

# Compendium of Research in the Northwest Territories

1998

Including: Scientific Licences,  
Archaeology Permits, Wildlife  
Permits and Fisheries Permits.



Aurora Research Institute  
Aurora College

## About the Aurora Research Institute

The Science Institute of the Northwest Territories (SINT) was created by the NWT Legislative Assembly in 1984. In 1995, the SINT divided and merged with the Aurora College in the NWT and the Nunavut Arctic College in Nunavut. The Science Institute in the NWT was renamed the Aurora Research Institute (ARI) in the spring of 1996.

ARI'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 includes work in the physical, social and biological sciences and in traditional knowledge.
- ▶ promoting communication between scientists 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 knowledge available to the people of the NWT;
- ▶ supporting or conducting research which contