOU NORTH OF FORT SIMPSON

Objectives: To conduct research on late winter distribution of boreal caribou north of Fort Simpson and south of the Ebbutt Hills, between the Mackenzie and Edehzhie rivers.

520

Wildlife

Larter, Nic

GNWT Department of Environment and Natural Resources

P.O. Box 240

Fort Simpson, NT X0E 0N0

File No: 3048

Region: DC

Location: Deh Cho region

DEPLOYMENT OF ADDITIONAL SATELLITE COLLARS ON BOREAL CARIBOU: TROUT LAKE

Objectives: To deploy a maximum of four collars on boreal caribou.

521

Wildlife

Larter, Nic

GNWT Department of Environment and Natural Resources

P.O. Box 240

Fort Simpson, NT X0E 0N0

File No: 4951

Region: DC

Location: Deh Cho region

DEPLOYMENT OF SATELLITE COLLARS ON BOREAL CARIBOU: EBBUTT HILLS

Objectives: To conduct research on boreal caribou using radio collars.

522 **Wildlife**

Larter, Nic

GNWT Environment and Natural Resources
P.O. Box 240
Fort Simpson, NT X0E 0N0

File No: 4952

Region: DC **Location:** Deh Cho region

MONITORING OF THE DENSITY AND DISTRIBUTION OF MOOSE IN AREAS IN THE LIARD VALLEY DEEMED IMPORTANT TO LOCAL FIRST NATIONS

Objectives: To collect baseline information on the current density and distribution of moose along the Mackenzie and Liard rivers, and to conduct biological sampling on harvested moose in the Deh Cho region.

523 **Wildlife**

Latour, Paul

Canadian Wildlife Service
301-5204, 50th Avenue
Fort Simpson, NT X0E 0N0

File No: 3043

Region: DC **Location:** Deh Cho region

TRUMPTER SWAN POPULATION DYNAMICS

Objectives: To conduct an aerial survey of wetland to classify and tally trumpeter swans in age classes and the number of young in each brood.

524 **Wildlife**

Latour, Paul

Canadian Wildlife Service
301-5204, 50th Avenue
Fort Simpson, NT X0E 0N0

File No: 3084

Region: SA **Location:** Ramparts River and wetlands (west of Ft. Good Hope)

ECOLOGICAL ASSESSMENT OF TS'UDELILINE–TUYETAH CANDIDATE PROTECTED AREA

Objectives: To conduct an ecological assessment of Ts'udeliline–Tuyetah Candidate Protected Area.

525 **Wildlife**

Machtans, Craig

Canadian Wildlife Service
301-5204, 50th Avenue
Fort Simpson, NT X0E 0N0

File No: 3085

Region: DC **Location:** Fort Liard/Liard Valley

LIARD VALLEY FOREST SONGBIRD STUDY

Objectives: To conduct songbird counts along the Liard Valley.

526 **Wildlife**

McLeod, Carla

Wolverine Air
P.O. Box 62
Hills Spring, AB T0K 1E0

File No: 3046

Region: DC, SA **Location:** South Nahanni (DOT/01)

RESEARCH ON HARVESTED DALL'S SHEEP AND CARIBOU WITHIN THE SOUTH NAHANNI DOT/01 ZONE

Objectives: To conduct research on harvested Dall's sheep and caribou within the South Nahanni DOT/01 zone.

527

Wildlife

Moore, Steve

EBA Engineering Consultants Ltd.
210-4916 49th Street
Yellowknife, NT X1A 2P7

File No: 3015

Region: SS **Location:** Pine Point, except Katlodeeche First Nation traditional lands

BASELINE WILDLIFE UTILIZATION SAMPLING IN CONJUNCTION WITH DEVELOPMENT OF ECOSYSTEM CLASSIFICATION MAP FOR THE PINE POINT AREA

No report available.

528

Wildlife

Moore, Steve

EBA Engineering Consultants Ltd.
210-4916 49th Street
Yellowknife, NT X1A 2P7

File No: 3077

Region: NS **Location:** Locations within Tyhee NWT Corp's (formally known as Discovery Mine) land use permit

2005 BASELINE DATA COLLECTION YELLOWKNIFE GOLD PROJECT, TYHEE NWT CORP. (DISCOVERY MINE SITE)

No report available.

529

Wildlife

Mulders, Robert

GNWT Department of Environment and Natural Resources
600-5102, 49th Street
Yellowknife, NT X1A 3S8

File No: 3078

Region: All **Location:** Throughout the NWT

NWT WOLVERINE CARCASS COLLECTION

To conduct wolverine carcass collection in the NWT.

530

Wildlife

Nagy, John

GNWT Department of Environment and Natural Resources
Bag Service #1
Inuvik, NT X0E 0T0

File No: 3110

Region: IN **Location:** Banks Island and north-west Victoria Island

BANKS AND NW VICTORIA ISLAND PEARY CARIBOU, MUSK-OX AND ARCTIC WOLF POPULATION SURVEY

Objectives: To conduct a Peary caribou, musk-ox and arctic wolf population survey.

531 **Wildlife**

Nagy, John

GNWT Department of Environment and Natural Resources
Bag Service #1
Inuvik, NT XOE 0T0

File No: 3296

Region: IN, GW **Location:** Inuvik region caribou herd ranges

PHOTOCENSUS, LATE WINTER RECRUITMENT AND POST-CALVING PRODUCTIVITY SURVEYS OF THE CAPE BATHURST, BLUENOSE-WEST AND BLUENOSE-EAST BARREN-GROUND CARIBOU

Objectives: To conduct research on barren-ground caribou.

532 **Wildlife**

Nagy, John

GNWT Department of Environment and Natural Resources
Bag Service #1
Inuvik, NT XOE 0T0

File No: 3297

Region: GW **Location:** Inuvik region, Gwich'in Settlement Area

BOREAL WOODLAND CARIBOU

Objectives: To conduct research on boreal woodland caribou.

533 **Wildlife**

Nishi, John

GNWT Department of Environment and Natural Resources
P.O. Box 390
Fort Smith, NT XOE 0P0

File No: 3009

Region: SS **Location:** Mackenzie Bison Sanctuary

POPULATION AND DISEASE MONITORING OF BISON IN THE MACKENZIE BISON SANCTUARY

No report available.

534 **Wildlife**

Nishi, John

GNWT Department of Environment and Natural Resources
P.O. Box 390
Fort Smith, NT XOE 0P0

File No: 3010

Region: SS **Location:** Slave River lowlands

Objectives: To conduct population and disease monitoring of bison in the Slave River lowlands.

535 **Wildlife**

Nishi, John

GNWT Department of Environment and Natural Resources
P.O. Box 390
Fort Smith, NT XOE 0P0

File No: 3011

Region: SS **Location:** Hook Lake

Objectives: To conduct the Hook Lake Wood Bison Recovery Project.

536 **Wildlife**

Nishi, John

GNWT Department of Environment and Natural Resources
P.O. Box 390
Fort Smith, NT X0E 0P0

File No: 3012

Region: SS **Location:** Slave River region

Objectives: To conduct surveillance of the Bison Control Area.

537 **Wildlife**

Pretzlaw, Troy

McGill University
21111, Lakeshore Road
Ste-Anne-de-Bellevue, QC H9X 3V9

File No: 3295

Region: GW **Location:** Inuvik region along the Dempster Highway

MAMMAL COMPOSITION ACROSS THE FOREST-TUNDRA TRANSITION: IMPLICATIONS OF CLIMATE CHANGE

Objectives: To conduct research on mammal composition.

538 **Wildlife**

Shier, Catherine

University of Alberta
CW 405, Biological Sciences Building
Edmonton, AB T6G 2E9

File No: 3294

Region: IN, GW **Location:** Inuvik region

SYNCHRONY BETWEEN MINK AND MUSKRAT POPULATIONS IN CANADA

Objectives: To conduct a mink and muskrat carcass collection.

539 **Wildlife**

Slatterly, Stuart

Ducks Unlimited Canada
P.O. Box 1160
Stonewall, MB R0C 2Z0

File No: 3300

Region: GW **Location:** Tundra-Cardinal-Clearwater lakes complex

DEMOGRAPHIC RATES AND FACTORS LIMITING BREEDING DUCK POPULATIONS IN THE MACKENZIE VALLEY, WITH SPECIAL EMPHASIS ON SCOTERS AND SCAUP

Objectives: To conduct research on scoters and scaup.

540 **Wildlife**

Stirling, Ian

Canadian Wildlife Service
5320, 122nd Street
Edmonton, AB T6H 3S5

File No: 3298

Region: IN **Location:** Eastern Beaufort Sea and Amundsen Gulf

POPULATION ASSESSMENT OF POLAR BEARS IN THE BEAUFORT SEA AND AMUNDSEN GULF

Objectives: To conduct polar bear research.

541

Wildlife

Voelzer, James

US Fish and Wildlife Service

911 NE 11th Avenue

Portland, OR USA 97232-4181

File No: 2875

Region: All

Location: Throughout the NWT

COOPERATIVE US-CANADA WATERFOWL POPULATION SURVEYS

No report available.

542

Wildlife

Wilson, Matthew

US Geological Survey

505 Azuar Drive

San Francisco, CA USA 94592

File No: 3082

Region: All

Location: Throughout the NWT

**CROSS-SEASONAL LINKAGES OF SURF SCOTERS (*Melanitta perspicillata*) WINTERING IN THE PACIFIC FLYWAY AND BREEDING
IN THE NWT**

Objectives: To conduct tracking of surf scoters in the NWT.

Department of Fisheries and Oceans

FISHERIES SCIENTIFIC LICENCES

543

Fisheries

Babaluk, John
DFO
501 University Crescent
Winnipeg, MB R3T 2N6

File No: SLE-05/06-303

Location: South Nahanni River, 61°03', 123°21', Little Nahanni River, 62°28', 128°37' and Broken Skull River, 62°16', 127°39', outside the boundaries of Nahanni National Park

Objectives: To determine the occurrence and distribution of fish species, collect basic biological data from fish and document the distribution of bull trout. The data collected will be utilized to develop a protocol for use in the management and monitoring of species in the area.

544

Fisheries

Babaluk, John
DFO
501 University Crescent,
Winnipeg, MB R3T 2N6

File No: SLE-05/06-304

Location: Prairie Creek, 61°23', 124°29' and Flat River, 61°24', 126°38', outside the boundaries of Nahanni National Park

Objectives: To determine the occurrence and distribution of fish species, collect basic biological data from fish and document the distribution of bull trout. The data collected will be utilized to develop a protocol for use in the management and monitoring of species in the area.

545

Fisheries

Bekhuis, Tim
AMEC, 2227 Douglas Road
Burnaby, BC V5C 5A9

File No: SI E-05/06-209

File No: SLE-05/06-209
Location: Gabcho Kué (Kennedy Lake) and tributaries within 10 km of 63°26'34" N, 109°11'45" E

Objectives: To continue the collection of data for use in the preparation of an environmental impact assessment of mine development activities in the Gahcho Kué area. Sampling will be conducted to determine the movements of fish between lakes and streams and to gain a better understanding of fish community characteristics and spawning locations.

546

Fisheries

Bekhuys, Tim
AMEC, 2227 Douglas Road
Burnaby, BC V5C 5A9

File No: SLE-05/06-210

File No: SLE-05/06-210
Location: Unnamed Lake (control lake): 63°27'44" N 109°18'54" W

Objectives: To continue the collection of data for use in the preparation of an environmental impact

assessment of mine development activities in the Gahcho Kué area. Sampling will be conducted to determine the movements of fish between lakes and streams and to gain a better understanding of fish community characteristics and spawning locations.

547**Fisheries****Bekhuys, Tim**AMEC, 2227 Douglas Road
Burnaby, BC V5C 5A9**File No:** SLE-05/06-211**Location:** Unnamed Lake (Lake 410): 63°32'04", 109°03'27"

Objectives: To continue the collection of data for use in the preparation of an environmental impact assessment of mine development activities in the Gahcho Kué area. Sampling will be conducted to determine the movements of fish between lakes and streams and to gain a better understanding of fish community characteristics and spawning locations.

548**Fisheries****Bekhuys, Tim**AMEC, 2227 Douglas Road
Burnaby, BC V5C 5A9**File No:** SLE-05/06-261**Location:** Kirk Lake and connecting stream to Lake 410 within 10 km of 63°40'00", 109°07'00"

Objectives: To determine fish absence/presence and species composition in areas that may be affected by the proposed mine development.

549**Fisheries****Bekhuys, Tim**AMEC, 2227 Douglas Road
Burnaby, BC V5C 5A9**File No:** SLE-05/06-262**Location:** Aylmer Lake and connecting streams to Kirk Lake within 10 km of 63°58'00", 108°51'00"

Objectives: To determine fish absence/presence and species composition in areas that may be affected by the proposed mine development.

550**Fisheries****Bergmann, Marty**DFO
501 University Crescent
Winnipeg, MN R3T 2N6**File No:** SLE-05/06-290**Location:** Beaufort Sea (aboard *Nahidik*) within boundaries formed by the following coordinates:
69.15205° to 70.46865° and 133.09160° to 138.68188°

Objectives: To “ground truth” data from hydroacoustic surveys of biota on the sea floor and water column; to collect information on the trophic structure of fish communities and obtain gut content and tissue collections for stable isotope analysis; and to continue the gathering of samples for ongoing genetic and contaminant studies.

551 **Fisheries**

Brewin, Kerry
Dillon Consulting Ltd.
101-6th Avenue SW,
Calgary, AB T2P 3P4

File No: SLE-05/06-259

Location: Matthews Lake, Zone 12: 487756E, 7105202N; unnamed stream (Stream B): 490879E, 7105612N; unnamed water body (Pond B): 492550E, 7104400N

Objectives: To determine if fish are utilizing the rehabilitated habitats for migration, spawning/rearing.

552 **Fisheries**

Cott, Pete
DFO
5204-50th Avenue
Yellowknife, NT X1A 1E2

File No: SLE-05/06-259

Location: Matthews Lake, Zone 12: 487756E, 7105202N; unnamed stream (Stream B): 490879E, 7105612N; unnamed water body (Pond B): 492550E, 7104400N

Objectives: To determine if fish are utilizing the rehabilitated habitats for migration, spawning/rearing.

553 **Fisheries**

Couture, Richard
EBA Engineering Consultants Ltd.
9th Floor – West Hastings Street
Vancouver, BC V6E 3X2

File No: SLE-05/06-216

Location: Narrow Lake: 63°09'36", 113°56'24"

Objectives: To continue the assessments of fish and fish habitat to supplement the existing data base on the streams that may be crossed by an all weather road and water bodies which the streams connect.

554 **Fisheries**

Couture, Richard
EBA Engineering Consultants Ltd.
9th Floor – West Hastings Street
Vancouver, BC V6E 3X2

File No: SLE-05/06-217

Location: Winter Lake: 63°10'12", 113°55'12"

Objectives: To continue the assessments of fish and fish habitat to supplement the existing data base on the streams that may be crossed by an all weather road and water bodies which the streams connect.

555 **Fisheries**

Couture, Richard
EBA Engineering Consultants Ltd.
9th Floor – West Hastings Street
Vancouver, BC V6E 3X2

File No: SLE-05/06-218

Location: Various streams within a study area bounded by straight lines connecting the following coordinates in the order in which they are listed:
63°08'24", 114°03'00"

63°00'00", 113°33'36"
63°00'00", 113°28'48"
63°08'24", 113°27'00"

Objectives: To continue the assessments of fish and fish habitat to supplement the existing data base on the streams that may be crossed by an all weather road and water bodies which the streams connect.

556 **Fisheries**

Dick, Terry
University of Manitoba
Department of Zoology
Winnipeg, MB R3T 2N2

File No: SLE-05/06-257

Location: Chitty Lake: 62°42'50", 114°07'55"

Objectives: To evaluate the trophic feeding structure through species composition, food habits and parasite studies and to establish patterns of movements of fish relative to habitat with the use of sonar tags.

557 **Fisheries**

Eschenroder, Randy
Great Lakes Fishery Commission
2100 Commonwealth Boulevard, Suite 100
Ann Arbor, MI 48105

File No: SLE-05/06-294

Location: Area 5 and 6 of Great Slave Lake (62–50° N x 113–50° W)

Objectives: To study the morphological diversity of lake trout and to differentiate between shallow and deep forms; and to collect and preserve cisco by-catch for later species identification by Dr. Jim Reist.

558 **Fisheries**

Evans, Marlene
Environment Canada
11, Innovation Boulevard
Saskatoon, SK, S7N 3H5

File No: SLE-05/06-296

Location: Area V in the Lutsel K'e area: 62°24' N, 110°44' W

Objectives: To determine changes in contaminants levels in fish harvested by commercial and subsistence users in the NWT.

559 **Fisheries**

Evans, Marlene
Environment Canada
11, Innovation Boulevard
Saskatoon, SK, S7N 3H5

File No: SLE-05/06-297

Location: Area III in the Fort Resolution area: 61°10' N, 113°42' W

Objectives: To determine changes in contaminants levels in fish harvested by commercial and subsistence users in the NWT.

560 **Fisheries**

Evans, Marlene
Environment Canada
11, Innovation Boulevard
Saskatoon, SK, S7N 3H5

File No: SLE-05/06-298

Location: Cli Lake: 61°59'00" N, 123°18'00" W

Objectives: To determine changes in contaminants levels in fish harvested by commercial and subsistence users in the NWT.

561 **Fisheries**

Evans, Marlene
Environment Canada
11, Innovation Boulevard
Saskatoon, SK, S7N 3H5

File No: SLE-05/06-299

Location: Colville Lake: 67°10'00" N, 126°00'00" W

Objectives: To determine changes in contaminants levels in fish harvested by commercial and subsistence users in the NWT.

562 **Fisheries**

Evans, Marlene
Environment Canada
11, Innovation Boulevard
Saskatoon, SK, S7N 3H5

File No: SLE-05/06-301

Location: Tieda River: 66°42.430', 129°18.117'
Hare Indian River: 66°19.032', 128°32.866'
Chick Creek: 65°50.896', 128°08.189'
Oscar Creek: 65°26.427', 127°25.687'
Francis Creek: 65°11.853', 126°27.845'
Jungle Ridge Creek: 65°03.669', 126°03.399'

Objectives: To improve the existing understanding of the structure and function of the aquatic environment in water bodies that may be impacted by various aspects of the development of the Mackenzie Gas Pipeline. One hundred metre sections of streams will be closed off and quantitative investigations will be conducted to determine fish species presence/absence. Lengths, weights and other measurements will be collected. Mortalities will be kept for laboratory analysis.

563 **Fisheries**

Evans, Marlene
Environment Canada
11, Innovation Boulevard
Saskatoon, SK, S7N 3H5

File No: SLE-05/06-302

Location: Mackenzie River, from 64°45' to 66°52' N

Objectives: To determine the health of fish at or near oil seepage sites, and to compare the findings to the health of fish in other parts of the Mackenzie River.

564

Fisheries

Ford, Bruce

Gartner Lee Limited
490-6400, Roberts Street
Burnaby, BC V5G 4C9

File No: SLE-05/06-313

Location: Giauque Lake: 63°11'00", 113°51'00"
Thistlewaite Lake: 63°10'00", 113°34'00"
Unnamed lake (Control A): 63°13'00", 113°42'00"

Objectives: To determine the levels of mercury and other metals in fish.

565

Fisheries

Fortier, Martin

Université Laval
GIROQ, Pavillion Vachon,
Quebec, QC G1K 7P4

File No: SLE-05/06-310

Location: Beaufort Sea / Amundsen Gulf (14 study stations) within coordinates 69°50'30" & 72°00'32" N and 121°40'00" & 135°00'00" W. Activities based aboard the CCG vessel Amundsen to conduct the Canadian Arctic Shelf Exchange Study (CASES)

Objectives: To continue the collection of data to gain a better understanding of the biogeochemical and ecological consequences that may be associated with the possible sustained reduction of ice cover due to global warming.

566

Fisheries

Gray, Michelle

University of New Brunswick
Department of Biology, 10 Bailey Drive
Fredericton, NB E3B 6E1

File No: SLE-05/06-311

Location: In the vicinity of the Diavik mining operations at Lac de Gras, 64°30'00", 110°17'00"

Objectives: To document fish health and conduct a population assessment as per Fisheries Authorization #SC98001.

567

Fisheries

Harris, Les

Gwich'in Renewable Resource Board
P.O. Box 2240
Inuvik, NT XOE 0T0

File No: SLE-05/06-246

Location: Travaillant Lake (67°36'53", 131°52'56") and all water bodies within a 25 km radius from same

Objectives: To track the movements of fish, which were fitted with radio transmitters during the past year. Fixed receiving stations and aerial methods will be utilized.

568 **Fisheries**

Harris, Les

Gwich'in Renewable Resource Board
P.O. Box 2240
Inuvik, NT XOE 0T0

File No: SLE-05/06-247

Location: Mackenzie River delta (69°21'00", 133°54'00") and tributaries

Objectives: To collect fin and tissue samples from broad whitefish from local harvesters to establish a base that will eventually be used for phylogeographic analysis and classification of genetic population structure.

569 **Fisheries**

Harwood, Lois

DFO
101 5204 50th Avenue
Yellowknife, NT X1A 1E2

File No: SLE-05/06-255

Location: Waters near Holman: 70° 35' 00", 117° 50' 00"; and Sachs Harbour: 72° 00' 00", 125° 15' 00"

Objectives: To collect measurements and samples for ageing, contaminants/disease testing, reproduction, diet and over-all health indicators from seals harvested by subsistence users. A collection of seals may be undertaken to augment the sample size if required.

570 **Fisheries**

Harwood, Lois

DFO
101 5204 50th Avenue
Yellowknife, NT X1A 1E2

File No: SLE-05/06-260

Location: Unnamed stream (Tributary 1) at Fish Lake, 71°12'08", 116°44'16"

Objectives: To gather information on the movement of char through tributaries and upper water bodies of the Fish Lake system. A floy tagging program will be conducted to gain a better under standing of the life history, migration and inter-relation with other populations.

571 **Fisheries**

Harwood, Lois

DFO
101 5204 50th Avenue
Yellowknife, NT X1A 1E2

File No: SLE-05/06-263

Location: Waters off Kendall Island: 69°30'00", 135°20'00"; and waters off Hendrickson Island: 69°30'00", 133°25'00"

Objectives: To collect ageing structures, tissues for contaminants and disease testing, reproductive and digestive tracts and lungs along with other measurements from beluga whales harvested by subsistence harvesters.

572 **Fisheries**

Harwood, Lois

DFO
101 5204 50th Avenue
Yellowknife, NT X1A 1E2

File No: SLE-05/06-322

Location: Beaufort Sea within 100 km of 69.65015° N, 136.47105 W

Objectives: To determine the distribution, densities, behavioural patterns, body and reproductive condition of ringed and bearded seals in areas subject to exploration activities. Seals will be captured live, measured and tagged with satellite and roto tags. Seals harvested by subsistence users will be sampled and measured. This information may be used to provide advice and recommendations for future monitoring programs to mitigate negative impacts of hydrocarbon exploration and development.

573

Fisheries

Herrington, Joey

IEG Environmental

P.O. Box 673

Yellowknife, NT X1A 2N5

File No: SLE-05/06-309

Location: Unnamed water body (Uyaalialuq): 69°23'48.6", 133°02'14.1"; Tuktoyaktuk Harbour: 69°24'09.8", 132°59'23.3"

Objectives: To collect fish samples to evaluate the potential impacts of sewage discharges on species within the receiving environment.

574

Fisheries

Horrocks, Kimberley

De Beers Canada Inc.

300-5102 50th Avenue

Yellowknife, NT X1A 3S8

File No: SLE-05/06-242

Location: At the location of the Snap Lake Mine water intake (63°36'31", 110°51'59"); the water outlet (63°36'13", 110°51'31"); and four other locations with similar habitat at the peninsula where the water intake and outlet are located

Objectives: To collect baseline information on the presence/absence/abundance of small-bodied fish in the vicinity of the water intake/outlet.

575

Fisheries

Horrocks, Kimberley

De Beers Canada Inc.

300-5102 50th Avenue

Yellowknife, NT X1A 3S8

File No: SLE-05/06-243

Location: Unnamed stream (Stream 27) at Snap Lake, 63 36 07, 110 57 26

Objectives: To document spawning activity prior to removing a natural blockage to migration.

576

Fisheries

Horrocks, Kimberley

De Beers Canada Inc.

300-5102 50th Avenue

Yellowknife, NT X1A 3S8

File No: SLE-05/06-244

Location: Snap Lake: 63°36'30", 110°51'32"

Objectives: To conduct a lake trout recruitment study.

577

Fisheries

Horrocks, Kimberley

De Beers Canada Inc.

300-5102 50th Avenue

Yellowknife, NT X1A 3S8

File No: SLE-05/06-245

Location: Water bodies within a 30 km radius of the coordinates 63°36'30", 110°51'32" at Snap Lake

Objectives: To inventory the fish stocks in lakes near Snap Lake in order to establish a reference lake.

578

Fisheries

Howland, Kimberley

DFO

501 University Crescent

Winnipeg, MB R3T 1E2

File No: SLE-05/06-273

Location: Travaillant Lake: 67°40'00", 131°54'00"

Objectives: To determine baseline population status, species composition and develop indicators of abundance and mortality rates.

579

Fisheries

Howland, Kimberley

DFO

501 University Crescent

Winnipeg, MB R3T 1E2

File No: SLE-05/06-274

Location: Travaillant River North: 67°45'00", 131°52'00"

Objectives: To determine baseline population status, species composition and develop indicators of abundance and mortality rates.

580

Fisheries

Howland, Kimberley

DFO

501 University Crescent

Winnipeg, MB R3T 1E2

File No: SLE-05/06-275

Location: Travaillant River South and Andrew Lake, 67°37'00", 131°52'00"

Objectives: To determine baseline population status, species composition and develop indicators of abundance and mortality rates.

581

Fisheries

Landry, Francois

Rescan Environmental Services Ltd.

6th Floor, 1111 West Hastings Street

Vancouver, BC V6E 2J3

File No: SLE-05/06-219

Location: North Panda Lake: 64°43'54", 110°34'38"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

582

Fisheries

Landry, Francois

Rescan Environmental Services Ltd.

6th Floor, 1111 West Hastings Street

Vancouver, BC V6E 2J3

File No: SLE-05/06-220

Location: Kodiak Lake: 64°42'14", 110°37'00"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

583

Fisheries

Landry, Francois

Rescan Environmental Services Ltd.

6th Floor, 1111 West Hastings Street

Vancouver, BC V6E 2J3

File No: SLE-05/06-221

Location: Panda Diversion Channel: 64°44'00", 110°40'00"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

584

Fisheries

Landry, Francois

Rescan Environmental Services Ltd.

6th Floor, 1111 West Hastings Street

Vancouver, BC V6E 2J3

File No: SLE-05/06-222

Location: Pigeon Stream 64°45'22", 110°40'37"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

585

Fisheries

Landry, Francois

Rescan Environmental Services Ltd.

6th Floor, 1111 West Hastings Street

Vancouver, BC V6E 2J3

File No: SLE-05/06-223**Location:** Polar-Vulture Stream 64°44'27", 110°32'54"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

586**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-224**Location:** Nero-Nema Stream: 64°39'29", 110°42'48"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

587**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-225**Location:** Bearclaw Lake: 64°44'22", 110°35'17"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

588**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-226**Location:** Buster Pond: 64°42'36", 110°36'10"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

589**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-227

Location: Unnamed water bodies: Fox 2 Lake and tributaries, 64°38'58", 110°43'00"; Fox 3 Lake and Tributaries, 64°38'46", 110°43'57"; South Fox 2 and tributaries, 64°38'52", 110°42'25"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

590**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-228

Location: Unnamed water bodies: Siksik Pond 1, 64°39'43", 110°39'51"; Siksik Pond 2 and tributaries, 64°39'37", 110°39'54"; Lake A and tributaries, 64°39'54", 110°39'29"; Pond B, 64°39'38", 110°39'29"; Lake I and tributaries, 64°38'25", 110°44'23"; Pond J and tributaries, 64°38'59", 110°44'20"; Pond K and tributaries, 64°38'59", 110°44'15"; Pond L and tributaries, 64°38'58", 110°44'30"; Pond M and tributaries, 64°38'57", 110°44'52"; Pond N and tributaries, 64°38'27", 110°44'40"; Pond P and tributaries, 64°39'04", 110°43'33"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

591**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-229

Location: Lac du Sauvage. Study area bounded by straight lines connecting the following coordinates:

64°34'08", 110°10'26"
64°37'49", 110°01'35"
64°33'17", 109°59'42"
64°34'08", 110°07'54"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

592**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-230

Location: Unnamed stream: 64°36'25", 110°09'07"; unnamed stream: 64°35'53", 110°08'28"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion

Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

593**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-231

Location: Ursula Lake: 64°48'58", 110°28'34"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

594**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-232

Location: Ursula Stream: 64°47'20", 110°21'11"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

595**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-233

Location: Upper Exeter Lake: 64°44'56", 110°43'37"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

596**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-234

Location: Pigeon Pond: 64°45'29", 110°39'25"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion

Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

597**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-235

Location: Big Reynolds Pond and tributaries, 64°44'56", 110°38'46"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

598**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-236

Location: Little Reynolds Pond and tributaries, 64°44'46", 110°39'43"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

599**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-237

Location: Upper Pigeon Pond A: 64°54'52", 110°38'05"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

600**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-238

Location: Pigeon Pond to Fay Bay Stream, 64°45'25", 110°40'01"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion

Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

601**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-239

Location: Carrie Lake and tributaries, 64°34'08", 110°12'22"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

602**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-240

Location: Study area bounded by straight lines connecting the following coordinates in the order in which they are listed:

64°31'00", 110°11'01"
64°34'15", 110°10'55"
64°34'11", 109°59'11"
64°30'54", 109°59'16"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

603**Fisheries****Landry, Francois**

Rescan Environmental Services Ltd.
6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-240

Location: Twenty-four water bodies in the Long Lake Containment Facility Watershed. Study area bounded by straight lines connecting the following coordinates:

64°41'15", 110°49'33"
64°44'17", 110°49'32"
64°44'14", 110°41'19"
64°41'15", 110°41'20"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

604 **Fisheries**

Low, George

Department of Fisheries and Oceans
42043 Mackenzie Highway
Hay River, NT X0E 0R9

File No: SLE-05/06-292

Location: Carcajou River (65–34 N x 128–43 W)

Objectives: To document the presence of bull trout in the Carcajou River watershed.

605 **Fisheries**

Low, George

Department of Fisheries and Oceans
42043 Mackenzie Highway
Hay River, NT X0E 0R9

File No: SLE-05/06-295

Location: Hay River “domestic area” (60–55N x 115–35 W)

Objectives: To provide training to Katlodeeche First Nation youth in DFO fish sampling protocol, setting and lifting lift gillnets, and the traditional methods of preparing and preserving of fish; and to collect traditional and scientific information on fish stocks in the Hay River domestic area.

606 **Fisheries**

Low, George

Department of Fisheries and Oceans
42043 Mackenzie Highway
Hay River, NT X0E 0R9

File No: SLE-05/06-318

Location: Yellowknife River: 62° 31', 114°19'

Objectives: To determine the effects of seven years of experimental and sport fishery on the cisco spawning run in the Yellowknife River. Cisco will be sampled for fork length and weight, and an ageing structure will be collected. Fins will be clipped and floy tags utilized to help determine the movements of the fish.

607 **Fisheries**

Low, George

Department of Fisheries and Oceans
42043 Mackenzie Highway
Hay River, NT X0E 0R9

File No: SLE-05/06-323

Location: Tathlina Lake: 60°33'00", 117°32'00"

Objectives: To collect data to assess the status of the walleye stocks in Tathlina Lake.

608 **Fisheries**

MacNeil, Scott

Golder Associates Ltd.
300, 10525-170 Street
Edmonton, AB T5P 4W2

File No: SLE-05/06-249

Location: Burke Lake: 63.517971°, 116.708364°

Objectives: To collect baseline data on the absence/presence of fish and habitat and habitat use in the area.

609 **Fisheries**

MacNeil, Scott
Golder Associates Ltd.
300, 10525-170 Street
Edmonton, AB T5P 4W2

File No: SLE-05/06-250

Location: Nico Lake: 63.545866°, 116.706648°; Peanut Lake: 63.545866°, 116.708620°;
Pond 12: 63.532820°, 116.728878°; Pond 13: 63.534708°, 116.728878°

Objectives: To collect baseline data on the absence/presence of fish and habitat and habitat use in the area.

610 **Fisheries**

MacNeil, Scott
Golder Associates Ltd.
300, 10525-170 Street
Edmonton, AB T5P 4W2

File No: SLE-05/06-250

Location: Unnamed Lake (Reference Lake): 63.492737°, 116.659870°

Objectives: To collect baseline data on the absence/presence of fish and habitat and habitat use in the area.

611 **Fisheries**

MacNeil, Scott
Golder Associates Ltd.
300, 10525-170 Street
Edmonton, AB T5P 4W2

File No: SLE-05/06-252

Location: Unnamed Stream (Reference Lake to Marian River): 63.4911°, 116.7254°
Unnamed Stream (Burke Lake to Marian River): 63.5032°, 116.7388°
Unnamed Stream (Peanut/Burke Creek): 63.5322°, 116.7257°
Unnamed Stream (Nico/Peanut Creek): 63.5408°, 116.7115°
Unnamed Stream (Lou /Lion Creek): 63.5544°, 116.8058°

Objectives: To collect baseline data on the absence/presence of fish and habitat and habitat use in the area.

612 **Fisheries**

MacNeil, Scott
Golder Associates Ltd.
300, 10525-170 Street
Edmonton, AB T5P 4W2

File No: SLE-05/06-253

Location: Stream confluences at the Marian River between 63.4835°, 116.7251° and 63.5187°, 116.7657°

Objectives: To collect baseline data on the absence/presence of fish and habitat and habitat use in the area.

613 **Fisheries**

McCullum, John
Environmental Monitoring Advisory Board
5006-50th Avenue Box 2577
Yellowknife, NT X1A 2P9

File No: SLE-05/06-300

Location: Lac de Gras near the location of the A154 Dike, 64°29'31", 110°14'12"

Objectives: To allow members of the communities most affected by Diavik's mining operations to assess the quality of Lac de Gras fish before, during and after mining operations. The primary focus is the quality of fish for eating. Community members will catch, prepare, eat and evaluate the quality of the fish.

614

Fisheries

McGurk, Michael

Rescan Environmental

6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-276

Location: Steeves Lake: 64°24'36", 115°05'50"

Objectives: To continue the collection of baseline data to determine the potential effects on the water bodies and fish populations after the release of treated water from the tailings impoundment. Fish species will be collected for analysis of tissue for metal concentrations, lengths weights, sex and maturity will be recorded and ageing structures collected.

615

Fisheries

McGurk, Michael

Rescan Environmental

6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-277

Location: Baton Lake: 64°23'40", 115°04'53"

Objectives: To continue the collection of baseline data to determine the potential effects on the water bodies and fish populations after the release of treated water from the tailings impoundment. Fish species will be collected for analysis of tissue for metal concentrations, lengths weights, sex and maturity will be recorded and ageing structures collected.

616

Fisheries

McGurk, Michael

Rescan Environmental

6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-278

Location: Spanner Lake: 64°27'48", 115°03'22"

Objectives: To continue the collection of baseline data to determine the potential effects on the water bodies and fish populations after the release of treated water from the tailings impoundment. Fish species will be collected for analysis of tissue for metal concentrations, lengths weights, sex and maturity will be recorded and ageing structures collected.

617

Fisheries

McGurk, Michael

Rescan Environmental

6th Floor, 1111 West Hastings Street
Vancouver, BC V6E 2J3

File No: SLE-05/06-279

Location: Unnamed water body (North Pond): 64°27'03", 115°02'54"

Objectives: To continue the collection of baseline data to determine the potential effects on the water bodies and fish populations after the release of treated water from the tailings impoundment. Fish species will be collected for analysis of tissue for metal concentrations, lengths weights, sex and maturity will be recorded and ageing structures collected.

618

Fisheries

McGurk, Michael

Rescan Environmental

6th Floor, 1111 West Hastings Street

Vancouver, BC V6E 2J3

File No: SLE-05/06-280

Location: Unnamed water body: 64°27'00", 115°02'49"

Objectives: To continue the collection of baseline data to determine the potential effects on the water bodies and fish populations after the release of treated water from the tailings impoundment. Fish species will be collected for analysis of tissue for metal concentrations, lengths weights, sex and maturity will be recorded and ageing structures collected.

619

Fisheries

McGurk, Michael

Rescan Environmental

6th Floor, 1111 West Hastings Street

Vancouver, BC V6E 2J3

File No: SLE-05/06-281

Location: Unnamed water body (L Shaped Lake): 64°27'28", 115°02'09"

Objectives: To continue the collection of baseline data to determine the potential effects on the water bodies and fish populations after the release of treated water from the tailings impoundment. Fish species will be collected for analysis of tissue for metal concentrations, lengths weights, sex and maturity will be recorded and ageing structures collected.

620

Fisheries

McGurk, Michael

Rescan Environmental

6th Floor, 1111 West Hastings Street

Vancouver, BC V6E 2J3

File No: SLE-05/06-282

Location: Unnamed water body (Paddle Lake): 64°26'22", 115°01'42"

Objectives: To continue the collection of baseline data to determine the potential effects on the water bodies and fish populations after the release of treated water from the tailings impoundment. Fish species will be collected for analysis of tissue for metal concentrations, lengths weights, sex and maturity will be recorded and ageing structures collected.

621

Fisheries

McGurk, Michael

Rescan Environmental

6th Floor, 1111 West Hastings Street

Vancouver, BC V6E 2J3

File No: SLE-05/06-283**Location:** Unnamed water body (Lake 315): 64°25'14", 115°00'46"

Objectives: To continue the collection of baseline data to determine the potential effects on the water bodies and fish populations after the release of treated water from the tailings impoundment. Fish species will be collected for analysis of tissue for metal concentrations, lengths weights, sex and maturity will be recorded and ageing structures collected.

622**Fisheries****McGurk, Michael**

Rescan Environmental

6th Floor, 1111 West Hastings Street

Vancouver, BC V6E 2J3

File No: SLE-05/06-284**Location:** Unnamed water body (Lower Lake): 64°24'42", 115°00'43"

Objectives: To continue the collection of baseline data to determine the potential effects on the water bodies and fish populations after the release of treated water from the tailings impoundment. Fish species will be collected for analysis of tissue for metal concentrations, lengths weights, sex and maturity will be recorded and ageing structures collected.

623**Fisheries****McGurk, Michael**

Rescan Environmental

6th Floor, 1111 West Hastings Street

Vancouver, BC V6E 2J3

File No: SLE-05/06-285**Location:** Upper Indin River. Study area bounded by straight lines connecting the following coordinates

64°23'49", 115°00'43"

64°23'15", 115°01'18"

64°23'04", 115°01'00"

Objectives: To continue the collection of baseline data to determine the potential effects on the water bodies and fish populations after the release of treated water from the tailings impoundment. Fish species will be collected for analysis of tissue for metal concentrations, lengths weights, sex and maturity will be recorded and ageing structures collected.

624**Fisheries****Morrison, Scott**5007-50th Avenue

P.O. Box 2498

Yellowknife, NT X1A 2P8

File No: SLE-05/06-312**Location:** In the vicinity of the Diavik mining operations at Lac de Gras 64°30'00", 110°18'00"

Objectives: To document shoal habitat use, ground truth hydro-acoustic equipment and determine fish use of dike as habitat. Fish will be weighed, measured and tagged.

625**Fisheries****Olsen, Brett**

Dillon Consulting Ltd.

P.O. Box 1409

Yellowknife, NT X1A 2P3

File No: SLE-05/06-258**Location:** Waters off Henrickson Island: 69 30 00, 133 35 00

Objectives: To collect data on the fatness and overall health of beluga whales harvested by subsistence users. Ageing structures, tissues for contaminants and disease testing will be collected. Length and girth measurements will be recorded.

631**Fisheries****Tallman, Ross**

DFO

501 University Crescent

Winnipeg, MN R3T 2N6

File No: SLE-05/06-264**Location:** Russel Bay (65°28'00", 123°05'00") in the Keith Arm of Great Bear Lake and Dease Arm (66°42'00", 120°20'00") at Great Bear Lake

Objectives: To determine the extent of movements of lake trout and if their populations are genetically distinct between the different basins of Great Bear Lake. Data on size and age structure, fecundity, growth and mortality will be collected.

632**Fisheries****Tallman, Ross**

DFO

501 University Crescent

Winnipeg, MN R3T 2N6

File No: SLE-05/06-265**Location:** Pierre Creek (67°19'55", 133°20'55") on the Mackenzie River

Objectives: To identify spawning and migratory time periods, spawning locations and over-wintering areas of fish species in the Mackenzie River system. Radio tags will be inserted surgically in fish and fish movements will be monitored with the use of aircraft and fixed station radio-receiver towers.

633**Fisheries****Tallman, Ross**

DFO

501 University Crescent

Winnipeg, MN R3T 2N6

File No: SLE-05/06-308**Location:** Loon Lake: 66°36'00", 128°45'00"

Objectives: To determine the population abundance and vital rates of fish. The abundance, growth rates, sizes, maturity and mortality of valued species, as well as the identity and relative abundance of other species in Loon Lake will be documented. Muscle tissues and organs will be collected for analysis.

634**Fisheries****Thomas, Craig**

Bathurst Inlet Developments

P.O. Box 820

Yellowknife, NT X1A 2N6

File No: SLE-05/06-315**Location:** Prairie Creek: 61°36'26", 124°20'14"

Funeral Creek: 61°35'39", 124°16'36"

Sundog Creek: 61°35'21", 124°11'45"
Tetcea River: 61°27'28", 123°44'43"
Fish Trap Creek: 61°27'24", 123°39'11"
Grainger River: 61°14'30", 123°02'05"

Objectives: To determine fish presence/absence and ascertain if road crossing locations support fish habitat in streams that will be crossed along the Prairie Creek Winter Access Road.

635 **Fisheries**

Tyson, Dave

DFO
Suite 101 Diamond Plaza
5204, 50th Avenue
Yellowknife, NT X1A 1E2

File No: SLE-05/06-248

Location: Unnamed lake (Lake 3): 62°42'54", 114°09'56"
Unnamed lake (Lake 11): 62°40'49", 114°10'11"
Unnamed lake (Lake 17): 62°41'07", 114°09'16"
Unnamed lake (Lake 34): 62°33'31", 114°02'30"

Objectives: To document the effects of water withdrawal on fish in small northern lakes and to identify safe water withdrawal thresholds.

636 **Fisheries**

Tyson, Dave

DFO
Suite 101, Diamond Plaza
5204, 50th Avenue
Yellowknife, NT X1A 1E2

File No: SLE-05/06-291

Location: Mackenzie River tributaries between Blackwater River and Loon River

Objectives: To document linkages between fish and fish habitat, identify key habitat components, and set up monitoring stations for cumulative effects studies.

637 **Fisheries**

Wenghofer, Calvin

DFO
P.O. Box 1871
Inuvik, NT X0E 0T0

File No: SLE-05/06-266

Location: Pokiak Channel (68°12'50", 134°59'45") on the Mackenzie River

Objectives: To collect data to determine fish species composition, abundance and health.

638 **Fisheries**

Wenghofer, Calvin

DFO
P.O. Box 1871
Inuvik, NT X0E 0T0

File No: SLE-05/06-267

Location: East Whitefish Channel (69°22'45", 133°37'00") in the Mackenzie Delta

Objectives: To collect data to determine fish species composition, abundance and health.

639
Wenghofer, Calvin

Fisheries

DFO
P.O. Box 1871
Inuvik, NT XOE 0T0

File No: SLE-05/06-268

Location: Tuktoyaktuk Harbour: 69°26'00", 132°58'00"

Objectives: To collect data to determine fish species composition, abundance and health.

640
Wenghofer, Calvin

Fisheries

DFO
P.O. Box 1871
Inuvik, NT XOE 0T0

File No: SLE-05/06-269

Location: Shingle Point (62°17'00", 107°38'00") in the Mackenzie Delta

Objectives: To collect data to determine fish species composition, abundance and health.

GLOSSARY

Active layer	the area where the soil freezes and thaws above the permafrost (see below)
Adfreeze	a special design and construction method used for engineering works in permafrost areas where permafrost degradation cannot be prevented; a foundation pile on which a cold air refrigeration system is installed to remove heat from the ground, to prevent degradation of the permafrost
Aeration	pumping air into a medium
Aeromagnetic survey	surveys from aircraft that make use of the magnetic field caused by magnetized rocks in the earth's crust to make estimates about underlying geology of a given area such as distribution of potential resources
Algae	simple living things that are composed of one or more cells; most algae are similar to plants that do not have roots or flowers
Algorithm	a procedure or formula for solving a problem
Alkali	a soluble salt obtained from the ashes of plants and consisting largely of potassium or sodium carbonate
Allomorph	a linguistics term that refers to two or more differing forms of a morpheme (see below) whose shape is determined phonologically (by sound), e.g., backs, blacken and hunted.
Anadromous	swims upriver from the sea to spawn
Anatomy	the science that deals with body structures of animals or plants
Angling	a method of fishing using a rod, line and hook
Anion	a negatively charged atom or molecule
Anoxic	a situation where oxygen is present in very low amounts or not at all
Anthropogenic	processes, effects, objects, or materials that are human-influenced
Anticline	a folded upward rock that has a centre that contains stratigraphically older rocks
Aquatic biota	all living organisms in the aquatic environment
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
Arsenic	a chemical element that is gray in color and that is highly poisonous with no taste
Arctic char	<i>Salvelinus alpinus</i> , a freshwater species of fish belonging to the salmon family; there are two subgroups of this species, a sea-run group and a freshwater or landlocked group
Arctic grayling	<i>Thymallus arcticus</i> , a freshwater species of fish belonging to the salmon family
Arctic Oscillation	describes oscillations or fluctuations in atmospheric pressure between the polar and middle latitudes that strengthen or weaken the winds circulating around the Arctic
Artifact	an old tool, weapon or other human-made object from the past

Asexual	an organism that reproduces without the aid of a partner
Attributed	to relate to a particular cause or source
Autecology	the branch of ecology that deals with the biological relationship between an individual organism or an individual species and its environment
Bacteria	tiny living single cells that can only be seen through a microscope
Bacteriochlorophyll	the photosynthetic pigment (the substance needed by plants and other organisms to convert carbon dioxide and water into food and oxygen) found in phototrophic bacteria
Baseline	a measurement, calculation or location used as a basis for comparison
Bathymetry	underwater topography or the mapping of the underwater contours of the bottoms of water bodies
Beaufort Gyre	the major ice and ocean current circulation of the Arctic Ocean
Benthic	of organisms that live at the bottom of a body of water
Benthos	the bottom of a body of water, such as a sea or lake; also the collection of organisms living on or in sea or lake bottoms
Berm	a raised bank or path
Biochemistry	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 science that deals with the distribution of all living organisms
Bioindicator	species or chemicals used to monitor the health of an environment or ecosystem
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
Bivalve	a mollusc, having two shells hinged together (e.g. the oyster)
Boreal	of the north, e.g. boreal forest (forests dominated by trees such as spruce, fir and pine found in the northern North Temperate Zone)
Bottom-fast ice	a subzone of the land-fast ice (see below) zone, where sea ice is frozen to the sea bottom
Brachiopods	marine invertebrates characterized by their filamentous feeding organs and two bilaterally symmetrical valves that make up its shell
<i>Braya Pilosa</i>	a long lost, rare, low, woolly, perennial plant recently rediscovered in the Northwest Territories
BP	'Before Present' ('present' defined as AD 1950); used when reporting raw, uncalibrated radiocarbon ages
Burbot	<i>Lota lota</i> , a freshwater fish related to cod; also known as loche or lingcod

Cation	a positively charged atom or molecule
Carnivore	a flesh-eating animal
Chert tools	prehistoric tools made of flint-like materials found in greensand, limestone, chalk or dolostone formations
Chlorophyll a	a pigment in plants that give them their green colour and which absorb energy from the sun; plants use chlorophyll to change carbon dioxide and water into food and oxygen
Cirque glacier	a glacier (see below) that forms in bowl-like depressions on mountain sides
Cisco	<i>Coregonus sp.</i> , a coldwater lake fish species belonging to the salmon family; also known as lake herring
Concept map	a technique used widely in education and business for visualizing the relationships between different concepts; the technique has been used for brainstorming, creating new knowledge, organizational training, assessing learning objectives, etc.
Conductivity (EM38) surveys	a test of ground conductivity (electrical conductivity of the subsurface of the earth) using the EM38 frequency domain electromagnetic meter
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
Conodont	an eel-like animal now extinct
Contaminants	introduced species, substances or materials, which were once either not present or present in lesser amounts, which may have a harmful effect on the environment and human health
Coral	a hard substance like stone found in tropical seas; coral is made from the skeletons of tiny marine organisms
Core	a part removed from the interior of a mass, especially to determine the interior composition
Correlated	a mutual relation between two comparable things
Country food	a term used to designate foods traditionally harvested such as caribou, whales, seals, waterfowl, fish, plants, berries and roots
Craton	the segment of the earth's continents that have remained tectonically stable and relatively earthquake-free for a vast period of time; the craton is composed of the continental shield and the surrounding continental platform
Cretaceous Period	the period, 144-66 million years ago, marking the end of the Mesozoic era, when extensive continent submergences took place in North America and Europe
Cumulative effects	the combined environmental impacts that accumulate over time and space due to contaminants, projects or individual actions
Crooked back	see <i>lake whitefish</i>
Debitage	the waste material produced from the production of chipped stone tools, including different types of lithic (see below) flakes, shatter, production errors and rejects
Deducing	draw a conclusion
Deformation	a measurable change in structure

Degradation	to reduce something or to place something at a lower level
Dendrochronology	a system of dating wooden objects using characteristic patterns of annual growth rings of trees to assign dates to timbers; also the study of tree growth rings
Density	a quantity of mass per unit volume
Devonian	the period between 410 and 370 million years ago when terrestrial plants began to spread across the land and when much development occurred in aquatic animals such as fish and other shell fish
Diabase dikes and sills	a geological feature consisting of intrusive diabase (dark coloured, fine grained igneous, basaltic) rock cutting across pre-existing layers
Dialysis array (peeper)	instrumentation to sample porewater (see below), which consist of an array of wells in a plexiglass plate, a filtration membrane, ultra-pure water and a peeper; after 10 to 14 days, the sample waters are removed from the wells and analyzed for dissolved metals
Discontinuous permafrost	permafrost (see below) that forms only in spots that are sheltered, in the case of the mean annual temperature falling slightly below 0°C; usually, permafrost remains discontinuous in places where the mean annual soil surface temperature is between -5 and 0°C
Diversion	a changing of the direction in which something is going
Dorsal fin	the vertical fin on the back of fish and certain marine mammals
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	living organisms and non-living structures that work together to form a system
Ecosite	the last eco-unit in the terrestrial ecosystem hierarchy, consisting of ecozone, ecoprovince and ecoregion; the ecosite is a way of classifying land in ways that are useful to managers; done at a scale of 10–1 000 ha, this classification includes detailed climatic, physiographic, flora and fauna, soil, water and the land use characteristics of the site
Effluent	something that flows out from a main source, such as sewage or waste matter
Ekman Grab	a box core type of sediment sampling device
Echinoderms	marine animals that include, among others, sea stars/starfish, sea urchins, sand dollars and sea cucumbers
Ecological Land Classification	mapping of distinct ecological areas, identified by their geology, topography, soils, vegetation, climate conditions, living species, water resources, as well as human-influenced actors; as these factors are known to control or influence the composition of living organisms and ecological processes, they provide a useful approximation of ecosystem potentials
Electrofishing	using electricity to stun and kill fish, usually during scientific work
Electromagnetic	magnetism that is caused by electricity
Emissions	something that is radiated outward or discharged from a source
Eocene	a time when small mammals began to develop on earth between 54 and 38 million years ago

Epoch	a period of time during which something important developed or happened
Erratics	rocks carried to their current locations by glacial ice; they can vary in size from pebbles to large boulders and are different in size and type from rocks native to the area they are found
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
Ethnography	research that uses fieldwork (interviews and observations) to describe a culture, community or society; the ethnographic method is used in several academic traditions, including anthropology, geography, sociology, psychology, economics and cultural studies
Eutrophication	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
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
Exceedance	the amount by which something, especially a pollutant, exceeds a standard or permissible measurement
Fauna	animal life of a particular region, environment, or geological period
Fens	a type of wetland fed by surface water and/or groundwater (see below); fens are alkaline or neutral whereas bogs are acidic (<i>see pH</i>)
Flora	the plants of a particular region, environment or geological region
Fluvial	pertaining to something's existence or growth around a stream or river
Focus group	a qualitative (see below) research method based on asking a group of people about their attitude toward an issue, concept, service, product, etc.; questions are asked in an interactive group setting where people are free to discuss their ideas with one another
Fossil	trace of an organism of a past age, embedded and preserved in the earth's crust
Frazzle ice	ice crystals that form in the water column (see below) where the water is too turbulent to permit ice formation
Fungi	a kingdom of heterotrophic organisms that produce spores
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	a 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

Geophysical survey	investigations carried out on the various physical properties of the earth and the composition and movement of its component layers of rock; in mineral exploration, the survey is carried out to detect zones through magnetism, gravity or conductivity; a variety of sensing instruments are used to collect data from above or below the earth's surface or from aerial or marine locations
Germination	sprouting or budding
Glacier	mass of ice compacted from snow which flows slowly down valleys or a large land area, either melting as it flows or reaching the sea and breaking off into icebergs
Glacial cirque	an amphitheatre-like valley formed at the head of a glacier by erosion
Global Positioning System (GPS)	a portable receiver able to pinpoint the receiver's location anywhere on the earth's surface utilizing a system of satellites to navigate and for surveying
Granitic rock	light coloured coarse-grained rock that was formed at great depths such as quartz
Granivory	feeding on grain
Gravel pad	a stable gravel surface, usually 1-2 m in depth, created for oil drilling pads, roads and pipeline routes
Groundwater	the water found beneath the earth's surface that supplies wells and springs
Ground Penetrating Radar (GPR)	a geophysical method that uses radar pulses to obtain images of the subsurface; GPR is used in rock, soil, ice, fresh water, pavements and structures to detect objects, changes in material, etc.
Grounded Theory	a research method in which theory is developed from data, rather than vice versa; concepts, categories and propositions are the elements that make up the method, where reasoning is from specific to general
Habitat	the specific area in which a particular organism lives
Heavy metals	base metals that commonly occur in urban and industrial pollution
Hester-Dendy plates	artificial substrate sampler for aquatic bioassessment consisting of 14 round plates of natural, water-resistant masonite spaced on an 8 inch eye bolt
Heterogeneous	a situation where something is in a mixed composition
High Arctic	regions within the Arctic Circle, especially the northern islands
Holocene	the most recent 11 000 years of the earth's history starting at the end of the last major ice age, which has been relatively warm
Host specificity	how selective a parasite is when looking for a host to live on as a source of food
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	petroleum-based products such as fuel, oil and grease
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

Ice scour	long, narrow ditches in a seabed, caused when land-fast ice (see below) and pack ice (large mass of floating sea ice) collide
Ice sheet	glacier (see above) ice that has a terrain coverage of greater than 50 000 km ²
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 characteristics
Inconnu	<i>Stenodus leucichthys</i> , a freshwater species of fish somewhat similar to whitefish; also known as coney
Informant	an individual who participates in a research project as an information or sample giver; depending on the type of research, the person can also be referred to as a subject, participant, respondent or interviewee
In situ	in the natural or original location or position
Interview	a research method used to obtain information about people's points of view, experiences or situations through dialogue; interviews can be unstructured (no set questions, informal conversation about topics of interest), semi-structured (some general, broad questions but flexible ordering and wording of questions) or structured (set list of specific questions)
Invertebrate	animals without a backbone
Jackfish	<i>Esox lucius</i> , a freshwater predatory fish; commonly known as northern pike
Karstic sink hole	a formation caused when layers of bedrock, consisting usually of rock like limestone or dolomite, dissolve and subsurface drainage occurs, leaving a hole in the surface topography
Kimberlite	a type of rock, produced by volcanic activity that can contain diamonds
Kitigazuit	the traditional gathering place where the Kitigaaryumiut people would hunt beluga and hold celebrations
Lacustrine	of or relating to lakes
Lake chub	<i>Coneius plumbeus</i> , a freshwater species of fish belonging to the carp or minnow family
Lake whitefish	<i>Coregonus clupeaformis</i> a species of freshwater whitefish; also known as crooked back and humpback whitefish
Land-fast ice	sea ice that has 'fastened' or frozen along coasts, shoals or the sea floor; the land-fast ice zone consists of two subzones: bottom-fast ice (see above) and floating fast ice (seaward of the bottom-fast ice and extending from shore to sea).
Larvae	a premature stage for an insect where it feeds a lot before it becomes a pupa
Late Pleistocene	the period, 250 000-10 000 years ago, which was dominated by glaciation and marked by megafauna extinction and the spread of humans to all continents except Antarctica
Latitude	a measurement of the angular distance from the equator to a given point on the earth's surface
Light Detection and Ranging (LiDAR)	a technology that uses laser pulses (properties of scattered light) to detect the distance of an object or surface; LiDAR is used in several fields, including: archaeology; geography; geology; and geomorphology
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
Literature review	an account of what has been published on a given topic by scholars and researchers; the purpose of preparing a literature review is to give a sense of the knowledge and ideas (including their strengths and weaknesses) that have been created on a topic
Lithology	the branch of geology that studies the mineral composition and structure of rocks, especially hand and outcrop specimens
Lithic	of, like, or made of stone; archaeological artifacts made of stone
Longnose sucker	<i>Castastomus castastomus</i> , a freshwater species of sucker; also known as sucker
Magnetotelluric profile	a ground electromagnetic survey method of exploring ore bodies and sub-surface geological features
Manganese	a metallic element that is used to make alloys
Memoryscape	a concept that refers to memories of the landscape, especially images of places that were visited
Mesic	moderately moist
Mesoproterozoic	a geologic era that occurred between 1 600 and 1 000 million years ago; the splitting up of the Columbia supercontinent, the formation of the Rodinia supercontinent and the evolution of sexual reproduction occurred in this era
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 characteristics
Metallothionein	a group of proteins that bind heavy metals
Methane	the simplest hydrocarbon (see above) that is the main ingredient in natural gas (CH_4)
Methanogenic	microorganisms that produce methane (CH_4) by the fermentation of simple organic carbon compounds with the production of carbon dioxide
Methodology	a set of practices, procedures or methods related to a particular research area or discipline
Microbes	bacteria that can cause disease
Microclimate	the climate close to the earth's surface or the climate of a small area
Microfossils	very small fossils that can only be viewed with the aid of a microscope
Microorganisms	organisms that must be viewed under a microscope, such as bacteria or viruses
Microtopography	measurement of the microscopic fluctuations on the surface of nominally smooth bodies
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
Morpheme	a linguistics term that refers to the smallest unit of meaning (either a word or a part of a word), e.g., <i>work</i> (one morpheme) and <i>workable</i> (two morphemes)
Morphometric	measurements taken at designated places to compare individuals of a species

Nine-spine stickleback	<i>Pungitius pungitius</i> , a freshwater species of scaleless fish; also known as stickleback
Nodwell	a two track vehicle capable of traversing a wide variety of terrain
Non-plastic silt	particles of sand and clay that dry rapidly but powder easily when dry
Organic	material pertaining to plants or animals
Otolith	any of the small particles of calcium carbonate in the inner ear.
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
Paleo-Eskimo	the people who migrated across the north ~ 2 000 years ago; it is not known if they are the ancestors of the modern Inuit
Paleoecological	a relationship or study of ancient organisms and how they related to their ancient environment
Paleoenvironmental	of an environment that existed in the past
Paleohydrological	a study of ancient water features preserved in rocks
Paleolimnological	a study of ancient lake conditions, especially sediment
Paleosol	fossil soil that is found underneath sedimentary or volcanic deposits or soil formed in the remote past that has no relationship to present-day climate or vegetation
Paleozoic	era of from 600 to 200 million years ago, characterized by the appearance of fish, reptiles and insects
Parameter	one set of measurable factors (such as temperature and pressure) that defines a system and determines its behaviour and are varied in an experiment
Parameterized	expressing something in terms of a parameter
Participant observation	a research method that aims at intensive involvement with people, often over an extended period of time, in their natural environments to obtain detailed information about their societies and cultures
Periphyton	microscopic aquatic organisms living attached to surfaces projecting from the bottom of freshwater aquatic environments (rocks, wrecks, weeds, etc.)
Permafrost	soil at or below the freezing point of water (0 °C) for two or more years
pH	a measure of acidity or alkalinity; the pH scale ranges from 0-14, with 7 representing neutral solutions, and values above and under 7 representing acidic and alkaline solutions, respectively
Phenophase	the timing of recurring biological phases; examples of a phenophase may be the date of the first flowering, budbreak, the first bird migration or insect appearance
Phenomenological perspective	an approach that takes into account the everyday lives and experiences of people to understand an issue
Photovoice	a method based on asking research participants to document facets of interest through photography and discussion of the photos taken; also known as photo novella
Phylogeography	the study of the geographic distribution of phylogenetic lineages, usually within species and to reconstruct the origins and diffusion of lineages

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
Pleistocene	an age of notable ice ages and development of humans between 2 000 000 and 10 000 years ago
Piedmont	a foothill, or land formed or lying at the foot of a mountain or mountain range
Piling	a column of wood or steel that is driven into the ground to provide support to a structure such as an offshore platform
Point counts	a method for surveying birds, which involves counting all the birds located within a circle with a specified radius (e.g., 20m) for a certain length of time (e.g., 10 minutes)
Polishing pond	a pond designed to receive treated underground waters and mining plant discharge and to be the final settling area for sediment and mineral precipitate
Polychaete	a class of segmented worms, generally marine
Polygons	interconnected trough-like features formed through a mix of climatic and ground-based processes, often containing ground ice in the form of ice wedges
Population metric	a measure of an aspect of population, such as abundance, age structure, growth rate, mortality rate, life expectancy, etc.
Porewater	water that fills the spaces between grains of sediment
Postglacial	relating to or occurring during the time following a glacial period
Proterozoic	era preceding the Paleozoic, having the oldest known animal fossil forms
Putative	to assume something
Qualitative	complete detailed descriptions usually taken from a small sample that allows for distinctions to be drawn from the data; qualitative research is usually associated with social science research and delves into the <i>why</i> and <i>how</i> of a problem rather than on just <i>what</i> , <i>where</i> and <i>when</i>
Quantitative	use of large amounts of data where statistics can be applied to interpret the data; the process of measurement is central to quantitative research and is used in both the natural sciences and social sciences
Quaternary	the period of geologic time 2.6 million years ago; the Quaternary is divided into the Pleistocene and the Holocene epochs, and characterized by major climatic changes around the earth and the evolution and spread of humans
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
Random Meander technique	a type of vegetation survey that involves walking the entirety of a site and identifying every species encountered during the traverse (see below)
Raptor	a bird of prey such as an eagle, falcon or osprey
Reclamation	the reconversion of disturbed land to its former state or other productive uses
Remediation	removal, reduction, or neutralization of substances, wastes or hazardous material from a site; the goal of remediation is to prevent or minimize any adverse effects to the environment or human health

Reef	a structure formed by coral and its remains that lie above the bottom sediment
Remote videography	detailed, remote monitoring or recording of animals using a closed-circuit television camera and infrared/red light illuminators; a monitor interfaces with a motion detector and time-lapse video cassette recorder to automatically record animal activity
Revitalization	to give new life or vitality to something
Riprap	a permanent, erosion resistant ground cover of large, loose, angular rocks with a geotextile or granular underlining, used to protect stream banks, drainage channels, steep slopes, and other such features from erosion
Rock glacier	a glacier created from a combination of cold climate, abundance of rock debris and a sloping environment; like ordinary glaciers, ice is present in large amounts to move the rock glacier downhill
Roving gamma survey	a radiometric (natural radiation in the earth's surface) survey to measure the gamma radiation field and locate prospective areas of high-grade uranium and polymetallic deposition; gamma rays can be measured on the ground or from a low flying aircraft using a spectrometer
Sandstone	sedimentary rock that contains fine-grained fragments that are firmly cemented together
Satellite imagery	computer images generated by a satellite which allow researchers to look at a specific area and monitor surface features such as vegetation
Satellite passive microwave measurements	measurements of naturally emitted microwave radiation from the earth's surface, carried out using a microwave radiometer; the measurements are used in snow and sea ice monitoring
Scarification	to break up or rake a surface (of soil); in botany, the cutting or softening of the outer seed coating in order to speed germination (see above)
Sediment	solid fragmented 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; one of three rock types with igneous (see above) and sedimentary characteristics
Sedimentation	the process where small particles are moved and deposited to accumulate into layers
Seed viability	the possibility of germination (see above); seeds vary in their time of viability from a few days to years
Seismic	pertaining to vibrations in the earth, both natural and induced
Settling pond	a pond designed for removing silt and suspended clays from water that is used to wash aggregate (mixed mineral substances)
Shovel testing	a crude test where a sample of ground is taken by use of a shovel
Slimy sculpin	<i>Cottus cognatus</i> , a freshwater cottid fish that have sharp spines instead of scales
Solutes	a substance that has dissolved
Species	a group of organisms that share common characteristics that group them together and also distinguish them from others
Sponges	aquatic organisms that characteristically have a porous skeleton composed of fibrous material and often form colonies attached to an underwater surface

Stone flakes	debris left over from a rock while making tools
Stratified	a system that is set up in layers or strata
Stratigraphic	formation of rock where different layers can be picked out based on type and age of the rock
Subnivean	a zone that is in or underlain by snow
Subsidence	to flatten out so as to form a depression; to sink or fall to the bottom
Substrate	a surface on which an organism grows or attaches itself to
Succession	a progressive change in the biological community as a result of a response from species to the changing environment
Sump	a pit for catching and storing liquids such as wastewater
Surficial	pertaining to something that is on the surface
Synthetic aperture radar	a high-resolution broad-area imaging system that collects the echo returns of radar pulses and processes them into a single radar image; the system is used in environmental monitoring, earth resource mapping, and military operations and is useful for acquiring imagery in inclement weather or during night
Tailings	portions of washed or milled ore that are regarded as too poor to be treated further
Tectonic	relating to the structure of the earth's crust, the forces and conditions within the earth that cause movements of the crust, or the results of crustal movements (e.g., tectonic valleys)
Terratorch	a vehicle mounted device that throws a stream of flaming liquid to rapidly ignite a prescribed fire
Thermistor	a semiconductor sensor whose electrical resistance varies rapidly and predictably with temperature; thermistors are used to measure temperature and gas flow or wind velocity
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	a layer in a large body of water that sharply separates regions differing in temperature; an abrupt temperature gradient in a lake
Till	unsorted sediment deposited directly from glacier ice, containing particles that range in size from clay to boulders
Tillites	sedimentary rock (see above) formed by the burial and eventual hardening of till
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
Transcript	a typed copy of an interview (see above)
Transect	an imaginary line across a surface where observations are made
Tree mensuration	the measurement of volume, growth and development of harvested and/or standing trees
Tributary	a place where a stream feeds into a larger stream or lake
Trophic structure	feeding relationships that include predator-prey, parasite-host and plant-herbivore (plant-eater) relationships; trophic structure studies look at competition for food among organisms

Tube-dwelling anemone	<i>Cerianthus sp.</i> , an animal closely related to the sea anemone
Tunicate	a filter-feeding sea animal that has a sac-shaped body with two siphons
Turbid	stirred up material suspended in a medium leaving it unclear and opaque
Vascular plants	plants that have developed a good conductive system and that have structural differentiation
Velocity	rate of occurrence or action; quickness of motion
Volatile	an easily vaporized compound
Walleye	<i>Stizostedion vitreum</i> , a piscivorous (fish-eating) freshwater species of fish belonging to the perch family
Water column	the open-water environment of a water body, distinct from its shore or bed, where swimming freshwater or marine organisms may be found
Watershed	the region draining into a river, river system, or other body of water
Whitefish	<i>Coregonus nasus</i> , a species of freshwater whitefish; also known as broad whitefish
Zooplankton	microscopic animal organisms floating in water

RESEARCHERS INDEX

Aurora Research Institute Scientific Research Licences			
169	Armitage, Derek	370	Duk-Rodkin, Alejandra
457	Armitage, Derek	083	Eberle, Jaelyne
147	Armstrong, Matthew	378	Edge, Dana
104	Barber, David	396	Edinger, Evan
385	Barnette, Laura	152	Edward, Christine
170	Balanoff, Helen	087	England, John
171	Bandringa, Bob	371	England, John
148	Bayha, Janet	112	English, Michael
377	Becker, Gisela	397	English, Michael
287	Bekhuys, Tim	294	Eschenroder, Randy
432	Bender, Emilee	398	Etty, Craig
386	Biggar, Kevin	057	Evans, Marlene
105	Blasco, Steve	339	Evans, Marlene
387	Blasco, Steve	340	Evans, Marlene
388	Blowes, David	174	Fabijan, Michael
106	Bonny, Sandy	088	Falck, Hendrik
389	Bonny, Sandy	372	Falck, Hendrik
107	Bostock, Michael	438	Fairbairn, Brett
433	Brennan, Jodi	341	Fawcett, Skya
288	Brewin, Kerry	153	Findlay, Isobel
149	Bronson, Jackie	154	Fitzpatrick, Patricia
150	Brown, Micaela	099	Fletcher, Christopher
434	Brownlee, Keith	379	Fletcher, Christopher
289	Buckland, Laurie	113	Forbes, Donald
108	Burn, Chris	114	Forbes, Donald
390	Burn, Chris	399	Forbes, Donald
085	Buse, Sarah	295	Ford, Bruce
059	Callow, Lin	115	Fortier, Louis
172	Cardinal, Nathan	116	Fortier, Louis
001	Caughill, Dave	400	Fortier, Martin
458	Chambers, Cynthia	006	Fraiken, Chris
109	Chen, Wenjun	296	Fraiken, Chris
391	Chen, Wenjun	439	Fremgen, Barbara
173	Christensen, Julia	297	Gal, Ruth
392	Christoffersen, Poul	117	Gajewski, Konrad
290	Classen, Claire	155	Galbraith, Lindsay
291	Cott, Pete	007	Goad, Robin
393	Couture, Réjean	008	Goad, Robin
435	Cox, Paul	299	Goad, Robin
292	Crossman, Bill	380	Gosselin, Pierre
436	Daitch, Richard	060	Graburn, Larry
002	D'Arrigo, Rosanne	061	Graburn, Larry
437	Davison, Colleen	062	Graburn, Larry
003	D'Entremont, Marc	063	Graburn, Larry
394	De Pascale, Gregory	064	Graburn, Larry
110	De Rahm, Laurent	065	Graburn, Larry
395	Derkson, Chris	066	Graburn, Larry
004	Dick, Terry	067	Graburn, Larry
005	Dick, Terry	068	Graburn, Larry
111	Dick, Terry	069	Graburn, Larry
293	Dick, Terry	070	Graburn, Larry
151	Dowlatabadi, Hadi	344	Graburn, Larry
086	Duk-Rodkin, Alejandra	345	Graburn, Larry
		346	Graburn, Larry
		347	Graburn, Larry
		348	Graburn, Larry

349	Graburn, Larry	017	Kustan, Ed
350	Graburn, Larry	018	Kustan, Ed
351	Graburn, Larry	019	Kustan, Ed
352	Graburn, Larry	072	Kustan, Ed
353	Graf, Linda	355	Kustan, Ed
009	Granchino, Sophia	356	Kustan, Ed
089	Grasby, Stephen	357	Kustan, Ed
373	Grasby, Stephen	358	Kustan, Ed
401	Grasby, Stephen	359	Kustan, Ed
299	Gray, Michelle	360	Kustan, Ed
010	Greene, David	122	Lafleur, Peter
300	Greene, David	408	Lafleur, Peter
118	Guo, Laodong	020	Lanoville, Rick
402	Guo, Laodong	021	Lantz, Trevor
011	Gyselman, Eric	310	Lantz, Trevor
012	Halliwell, Douglas	311	Layberry, Ross
013	Halliwell, Douglas	123	Lesack, Lance
014	Harris, Les	409	Lesack, Lance
301	Harris, Les	124	Lintern, David Gwyn
302	Harris, Les	160	Little, Lois
015	Harris, James	445	Little, Lois
175	Hart, Elisa	460	Lyons, Natasha
459	Hart, Elisa	410	MacDonald, Glen
090	Hayes, Sharon	022	MacNeill, Scott
381	Heon, Elise	084	MacPhee, Ross
303	Herrington, Joey	125	Maloof, Adam
119	Hicks, Faye	461	Maraj, Ramona
403	Hicks, Faye	126	Marsh, Philip
440	Hodgkins, Andrew	411	Marsh, Philip
304	Horrocks, Kim	094	Martel, Edith
305	Howland, Kimberly	446	Martelock, Heather
306	Howland, Kimberly	161	Martin, Brad
307	Hoyt, Andrea	412	McCarthy, Daniel
441	Huxtable, Lynn	176	McCullum, John
156	Ip, Janet	462	McCullum, John
091	Jackson, Valerie	127	McDowell, Donald
374	Jackson, Valerie	023	McGurk, Michael
442	Jaker, Alessandro	024	McGurk, Michael
100	Jardine, Cynthia	342	McGurk, Michael
382	Jardine, Cynthia	343	McLeod, Deborah
071	Jenkins, Robert	128	Mielko, Corrine
368	Johnson, Art	101	Mill, Judy
157	Johnson, Don	073	Millman, Pete
443	Johnson, Don	447	Mitchell, Kellie
354	Johnson, Pascale	102	Moffitt, Pertice
375	Jones, Adrienne	312	Moore, Steve
158	Kafarowski, Joanna	025	Morrison, Scott
120	Karunaratne, Kumari	313	Morrison, Scott
404	Karunaratne, Kumari	026	Muggli, Deborah
308	Katz, Sharon	314	Muggli, Deborah
309	Kutz, Susan	413	Murton, Julian
092	Kershaw, Peter	415	Nichol, Susan
376	Kershaw, Peter	129	Nixon, Mark
159	Kielly, Harry	416	Nixon, Mark
016	Kingsley, David	414	Nguyen, Thai-Nguyen
121	Koerner, Roy	315	Olsen, Brett
405	Koerner, Roy	095	Ootes, Luke
093	Kokelj, Steven	027	Osawa, Akira
406	Kokelj, Steven	316	Osawa, Akira
407	Kokelj, Steven	317	Osawa, Akira
444	Krogman, Naomi	028	Palczynski, Richard
383	Kuhnlein, Harriet	177	Parlee, Brenda

448	Patrick, Mark	422	Rempel, Laura
449	Pearce, Tristan	451	Ritchie, Douglas
162	Pilz, Krista	042	Robinson, Cindy
417	Pisaric, Michael	163	Robinson, Suzanne
130	Plug, Laurence	452	Robinson, Suzanne
131	Pollard, Wayne	134	Rouse, Wayne
418	Pollard, Wayne	423	Rouse, Wayne
450	Posynick, James	164	Salokangas, Raila
029	Povey, Andrew	453	Salokangas, Raila
030	Povey, Andrew	165	Saxon, Leslie
031	Povey, Andrew	454	Saxon, Leslie
032	Povey, Andrew	043	Schreyer, Richard
033	Povey, Andrew	044	Schreyer, Richard
034	Povey, Andrew	424	Seligman, Ben
035	Povey, Andrew	182	Sharp, Karen
036	Povey, Andrew	328	Shapiro, Mike
037	Povey, Andrew	045	Sheldon, Tom
038	Povey, Andrew	046	Slaney, Tim
039	Povey, Andrew	471	Smith, Barney
040	Povey, Andrew	329	Smith, Lisa
041	Povey, Andrew	097	Snyder, David
074	Povey, Andrew	135	Soare, Richard
075	Povey, Andrew	425	Soare, Richard
076	Povey, Andrew	135	Sofko, George
077	Povey, Andrew	136	Soppet, Dayle
078	Povey, Andrew	098	Spratt, Jessica
178	Povey, Andrew	047	Stabler, James
179	Povey, Andrew	330	Stabler, James
180	Povey, Andrew	166	Stephen, Bob
181	Povey, Andrew	103	Stockton, Pam
318	Povey, Andrew	455	Stockton, Pam
319	Povey, Andrew	365	Stone, Ivy
320	Povey, Andrew	082	Stone, Larry
321	Povey, Andrew	058	Stone, Michael
322	Povey, Andrew	138	Tait, Matthew
323	Povey, Andrew	426	Tait, Matthew
324	Povey, Andrew	427	Tomkins, Jessica
325	Povey, Andrew	331	Thomas, Craig
326	Povey, Andrew	048	Tonn, William
327	Povey, Andrew	332	Toyne, Melanie
359	Povey, Andrew	049	Turchenek, Larry
361	Povey, Andrew	456	Turner, Jennifer
362	Povey, Andrew	050	Uren, Shane
363	Povey, Andrew	051	Van der Gugten, Neil
463	Povey, Andrew	428	Van Stempvoort, Dale
464	Povey, Andrew	472	Vincent, Bruce
465	Povey, Andrew	473	Vincent, Bruce
466	Povey, Andrew	139	Vincent, Warwick
467	Povey, Andrew	140	Walker, Donald
468	Povey, Andrew	429	Walker, Donald
469	Povey, Andrew	141	Walker, Tony
470	Povey, Andrew	430	Walker, Tony
096	Prost, Gary	167	Ward, Angela
132	Prowse, Terry	052	Weagle, Ken
419	Prowse, Terry	053	Weagle, Ken
420	Prowse, Terry	333	Weagle, Ken
079	Pyc, Cynthia	334	Weagle, Ken
080	Pyc, Cynthia	168	Weitzner, Vivianne
081	Pyc, Cynthia	142	Wells, Joseph
364	Quaife, Ron	366	Wiatzka, Gerd
133	Quinton, William	474	Wicks, Darren
421	Quinton, William	367	Widdifield, Dave

384	Williams, Boyce	490	Branigan, Marsha
369	Williams, Christopher	491	Buckland, Laurie
143	Wolfe, Brent	492	Buckland, Laurie
431	Wolfe, Brent	205	Carriere, Suzanne
144	Wright, Fred	206	Carriere, Suzanne
054	Wytrychowski, Scott	493	Carriere, Suzanne
055	Wytrychowski, Scott	494	Carriere, Suzanne
145	Wytrychowski, Scott	207	Catto, Steve
335	Wytrychowski, Scott	495	Catto, Steve
336	Wytrychowski, Scott	496	Catto, Steve
337	Wytrychowski, Scott	208	Cluff, Dean
056	Zalatan, Rebecca	209	Cluff, Dean
338	Zalatan, Rebecca	210	Cluff, Dean
146	Zhou, Fuqun	211	Cluff, Dean
		497	Cluff, Dean
		212	Cook, Joseph
		498	Coulton, Don
	Prince of Wales Northern Heritage Centre Archaeology Permits	213	Derocher, Andrew
		499	Derocher, Andrew
475	Andrews, Tom	214	Dickson, Lynne
183	Betts, Matthew	500	Dickson, Lynne
184	Bussey, Jean	215	Elkin, Brett
185	Bussey, Jean	501	Elkin, Brett
186	Bussey, Jean	502	Elkin, Brett
187	Bussey, Jean	503	Ellsworth, Troy
188	Bussey, Jean	216	Ferguson, Carl
476	Bussey, Jean	218	Goad, Robin
477	Bussey, Jean	298	Goad, Robin
478	Bussey, Jean	219	Godwin-Sheppard, Chris
189	Clarke, Grant	220	Gunn, Anne
190	Hanna, Don	221	Gunn, Anne
191	Hanna, Don	504	Gunn, Anne
192	Hanna, Don	505	Gunn, Anne
193	Hanna, Don	222	Hanks, Chris
479	Hanna, Don	223	Haszard, Shannon
480	Hanna, Don	224	Haszard, Shannon
194	Johnson, Donald	225	Haszard, Shannon
481	MacKay, Glen	506	Haszard, Shannon
482	MacKay, Glen	507	Haszard, Shannon
195	Paquin, Todd	226	Hindmarch, Trevor
196	Prager, Gabriella	227	Hines, Jim
483	Prager, Gabriella	228	Hines, Jim
197	Thomson, Callum	229	Hines, Jim
198	Thomson, Callum	230	Hines, Jim
484	Thomson, Callum	508	Hines, Jim
199	Unfreed, Wendy	509	Hines, Jim
		510	Hines, Jim
		511	Hines, Jim
		512	Johns, Brian
	Department of Resources, Wildlife And Economic Development Wildlife Research Permits	231	Johnson, Deborah
		513	Johnson, Deborah
		514	Johnson, Deborah
200	Auriat, Denise	515	Johnson, Vicky
485	Auriat, Denise	516	Johnson, Vicky
486	Bayne, Erin	232	Johnston, Vickie
487	Bayne, Erin	233	Kustan, Ed
201	Bekhuys, Tim	234	Kustan, Ed
202	Bollinger, Karen	517	Lafrance, Michel
488	Bollinger, Karen	235	Larter, Nic
203	Branigan, Marsha	518	Larter, Nic
204	Branigan, Marsha	519	Larter, Nic
489	Branigan, Marsha	520	Larter, Nic

521	Larter, Nic	551	Brewin, Kerry
522	Larter, Nic	262	Cobb, Donald
523	Latour, Paul	263	Cobb, Donald
524	Latour, Paul	264	Cobb, Donald
236	Machtans, Craig	265	Cobb, Donald
525	Machtans, Craig	266	Cott, Pete
526	McLeod, Carla	552	Cott, Pete
237	Moore, Steve	553	Couture, Richard
527	Moore, Steve	554	Couture, Richard
528	Moore, Steve	555	Couture, Richard
238	Mulders, Robert	556	Dick, Terry
239	Mulders, Robert	557	Eschenroder, Randy
529	Mulders, Robert	558	Evans, Marlene
240	Nagy, John	559	Evans, Marlene
241	Nagy, John	560	Evans, Marlene
530	Nagy, John	561	Evans, Marlene
531	Nagy, John	562	Evans, Marlene
532	Nagy, John	563	Evans, Marlene
242	Nishi, John	564	Ford, Bruce
243	Nishi, John	565	Fortier, Martin
244	Nishi, John	566	Gray, Michelle
245	Nishi, John	567	Harris, Les
533	Nishi, John	568	Harris, Les
534	Nishi, John	267	Harwood, Lois
535	Nishi, John	268	Harwood, Lois
536	Nishi, John	269	Harwood, Lois
246	Panayi, Damian	270	Harwood, Lois
247	Panayi, Damian	271	Harwood, Lois
248	Poole, Kim	272	Harwood, Lois
249	Povey, Andrew	273	Harwood, Lois
250	Povey, Andrew	274	Harwood, Lois
251	Povey, Andrew	275	Harwood, Lois
252	Povey, Andrew	569	Harwood, Lois
537	Pretzlaw, Troy	570	Harwood, Lois
253	Schryer, Richard	571	Harwood, Lois
538	Shier, Catherine	572	Harwood, Lois
254	Slattery, Stuart	573	Herrington, Joey
539	Slattery, Stuart	574	Horrocks, Kimberley
255	Stirling, Ian	575	Horrocks, Kimberley
256	Stirling, Ian	576	Horrocks, Kimberley
540	Stirling, Ian	577	Horrocks, Kimberley
257	Veitch, Alasdair and Popko, Richard	578	Howland, Kimberley
258	Voelzer, James	579	Howland, Kimberley
541	Voelzer, James	580	Howland, Kimberley
542	Wilson, Matthew	276	Johnson, Jim
		581	Landry, Francois
		582	Landry, Francois
		583	Landry, Francois
		584	Landry, Francois
		585	Landry, Francois
		586	Landry, Francois
		587	Landry, Francois
543	Babaluk, John	588	Landry, Francois
544	Babaluk, John	589	Landry, Francois
545	Bekhuys, Tim	590	Landry, Francois
546	Bekhuys, Tim	591	Landry, Francois
547	Bekhuys, Tim	592	Landry, Francois
548	Bekhuys, Tim	593	Landry, Francois
549	Bekhuys, Tim	594	Landry, Francois
259	Bergmann, Martin	595	Landry, Francois
260	Bergmann, Martin	596	Landry, Francois
261	Bergmann, Martin	597	Landry, Francois
550	Bergmann, Marty		

Department of Fisheries & Oceans
Fisheries Scientific Licences

543	Babaluk, John	587	Landry, Francois
544	Babaluk, John	588	Landry, Francois
545	Bekhuys, Tim	589	Landry, Francois
546	Bekhuys, Tim	590	Landry, Francois
547	Bekhuys, Tim	591	Landry, Francois
548	Bekhuys, Tim	592	Landry, Francois
549	Bekhuys, Tim	593	Landry, Francois
259	Bergmann, Martin	594	Landry, Francois
260	Bergmann, Martin	595	Landry, Francois
261	Bergmann, Martin	596	Landry, Francois
550	Bergmann, Marty	597	Landry, Francois

598	Landry, Francois	621	McGurk, Michael
599	Landry, Francois	622	McGurk, Michael
600	Landry, Francois	623	McGurk, Michael
601	Landry, Francois	624	Morrison, Scott
602	Landry, Francois	625	Olsen, Brett
603	Landry, Francois	281	Orr, Jack
277	Low, George	626	Povey, Andrew
278	Low, George	627	Povey, Andrew
279	Low, George	628	Povey, Andrew
604	Low, George	629	Shapiro, Michael
605	Low, George	282	Stern, Gary
606	Low, George	630	Stern, Gary
607	Low, George	283	Tallman, Ross
608	MacNeil, Scott	284	Tallman, Ross
609	MacNeil, Scott	631	Tallman, Ross
610	MacNeil, Scott	632	Tallman, Ross
611	MacNeil, Scott	633	Tallman, Ross
612	MacNeil, Scott	634	Thomas, Craig
613	McCullum, John	285	Tyson, Dave
614	McGurk, Michael	635	Tyson, Dave
615	McGurk, Michael	636	Tyson, Dave
616	McGurk, Michael	286	Watkinson, Douglas
617	McGurk, Michael	637	Wenghofer, Calvin
618	McGurk, Michael	638	Wenghofer, Calvin
619	McGurk, Michael	639	Wenghofer, Calvin
620	McGurk, Michael	640	Wenghofer, Calvin

INDEX

A

Aboriginal Pipeline Group 109
 Access and Benefits 42, 43, 44, 172, 173, 174
 Acoustic tagging See Tagging
 Active layer 14, 50, 51, 58, 76, 80, 170, 175, 178, 180, 196, 198, 206, 207, 214
 Adaptation 104, 224, 227, 228
 Aerial photography 45, 46, 47, 69, 80
 Aerial surveys 121, 126, 136, 247, 253
 Air quality 121, 126, 136, 247, 253
 Aklavik 23, 31, 35, 142, 150, 162, 163
 Alder 14, 19, 152
 Alexie Lake 11, 32
 Algae 65, 70, 81, 152, 204, 209
 Algorithm 68, 69, 198
 Alpine Environmental Ltd. 175
 AMEC Americas Ltd. 48, 49, 50, 142, 156, 157, 158, 159, 177, 178, 231, 232, 233
 AMEC Earth & Environmental Ltd. 23, 24, 25, 26, 27, 28, 29, 32, 33, 35, 48, 49, 50, 101, 102, 119, 123, 142, 156, 157, 158, 159, 177, 178, 217, 231, 232, 233, 258, 259, 278
 American Geophysical Union's Western Pacific Geophysical Meeting 201
 American Museum of Natural History 52
 Ammonia 22
 Amundsen Gulf 33, 64, 70, 131, 132, 136, 199, 256, 263
 Anadromous 16, 138, 149
 Anderson River Bird Sanctuary 250
 Anthrax 129
 Anticline 59
 Antimony 167
 Aquatic surveys/studies/monitoring 12, 13, 15, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 33, 35, 36, 81, 83, 143, 144, 146, 147, 150, 153, 155, 156, 157, 162, 163, 166, 167, 203, 204, 210, 215, 230, 262, 290
 Archean 58, 186
Artagrostis latifolia 80, 144
 Arctic cod 70
 Arctic grayling 12, 24, 25, 28, 32, 68, 143, 161, 162
 Arctic lamprey 166
 Arctic Ocean 70, 134, 183, 184, 200
 Arctic Oscillation 38, 164
 Arctic Small Tool tradition 105, 109, 238
Arctophila fulva 144
 Arsenic 10, 31, 36, 39, 84, 167
Artemisia tilesii 144
 Artifacts 104, 105, 106, 110, 114, 118, 221, 229, 236, 242
 Artificial islands 64
Astragalus alpinus 144
 Aulavik National Park 52
 Aurora College 62, 91, 92, 94, 95, 146, 188, 209, 216, 220, 225
 Aurora Research Institute 144, 151, 226
 Aurora Wildlife Research 130
 Autecology 19, 152

B

Back Bay 10
 Bacteria 65, 122, 204
 Banks Island 52, 69, 81, 125, 128, 181, 184, 197, 198, 199, 214, 250, 254
 Barge 15, 28, 29, 30, 50, 82, 157, 180, 212

Baseline data	13, 14, 15, 20, 21, 22, 23, 31, 32, 34, 35, 36, 50, 51, 72, 84, 88, 119, 122, 123, 126, 127, 130, 136, 138, 140, 142, 147, 153, 154, 155, 158, 160, 161, 162, 163, 168, 195, 199, 203, 209, 217, 220, 230, 231, 240, 251, 253, 254, 265, 266, 274, 275, 276, 277	
Bathurst Inlet Developments	160, 279	
Bathymetry	21, 25, 27, 28, 29, 30, 35, 45, 46, 47, 48, 50, 69, 78, 82, 162, 197, 199, 209, 212	
Beaufort Gyre	134	
Beaufort Sea	30, 33, 70, 76, 82, 83, 99, 104, 131, 132, 134, 136, 138, 139, 160, 202, 203, 207, 256, 257, 259, 263, 265	
Beaver	13, 15, 16	
<i>Beckmannia syzigachne</i>	144	
Bedford Institute of Oceanography	64, 69, 199	
Bedrock	58, 76, 105, 107, 109, 186, 206, 238, 239, 242, 243	
<i>Begonias</i>	65	
Benthos	10, 14, 15, 16, 21, 22, 30, 31, 35, 36, 81, 84, 134, 146, 147, 149, 150, 164, 167, 197, 230	
Bering Land Bridge	52	
Berm	149	
BHP Billiton Diamonds Inc.	14, 105, 124, 155, 230, 237	
Big Smith Creek	12, 68, 113	
Biodiversity	197	
Birch	122, 164	
Bison	110, 111, 112, 128, 129, 255	
Bison Historical Services	110, 111, 112, 239, 240	
Bivalves	184	
Borehole	18, 41, 48, 169, 170, 171, 180, 213	
Bosworth Creek	12, 68	
Bottom-fast ice	69, 199	
BP Canada Energy Company Ltd	51	
Brassicaceae	17	
<i>Braya pilosa</i>	17	
Brock University	205	
Broken Skull River	258	
Brucellosis	129	
Bull trout	258, 273	
Burbot	12, 22, 25, 39, 68, 166	

C

C.S. Lord Northern Geoscience Centre	55, 58, 59, 185
<i>Calamagrostis canadensis</i>	144
<i>Calamagrostis stricta</i>	144
Cameron Hills	19, 47, 125, 246, 251
Camp Farewell	49, 180, 212
Campbell Lake	156, 186
Camsell River	21
Canada Centre for Remote Sensing	194
Canadian Arctic Shelf Exchange Study	70, 199, 263
Canadian Biodiversity Information Facility	153
Canadian Circumpolar Institute	91
Canadian Council of Ministers of the Environment (CCME) “Guidelines for the Protection of Aquatic Life”	36, 163, 167
<i>Canadian Environmental Assessment Act</i>	87
Canadian Environmental Assessment Agency	88
<i>Canadian Field Naturalist</i>	17
Canadian Hydrographic Service	192
Canadian Institutes of Health Research	61
<i>Canadian Journal of Fisheries and Aquatic Sciences</i>	74
Canadian Wildlife Service	75, 118, 122, 125, 126, 127, 131, 132, 153, 180, 234, 248, 250, 251, 253, 256
Canol Heritage Trail	57, 153, 187
Cantung Mine	55, 185
Canyon Creek	12, 68, 210, 211
Cape Bathurst	17
Carbon	23, 35, 66, 67, 70, 71, 73, 74, 81, 82, 134, 138, 155, 164, 182, 187, 195, 199, 200, 204, 209, 215
Carbon dioxide	70, 73, 203
Carbonate mounds	200
Carcajou River	273

Caribou	15, 16, 31, 38, 40, 53, 99, 101, 103, 105, 117, 119, 120, 121, 124, 126, 127, 128, 130, 142, 147, 150, 152, 154, 162, 164, 165, 225, 230, 236, 243, 246, 249, 251, 252, 254, 255	
Caribou Hills		206
Caribou River		55, 185
Carleton University		57, 58, 66, 72, 186, 194, 201, 206, 208
Centre for Indigenous Environmental Research		88
Centre for Indigenous Peoples Nutrition and Environment		190
Centre for the Study of Co-operatives		89, 218
Char		138, 151, 264
Chert		105, 109, 238, 242, 243
Chevron Canada Resources		50, 51, 75, 80, 117, 198
Chief Jimmy Bruneau School		235
Chitty Lake		11, 32, 135, 145, 261
Chlorides		179
Cisco		11, 30, 138, 139, 145, 150, 151, 161, 261, 273
Climate	35, 37, 57, 64, 66, 67, 68, 69, 70, 71, 72, 75, 76, 78, 79, 81, 82, 83, 84, 85, 134	
Climate change	71, 76, 84, 85, 152, 160, 189, 194, 195, 197, 200, 202, 203, 208, 224, 225, 228, 256	
Collaring		119, 121, 132, 230, 252
Colomac Gold Mine		20, 167
ColtKBR		40, 41, 42, 43, 44, 45, 46, 169, 170, 171, 172, 173
Colville Lake		86, 111, 112, 166, 262
Co-management		<i>See</i> Resource management
Committee on the Status of Endangered Wildlife in Canada (COSEWIC)		32, 98
Con Mine		31, 32
Concordia University		14, 79, 147, 212
Conductivity	23, 24, 25, 27, 28, 29, 30, 35, 74, 78, 81, 82, 143, 156, 157, 162, 175, 178, 179, 193, 199, 215	
Coney		<i>See</i> Inconnu
ConocoPhillips Canada Resources Ltd.		40, 58, 59, 109, 174
Conodont		187
Contaminants		14, 39, 70, 134, 136, 147, 166, 168, 259, 262, 264
Co-operatives		89, 134, 219
Copper		22, 167
Copper Inuit		91, 113, 221
Country food		87, 103, 189, 191, 234
Cretaceous		187
Crooked back		<i>See</i> Whitefish
Crosscurrent Associates Ltd		241
Cruciferae		17
Cumulative effects		31, 88, 89, 231, 245, 280

D

Dahadini River	54
Dalhousie University	77, 82, 88, 98, 214
Dall's sheep	119, 245, 247, 254
Daring Lake	68, 73, 153, 198, 203
DDT	166
De Beers Canada Inc.	107, 108, 149, 237, 265, 266
De Vries Lake	186
Debitage	242
Deh Cho Region	18, 19, 24, 28, 29, 41, 42, 43, 44, 46, 47, 50, 51, 54, 55, 56, 65, 67, 72, 76, 78, 102, 110, 114, 119, 120, 124, 125, 126, 127, 129, 130, 131, 146, 153, 156, 160, 166, 172, 175, 176, 177, 183, 185, 191, 201, 205, 207, 210, 213, 217, 223, 231, 232, 233, 234, 240, 241, 245, 247, 248, 249, 252, 253, 254
Deline	11, 61, 79, 86, 89, 153, 189, 217, 218, 221, 222, 249
Deline First Nation	61, 189
Deline Land and Financial Corporation	61
Deline Land Corporation	233
Dempster Highway	19, 41, 66
Dendrochronology	10
Dene Languages Conference, Victoria, British Columbia	226
Department of Fisheries and Oceans	15, 21, 22, 37, 50, 91, 134, 135, 136, 137, 138, 139, 140, 144, 147, 148, 150, 151, 154, 161, 169, 171, 201, 210, 231, 258, 259, 260, 264, 266, 273, 278, 279, 280, 281
<i>Deschampsia caespitosa</i>	144

Dettah	61, 179, 190, 217, 221, 224, 243
Devon Canada Corporation	48, 99, 100
Devonian	59
Diabase	75
Diavik Diamond Mines Inc.	21, 36, 37, 59, 84, 101, 147, 154, 163, 164
Dike	21, 37, 75, 84, 154, 230, 231, 277
Dillon Consulting Ltd.	20, 142, 155, 260, 277
Discovery Mine	35, 115, 145, 242, 254
DNA	17, 52, 128, 148, 160, 236
Dogrib Community Services Board	62
Dogrib First Nation	114
Dogrib Treaty 11 Council	109
Dogrib Treaty 11 Council Land and Environment Committee	36
Dolomite	153
Drilling	40, 47, 50, 51, 57, 58, 80, 109, 110, 111, 112, 116, 117
Drilling/gravel pad	15, 16, 170
Dublin Institute for Advanced Studies	59
Ducks Unlimited	124, 125, 131, 249, 256
Dye tracer	12, 146

E

Earth System Science Partnership Global Environmental Change Open Science Conference, Beijing, China	201
EBA Engineering Consultants	35, 109, 127, 153, 161, 162, 254, 260
Echinoderms	197
Ecological Land Classification	26, 27, 28, 34, 153
Ecology North/C-CIARN	225
Edehzhie Protected Area	252
Education	92, 218, 219, 235
Effluent	12, 31, 36, 146, 149, 163, 164
Eglington Island	184
Ekati Diamond Mine	22, 34, 59, 72, 105, 124, 155, 238, 267, 268, 269, 270, 271, 272
Electrofishing	24, 25, 27, 28, 29, 30
Ellef Ringnes Island	81, 214
Ellice Island	50, 51, 117
<i>Elymus macrorhys</i>	144
<i>Elymus trachycaulus</i>	144
EM38	175, 178
Emerald shiner	12
Enterprise	72, 153, 245
Environment Canada	15, 16, 32, 39, 166, 179, 197, 213, 261, 262
Environmental assessment	36, 87, 89, 90
Environmental Effects Monitoring	31
Environmental impact assessment	32, 99, 100, 258, 259
Environmental Monitoring Advisory Board	37, 100, 230, 274
Environmental Studies Research Funds (ESRF) "Protocol for the Assessment of Drilling Waste Sumps"	175, 198
Eocene	52
Ernie MacDonald Land Corporation	233
Erratic	183, 184
Esker	13, 105, 106, 108, 109, 115, 117, 196, 208, 238, 242
Ethics in research	88
Ethylbenzene	175, 214
Eureka Sound Group strata	52
Eutrophication	36
Excavation	108, 169, 238, 242
Exeter-Daring-Yamba Lake catchment	68, 197

F

Falcon	31, 150, 154, 247
Fecal sampling	119, 129
Fish habitat	11, 13, 14, 20, 22, 23, 24, 25, 27, 28, 29, 30, 31, 136, 142, 143, 147, 150, 153, 156, 157, 161, 162, 199, 260, 261, 274, 280

Fish palatability	31, 150, 230, 231
<i>Fisheries Act</i>	231
Fisheries Joint Management Committee	91, 151
Flat River	183, 258
Floods, flooding	67, 72, 97, 225, 228
Floy tagging	<i>See</i> Tagging
Flybye Springs	65, 193
FMA Heritage Resources Consultants Inc.	117
Forest fires	19, 23, 146, 154, 156, 196, 206
Prescribed burning	19
Forests	18, 19, 66, 67, 81, 125, 127, 146, 148, 155, 156, 160, 181, 195, 204, 210, 245
Forest-tundra	20, 66, 152, 256
Fort Good Hope	86, 90, 112, 139, 153, 161, 166, 196, 207
Fort Liard	18, 51, 65, 127
Fort McPherson	19, 98, 101, 152, 156, 190, 224, 226, 232
Fort Norman Metis Local No. 60	233
Fort Providence	19, 65, 120, 233, 245
Fort Providence Resource Management Board	233
Fort Resolution	39, 83, 95, 97, 166, 215, 217, 222, 228, 261
Fort Resolution Environmental Committee	97, 228
Fort Resolution Environmental Working Committee	215
Fort Simpson	28, 56, 67, 76, 95, 127, 224, 232, 245
Fort Simpson Metis	234
Fort Smith	19, 87, 92, 122, 126, 127, 128, 129, 146, 188, 219, 220, 224, 245, 248, 255
Fortune Minerals Ltd.	12, 13, 123, 146
Fossils	52, 55, 65, 104, 181, 184, 186, 204
Fox Holes Lake	17
Fox Pit	13, 14
Foxes	53, 163, 180
Franklin & Marshall College	181
Frazzle ice	23, 24, 25, 156, 157
Frost boil	81

G

Gahcho Kué	23, 32, 33, 34, 35, 108, 119, 123, 124, 142, 217, 237, 258, 259, <i>See</i> Gahcho Kué
Gameti	57, 59, 94, 95, 217, 226
Garry Island	30, 66, 75, 82, 118, 194
Gartner Lee Ltd.	145
Geertz, Clifford	219
Gender	87, 91
Genes, genetic	17, 32, 134, 140, 148, 159, 160, 190, 236, 248, 259, 264, 278, 279
Geological Survey of Canada	48, 54, 55, 56, 64, 72, 76, 83, 183, 185, 186, 192, 200, 201, 207
Geophysical surveys	56, 77, 175, 179, 180, 195
Germination	14, 144, 148
Giant Mine	31, 32, 129, 167, 192
Glacial scour	70
Glacier	55, 73, 183, 196, 205, 208
Global warming	155, 203, 263
GNWT Department of Environment and Natural Resources	19, 34, 55, 119, 120, 121, 122, 123, 124, 126, 127, 128, 129, 132, 153, 160, 162, 185, 193, 230, 246, 247, 248, 249, 250, 252, 254, 255, 256
GNWT Department of Environment and Natural Resources, Forest Management Division	19, 160
GNWT Department of Municipal and Community Affairs	149, 223
Golder Associates Ltd.	10, 12, 13, 30, 31, 109, 114, 125, 129, 131, 143, 146, 150, 246, 273, 274
Goose	125, 126, 250
GPR	57, 69, 75, 78, 199, 209, 212
GPS	48, 56, 66, 75, 119, 146, 151, 158, 162, 175, 178
Granitoid, granite	54, 58
Granular deposits	77, 208
Great Bear Lake	11, 32, 79, 140, 179, 189, 211, 222, 279
Great Lakes Fishery Commission	145, 261
Great Slave Lake	10, 11, 31, 32, 37, 39, 56, 72, 79, 116, 117, 138, 139, 145, 153, 164, 166, 185, 195, 201, 211, 243, 261
Greater Nahanni ecosystem	120, 185, 247

Greenhouse gas	66, 194
Grizzly bear	31, 56, 120, 122, 142, 150, 162, 229, 246, 247, 248
Ground-truthing	21, 35, 67, 154, 162
Groundwater	18, 25, 28, 29, 35, 51, 162, 175, 176, 213
Gwich'in Renewable Resource Board	16, 119, 148, 245, 263, 264
Gwich'in Settlement Area	14, 15, 16, 19, 24, 26, 27, 43, 44, 45, 49, 57, 59, 62, 66, 67, 69, 71, 73, 77, 80, 82, 84, 86, 90, 91, 93, 94, 98, 99, 101, 102, 110, 131, 144, 148, 150, 151, 152, 156, 157, 158, 160, 168, 170, 173, 177, 181, 186, 190, 194, 195, 200, 204, 205, 207, 209, 212, 219, 222, 225, 226, 232, 247, 248, 251, 255, 256
Gwich'in Tribal Council	59, 168, 171

H

Hares	120, 131, 247
Harvard University	74
Hay River	72, 153, 191, 201, 224, 245
Hay River Reserve	217, 218
Health Canada	61, 62, 167
Healthcare practice in the NWT	62, 188, 227
<i>Hedysarum alpinum</i>	144
Herschel Island	64, 66, 132, 194
Hertzberg Laboratories	54
High Arctic	70, 72, 202
Holman	<i>See</i> Ulukhaktok
Holman Community Corporation	91, 114, 221
Holocene	71, 205, 208
Hospital for Sick Children	190
Hummock	206, 207, 214
<i>Hyalella azteca</i>	39
Hydroacoustic surveys	15, 21, 30, 134, 154, 259
Hydrocarbon	18, 51, 64, 83, 86, 163, 169, 171, 175, 179, 186, 187, 192, 195, 265
Hydrology	13, 22, 23, 24, 25, 27, 28, 29, 30, 78, 83, 142, 143, 155, 157, 162, 209, 215

I

Ice cap	53, 55, 73, 183, 184, 202
Ice jam	72, 201, 209
Ice patch	236
Ice scour	64, 192
Ice sheet	183, 195
Ice surveys/studies/monitoring	23, 24, 25, 30, 36, 40, 41, 42, 43, 44, 67, 68, 71, 72, 74, 75, 97, 156, 157, 163, 170, 172, 173, 174, 180, 202, 208
Ice vein	170, 206
Ice wedge	206, 212
IEG Environmental	82, 149, 174, 178, 265
Illisarvik	66, 194
Impact and Benefit Agreements	90, 96
Imperial Oil	12, 42, 43, 44, 47, 101, 102, 109, 172, 173, 174, 178, 232, 233, 234
Inconnu	30
Indian Affairs and Northern Development	47, 58, 167, 180, 192, 202, 222
Indian and Northern Affairs Canada	21, 30, 50, 57, 88, 90, 169, 171, 174, 179, 180, 197
Indicators	37, 84, 99, 101, 163, 264, 266
Indigenous Knowledge	<i>See</i> Traditional Knowledge
Ingraham Trail	153, 194, 241, 242
Ingram Trail	201
Ingray Lake	186
Institute for Aboriginal Peoples Health	61
Institute of Arctic Biology	81, 214
Intergovernmental Panel on Climate Change (IPCC) “Good Practice Guidance for Land Use, Land Use Change and Forestry”	195
International Travertine Symposium, Denizli, Turkey	194
Interviews	61, 62, 88, 89, 90, 91, 92, 93, 94, 96, 98, 99, 100, 101, 102, 230, 234
Focus group	92, 152, 218, 228
Inuvialuit Cultural Resource Centre	98, 100, 229

Inuvialuit Ethnobotany Project	98
Inuvialuit Final Agreement	224
Inuvialuit Land Administration	114, 169
Inuvialuit Regional Corporation	93, 168
Inuvialuit Settlement Region	14, 15, 16, 17, 23, 25, 26, 29, 33, 39, 40, 45, 47, 48, 49, 50, 51, 52, 54, 57, 59, 62, 64, 66, 69, 70, 71, 72, 73, 74, 75, 76, 77, 79, 80, 81, 82, 83, 84, 86, 90, 91, 93, 94, 97, 98, 99, 100, 101, 102, 104, 109, 110, 113, 117, 119, 120, 122, 125, 126, 128, 131, 132, 143, 144, 145, 148, 149, 151, 152, 153, 155, 156, 157, 158, 159, 160, 164, 166, 167, 168, 169, 170, 171, 173, 174, 177, 178, 180, 181, 184, 189, 192, 194, 197, 198, 199, 200, 202, 204, 205, 206, 207, 208, 209, 212, 213, 214, 217, 219, 221, 222, 223, 224, 225, 227, 228, 229, 231, 234, 239, 245, 246, 247, 248, 249, 250, 251, 254, 255, 256
Inuvik	14, 15, 16, 19, 49, 57, 58, 59, 62, 66, 71, 73, 74, 75, 80, 81, 82, 84, 85, 86, 90, 91, 92, 93, 94, 95, 98, 99, 100, 101, 102, 109, 117, 119, 120, 122, 128, 144, 148, 151, 152, 168, 170, 171, 174, 178, 181, 186, 189, 194, 195, 196, 200, 202, 203, 204, 205, 208, 209, 212, 219, 220, 222, 223, 224, 225, 226, 229, 231, 232, 240, 245, 246, 247, 248, 249, 250, 251, 254, 255, 256, 263, 264, 280, 281
Inuvik Regional Health and Social Services Authority	168
Ionomonde	80
Iron	167
Isotope analysis	68, 71, 74, 81, 134, 198, 200, 215, 236, 259
Ivvavik	93

J

Jackfish	See Northern pike
Jacques Whitford Environment Ltd.	11
Jean Marie River	232
Jean Marie River First Nation	102, 110
Jesuit University of Munich	219

K

Kaa'gee Tu First Nation	233
Kakisa	245
Kakisa Lake	233
Karst	56
Karstic sink holes	196
Katlodeeche First Nation	234
Kavik-AXYS Inc.	80, 99
Kendall Island, Kendall Island Bird Sanctuary	15, 23, 75, 118, 136, 137, 170, 192, 202
Kennedy Lake	<i>See Gahcho Kué</i>
Kimberlite	22, 59, 72
Kittigazuit	30, 49, 82
Klohn Crippen Berger	174, 178
Kugmallit Bay	69, 74
Kumak Channel	30, 82, 158, 180, 212, 278

L

Lac de Gras	21, 22, 36, 37, 59, 77, 84, 101, 105, 193, 230, 237, 263
Lake chub	28
Lake trout	11, 14, 21, 32, 37, 39, 140, 145, 146, 147, 150, 151, 166, 167, 231, 261, 266, 279
Lakehead University	216, 221
Lamont-Doherty Earth Observatory	10
Land claims	93, 94, 99
Land-fast ice	214
Landslides	54, 195, 196, 207
Larch	156
Late Pleistocene	183
Laurentide Ice Sheet	55, 183, 184
Lead	55
Liard Pipeline	18, 246
Lichen	14, 30, 67, 152, 163, 205
LiDAR	45, 46, 47, 48, 69
Lidlii Kue First Nation	110, 232
Ligotrophic	14

Limestone	153, 187
Limnology	21, 22, 34, 83, 155, 204, 215
Linguistics	94, 221, 226
Literacy	94, 95, 96, 97, 225, 228
Little Nahanni River	258
Loche	<i>See</i> Burbot
Longnose sucker	29, 30, 146, 150
Lupin Gold Mine	194
Lutra Associates Ltd.	92, 95, 222
Lutsel K'e	11, 96
Lutsel K'e Dene First Nation	32, 96, 105, 108, 109, 195, 237, 238

M

Mackenzie Bison Sanctuary	255
Mackenzie Delta	14, 15, 16, 19, 29, 30, 40, 45, 46, 48, 57, 69, 73, 76, 77, 81, 82, 83, 110, 117, 118, 120, 134, 138, 144, 152, 170, 172, 173, 174, 180, 192, 199, 202, 203, 204, 205, 206, 207, 208, 209, 212, 213, 239, 248, 280, 281
Mackenzie Gas Pipeline	15, 16, 203, 208, 262
Mackenzie Gas Project	15, 48, 75, 82, 94, 102, 203, 226, 231, 232, 233
Mackenzie Mountains	10, 56, 57, 119, 120, 183, 187, 236, 245
Mackenzie Project Environment Group	48, 49, 50, 110, 130, 131
Mackenzie River	12, 15, 16, 67, 68, 70, 71, 73, 77, 78, 82, 111, 112, 118, 126, 132, 135, 140, 146, 148, 149, 166, 199, 200, 204, 209, 212, 214, 245, 251, 252, 262, 264, 279, 280
Mackenzie Valley	26, 27, 28, 40, 41, 44, 45, 46, 76, 110, 112, 131
Mackenzie Valley Environmental Impact Review Board	48, 90
Mackenzie Valley Land and Water Board	35, 36, 150, 162, 163
Mackenzie Valley Pipeline	86, 94, 110, 161, 170, 172, 173, 174
Mackenzie Valley Pipeline Inquiry	94
<i>Mackenzie Valley Resource Management Act</i>	87, 99
Magnetic storms	80
Magnetotelluric	56, 59
Marmot	234
Mars	79
Marsh, Donald	93
Massachusetts Institute of Technology	226
Massive ice	77, 208
Mattberry Lake	56, 186
Matthews Lake	20, 109, 142, 162, 260
Matthews Lake and Area Fisheries Habitat Restoration Project	20
McGill University	77, 114, 190, 196, 208, 256
McMaster University	76, 79, 211
Media Awareness Network (MNet)	220
<i>Melanitta perspicillata</i>	257
Melville Island	52, 54, 55, 69, 71, 72, 184, 199, 202, 213
Melville Island Ice Cap	184, 202
Memorial University	57, 186, 197
Mercury	34, 35, 39, 146, 151, 166, 167, 263
Mesoproterozoic	187
Metal Mining Effluent Regulations	31, 32
Metal, metal concentration	16, 21, 32, 39, 55, 58, 84, 106, 114, 164, 167, 186, 275, 276, 277
Metamorphic rock	58
Meteorology	13, 73, 142, 155
Microfossils	<i>See</i> Fossils
Migratory birds	180, 246
Mine decommissioning	51, 175
Mining	89, 90, 96, 101, 106, 114, 115, 259
Mink	256
Mitigation	18, 31, 86, 100, 106, 108, 114, 116, 144, 237, 239, 243, 244
Molybdenum	22
Monitoring	14, 18, 20, 22, 31, 33, 36, 37, 40, 47, 49, 50, 51, 57, 58, 64, 66, 69, 76, 81, 84, 86, 87, 89, 90, 96, 101, 107, 108, 120, 124, 127, 142, 143, 150, 152, 155, 158, 160, 162, 163, 164, 166, 168, 170, 175, 176, 179, 180, 193, 194, 200, 202, 203, 205, 207, 208, 215, 230, 246, 248, 250, 251, 255, 258, 265, 267, 268, 269, 270, 271, 272, 280
Moose	56, 121, 130, 147, 154, 162, 243, 253

Moraine	184, 206
Musk-ox	52, 254
Muskrat	13, 129, 251, 256
<i>Myoxocephalus thompsoni</i>	32

N

N'dilo	61, 95, 190, 217, 221, 224
Nahanni National Park Reserve	55, 56, 153, 185, 205, 258
Nahendeh Land and Environmental Services	175
National Energy Board	48
National Water Research Institute	39, 75, 166, 205, 209, 213
National Water Resource Institute	77
Native Women's Association of the NWT	92
Natural Resources Canada	49, 56, 59, 66, 78, 84, 185, 192, 194, 195, 200
Neo-eskimo	113
Nickel	36, 39
NICO Mine	12, 13, 123, 147
Niglitingak	15, 29, 30, 49, 75, 82, 109, 117, 118, 157, 180, 212
Nitrate	22
Nitrogen	22, 35, 134
Non-native plants	18
Norex/Graham Vein Mine	21
Norman Wells	12, 40, 57, 67, 76, 79, 84, 86, 95, 109, 112, 127, 132, 195, 207, 224
North Slave Métis Alliance	107, 114
North Slave Métis Land and Resources Committee	36
North Slave Region	10, 11, 12, 13, 20, 21, 22, 23, 30, 31, 32, 33, 34, 35, 36, 37, 54, 56, 58, 59, 61, 62, 68, 69, 72, 73, 76, 77, 84, 87, 88, 89, 90, 94, 95, 99, 101, 105, 106, 107, 108, 115, 116, 119, 120, 121, 123, 124, 125, 127, 128, 129, 130, 131, 142, 143, 145, 147, 150, 153, 154, 155, 161, 162, 163, 164, 167, 179, 185, 188, 190, 192, 193, 194, 196, 197, 199, 201, 203, 204, 216, 217, 218, 219, 220, 222, 226, 227, 230, 235, 237, 238, 241, 242, 243, 247, 252, 254
Northern architecture	216, 223
Northern Contaminants Program	168
Northern pike	11, 12, 28, 30, 32, 68, 145, 147, 150, 161, 162
Northrim Mine	21
North-South Institute	96
Northwest Territories Geoscience Office	56, 185, 186
Northwestern University	93
Nunavut Land Claims Agreement	87
Nunavut Wildlife Management Board	91
NWT Literacy Council	92, 95, 97
NWT Power Corporation	34, 197
NWT Water Board	149, 169

O

Oil and gas	86, 94, 100, 174, 178, 248
Olokhaktomiut Hunters and Trappers Committee	91, 114, 221
<i>Ophiomorpha</i>	52
Oscar Creek	12, 68, 166, 210, 262
Outcrop	59, 98
Oxygen	20, 23, 24, 25, 27, 28, 29, 30, 34, 65, 74, 143, 156, 157, 162, 193, 198, 199, 215
<i>Oxytropis campestris</i>	144
<i>Oxytropis deflexa</i>	144

P

PaciTech Environmental Consulting	33, 160
Paleozoic	186
Panda Diversion Channel	22, 155, 267, 268, 269, 270, 271, 272
Paramount Resources Ltd.	18, 19, 47, 112, 126, 127, 175, 176, 177
Parasites	11, 12, 68, 119, 122, 261
Parks Canada	56, 98, 120, 144, 153, 234, 247
Parsons Lake	16, 40, 48, 59, 77, 109

Participant observation 88, 222
 Passive Integrated Transponder (PIT) See Tagging
 Passive microwave 64, 68, 196, 197
 Paulatuk 69, 98, 102, 152, 194
 PCBs 149, 166
 Peatland 78, 154, 170, 210
 Peel Plateau 20, 186, 187
 Pehdzeh Ki First Nation 110, 231
 Permafrost 19, 40, 47, 57, 58, 66, 72, 76, 78, 80, 82, 85, 148, 152, 156, 180, 181, 187, 193, 194, 199, 201, 202, 204, 205, 206, 208, 209, 210, 212, 213
 Permanent Monitoring Plots 160
 Petitot, Emile 226
 Petroleum 12, 15, 16, 186
 pH 22, 23, 24, 25, 27, 28, 29, 30, 71, 81, 143, 156, 157, 162, 164, 193, 215
 Phosphate 35
 Phosphorus 15, 16, 22, 36
 Photo novella See Photovoice
 Photovoice 90, 190, 223
 Phytoplankton 14, 22, 81, 155, 167
 Piedmont 183
 Pine 23, 154, 155, 242
 Pine Point Mine 153, 254
 Pingo 69, 79
 Pingo Canadian Landmark 69
 Pipeline 15, 16, 18, 23, 24, 25, 26, 27, 28, 29, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 78, 86, 109, 122, 125, 130, 156, 157, 158, 159, 166, 169, 170, 171, 172, 173, 174, 177, 178, 195, 196, 207, 209, 213, 245, 246, 251
 Plankton 31, 150, 209
 Pleistocene 52
Poa glauca 144
 Point/track counts 120, 125, 127, 130, 147, 246
 Pointed Mountain Gas Field 51, 175
 Points West Heritage Consulting 105, 106, 107, 108, 109, 115, 237, 238, 242
 Polar bear 53, 131, 132, 257
 Polishing pond 167
 Ponding 18, 47, 175, 178, 179
 Porewater 39, 167, 170
 Potassium 22
 Prairie Creek 55, 160, 161, 185, 258, 279, 280
 Prince of Wales Northern Heritage Centre 91, 104, 112, 114, 236, 240, 241, 242
 Prince of Wales Strait 184
 Prince Patrick Island 54, 55, 81, 184, 199, 200, 214
 Proterozoic 186
 Ptarmigan 180
Puccinellia borealis 80

Q

Quartz 105, 109, 116, 238, 242, 243
 Queen's University 167, 191, 213

R

Radar 80, 81, 199, 213
 Radiocarbon dating 52, 53, 71, 184, 200, 204, 208, 236
 Radio-tagging See Tagging
 Radio-tracking 251, 263
 Rae-Edzo 62, 87, 94, 155, 188, 190, 216, 217, 218, 224, 226, 235
 Rainbow smelt 30
 Ramparts River 187, 253
 Random meander technique 26, 27, 29
 Raptors 13, 147
Rare plants 13, 17, 26, 27, 28, 34
 Ratfish 52

Reclamation	30, 40, 130, 144, 146
Reconnaissance	34, 41, 42, 43, 44, 45, 46, 67, 106, 107, 108, 110, 115, 118, 127, 143, 161, 186, 187, 205, 212, 239
Recycling	86
Reindeer	180, 239
Reindeer Channel	50, 212
Reindeer Station	81, 213
Remediation	145, 179, 192
Remote sensing	67, 68, 69, 196
Remote videography	23, 24, 25, 156, 157
Rengleng River	181
Rescan Environmental Services Ltd.	13, 20, 21, 22, 34, 130, 154, 167, 266, 267, 268, 269, 270, 271, 272, 275, 276, 277
Resource management	86, 99, 101, 222
Revegetation	18, 19, 48, 80, 144, 164
Richards Island	57, 66, 77, 81, 83, 110, 144, 194, 205, 206, 208, 239, 240
Richardson Mountains	59, 119, 187, 234
Riprap	11
Roving gamma survey	179
Ryukoku University	22, 155, 156

S

Sachs Harbour	69, 98, 102, 136, 152, 197, 199, 264
Sahtu Environmental Services Inc.	112
Sahtu Renewable Resources Board	86, 153, 194
Sahtu Settlement Area	10, 11, 12, 21, 25, 27, 28, 32, 40, 41, 42, 44, 49, 54, 55, 57, 61, 65, 67, 68, 76, 79, 84, 86, 110, 111, 112, 122, 124, 126, 127, 130, 131, 132, 146, 150, 153, 159, 160, 161, 166, 171, 173, 178, 179, 185, 187, 189, 193, 195, 207, 210, 211, 217, 218, 221, 222, 233, 236, 240, 247, 248, 249, 251, 253, 254
Saint Francis Xavier University	94, 225
Salinity	50, 51, 70, 82
Salmita Mine	20, 35, 142, 162
Sambaa K'e Development Corporation	102
Sand wedge	206
Sandstone	52, 153
Sans Sault Rapids	187
Satellite imagery	35, 162, 210, 236
Scarification	14, 148
Scour hole	77, 209
Sculpins	12, 25, 29, 30, 32, 68, 150
Sea ice	64, 69, 70, 134
Seals	53, 136, 265
Sedge	73, 80
Sediment	10, 12, 13, 14, 15, 16, 21, 22, 25, 28, 30, 32, 35, 36, 39, 64, 70, 71, 74, 82, 83, 84, 147, 150, 155, 167, 183, 184, 192, 193, 195, 197, 201, 204, 206, 208, 210, 211, 214, 215, 230, 242, 291
Sedimentary rock	58, 187
Seedbed	14, 148
Seismic lines	14, 148
Seismic surveys/studies	15, 50, 57, 59, 69, 75, 117, 118, 140, 195, 240
SENES Consultants Ltd.	179
Settling pond	167
Shale	153, 187
Shark	52
Shell Canada Ltd.	180, 212
Shiha Pipeline	127, 176
Shingle Point	69, 135, 199, 229, 230, 281
Shorebirds	13, 126, 251
Shrimp	20, 52
Silver	18, 186
Silver Bear Properties	21
Simon Fraser University	73, 78, 90, 103, 203, 204, 210
Slave River	39, 83, 97, 129, 154, 166, 215, 228, 251, 255, 256
Slumping	48, 57, 175, 178, 197, 203, 204
Small mammals	120, 245, 247
Smallwood Mine	21

Snake River	187
Snap Lake	31, 89, 107, 120, 130, 131, 265
Snow surveys/studies/monitoring	40, 57, 66, 68, 73, 75, 76, 162, 196, 198, 201, 202, 209
Snowfield Development Corporation	116
Snowpack water equivalent	68, 196, 198
Social work in northern Canada	217
Society for the Study of the Indigenous Languages of the Americas Annual Meeting	226
Socio-economic studies	90, 101, 102, 217
Soil	15, 18, 22, 23, 25, 26, 27, 29, 34, 40, 50, 51, 57, 72, 78, 82, 83, 155, 163, 164, 170, 175, 176, 178, 179, 180, 198, 203, 206, 207, 210, 214
Sonar	25, 27, 28, 64, 78, 199
Sonar tagging	See Tagging
South Nahanni River	183, 236, 258
South Slave Region	11, 17, 23, 32, 33, 34, 39, 58, 72, 83, 87, 92, 96, 97, 103, 108, 122, 125, 128, 129, 130, 142, 143, 145, 146, 153, 155, 164, 166, 188, 195, 215, 217, 219, 222, 228, 246, 249, 250, 251, 254, 255, 256
Spawning	16, 24, 37, 140, 142, 145, 147, 149, 150, 162, 258, 259, 260, 265, 273, 279
<i>Spelling Manual for Tâuchô Yatîü</i>	226
Sports North	217
Spruce	10, 14, 37, 57, 66, 148, 154, 156, 164, 181, 204
Stabilizing Indigenous Languages Symposium, Victoria, British Columbia	226
Stanford University	17, 159, 160, 220
Stanton Territorial Health Authority	62
Sticklebacks	17, 23, 25, 28, 30, 31, 150, 160, 161, 278
Stone flakes	110
Stone tools	105, 109, 110, 116, 117, 236, 238, 243
Stratigraphy	54, 183, 186, 198
Subsidence	14, 47, 48, 81, 148, 175, 179
Substrate	11, 14, 25, 27, 28, 29, 30, 37, 78, 148, 162, 164
Sulfides	186, 193
Sulphate	22, 73
Sulphur	65, 75, 138
Sump	18, 40, 47, 50, 51, 57, 58, 80, 111, 117, 170, 174, 175, 176, 177, 178, 179, 198, 199, 202
Surface water	51, 167, 175, 198
Surficial geology	54, 183
Sustainability	83, 88, 90, 94, 131, 190
Swans	250, 253

T

Tagging	11, 16, 21, 32, 132, 138, 139, 140, 145, 149, 154, 261, 264, 265, 273, 277, 279
Taglu	15, 48, 58, 109
Tailings	10, 72, 115, 146, 192, 242, 275, 276, 277
Taltson Hydro Project	34, 130
Taltson River	34, 120, 130
Tampere Polytechnic, Finland	94
Terra Mine	21
Thames Valley University	188
Thermocline	20
Thermokarst	57, 203, 212
Thomson Heritage	116, 243
Tibbett Lake	72
Till	See Sediment, See Sediment, See Sediment
Tillite	183
Tissue	11, 12, 17, 21, 68, 136, 137, 138, 146, 161, 162, 163, 167, 259, 264, 275, 276, 277, 279
Tlicho Community Services Authority	235
Tlicho Government	238
Toluene	18, 214
Traditional Knowledge	30, 87, 97, 98, 99, 100, 101, 102, 147, 151, 229, 231, 232, 233, 234
Traditional land use	87, 100, 110, 113, 240
Trail River	187
Transect	18, 21, 48, 76, 82, 84, 104, 115, 136, 154, 202, 207, 214, 215
Travaillant Lake	16, 263
Travaillant River	16, 149, 266

Trent University	73, 203
Trophic structure	134, 138, 259, 261
Tropical ray	52
Trout Lake	28, 102, 127, 139, 156, 240, 241, 245, 252
Trout Lake Dene Band	110
Trout-perch	29, 30
Tsiigehtchic	14, 67, 77, 95, 101, 140, 144, 148, 152, 209, 226, 232
Ts'udelilene-Tuyetah Candidate Protected Area	253
Tuberculosis	129
Tuktoyaktuk	48, 49, 64, 69, 74, 77, 79, 81, 94, 98, 99, 100, 102, 104, 105, 110, 120, 132, 135, 149, 152, 178, 199, 206, 208, 212, 214, 222, 223, 227, 229, 231, 265, 281
Tuktoyaktuk Place Names Project	100, 229
Tulita	29, 45, 57, 68, 86, 233, 240
Tulita Dene Band Council	233
Tulita Municipal Land Corporation	233
Tundra	20, 52, 57, 66, 68, 69, 73, 98, 104, 121, 152, 163, 170, 198, 203, 204, 209
Tundra Mill Mine	20
Tundra Mine	30, 130

U

Ultraviolet radiation	73, 81
Ulukhaktok	69, 91, 94, 95, 97, 98, 102, 113, 136, 217, 221
United Nations Framework Convention on Climate Change	195
Université Laval	70, 81, 189, 199, 263
University of Aberdeen	92
University of Alaska, Fairbanks	71, 200
University of Alberta	33, 54, 57, 61, 62, 65, 71, 87, 122, 143, 184, 186, 187, 189, 190, 192, 193, 201, 219, 221, 245, 248, 256
University of British Columbia	19, 37, 65, 88, 90, 152, 164, 226
University of Calgary	62, 80, 99, 188, 213, 218
University of California, Los Angeles	204
University of Colorado Museum	52
University of Guelph	224, 227
University of Manitoba	11, 12, 32, 64, 67, 68, 91, 93, 101, 113, 114, 145, 221, 261
University of New Brunswick	147, 263
University of New Mexico	122
University of Ottawa	71, 186, 222
University of Saskatchewan	80, 87, 89, 95, 218, 247
University of Sussex	206
University of Toronto	62, 104, 190, 208, 219
University of Victoria	67, 74, 77, 94, 95, 209, 226
University of Wales, Aberystwyth	195
University of Waterloo	39, 89, 193, 223
University of Western Ontario	86
US Fish and Wildlife Service	119, 123, 132, 245, 257
US Geological Survey	257
Utah Valley State College	17

V

Vegetation surveys/studies/monitoring	13, 26, 27, 29, 31, 34, 40, 56, 66, 69, 82, 119, 129, 142, 147, 150, 160, 162, 175, 178, 179, 202, 207, 214, 237, 249
Vermilion Community College	114
Victoria Island	69, 74, 91, 113, 114, 122, 128, 199, 221, 248, 254
Virginia Falls	153, 183
Volunteerism	92, 217
Vuntut Gwitchin First Nation	234

W

Walleye	24, 29, 273
Waste rock	14, 22, 115, 193
Water column	32, 74, 81, 82, 134, 144, 192, 209, 214, 230, 259

Water quality	12, 13, 14, 20, 22, 23, 24, 25, 27, 28, 29, 30, 31, 32, 35, 39, 57, 84, 101, 142, 150, 151, 153, 155, 156, 157, 162, 167, 179, 203, 209, 225, 230
Water Survey of Canada	198
Waterfowl	13, 119, 122, 123, 125, 131, 132, 142, 162, 163, 245, 248, 249, 256, 257
Wecho River	54, 58
Wekweti	94, 95
Well	18, 47, 51, 111, 117, 170, 176, 180, 213
Wellsite	48, 51, 111, 112, 117, 170, 175, 176, 177, 240
Western College of Veterinary Medicine	152
Wha Ti	88, 94, 114, 143, 217, 218, 226
Wha Ti First Nation	88
Whales	64, 104, 136, 137, 139, 193, 200, 264, 279
Whitefish	11, 14, 16, 30, 32, 138, 139, 140, 145, 146, 147, 148, 149, 150, 151, 161, 162, 167, 264
White-tailed deer	122
Whooping crane	33, 143, 154, 250
Wildlife surveys/studies/monitoring	31, 34, 35, 40, 86, 142, 147, 150, 152, 154, 162, 230
Wilfrid Laurier University	68, 83, 97, 197, 215, 228
Willow	14, 20, 152
Wolf	31, 99, 121, 132, 142, 150, 162, 247, 254
Wolverine	31, 98, 128, 150, 180, 254
Women and childbirth	62, 168, 188
Women in decision-making	91
Wood Buffalo National Park	23, 33, 143, 146, 155, 250
WorleyParsons Komex	174, 178
Wrigley	28, 54, 112, 213, 231, 245
Wuttunee, Wanda	219

X

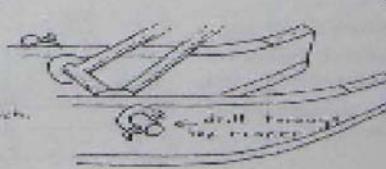
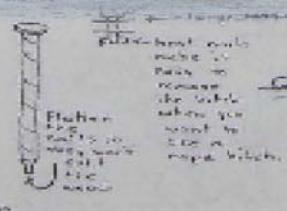
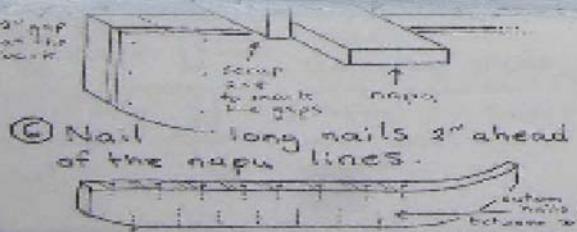
Xylenes	175
---------	-----

Y

Ya Ya Lake	50
Yellowknife	10, 11, 13, 16, 20, 21, 30, 31, 32, 35, 36, 37, 47, 54, 55, 56, 57, 58, 59, 62, 65, 72, 87, 88, 89, 90, 94, 95, 97, 99, 100, 106, 108, 112, 115, 116, 120, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 135, 136, 216, 219, 220, 222, 224, 227
Yellowknife Bay	10, 31, 116
Yellowknife Gold Mine	194
Yellowknife Interagency Family Violence Protocol	222
Yellowknife River	10, 31, 273
Yellowknives Dene First Nation	10, 105, 109, 116, 117, 190, 238, 243
Yukon Environment, Fish & Wildlife Branch	229, 234
<i>Yukon Environmental and Socioeconomic Act</i>	87

Z

Zinc	55, 161, 167
Zooplankton	14, 15, 16, 22, 36, 70, 81, 155, 200, 204, 209



⑪ Attach the hitch, and you are done!

Snow people will their man attachment.

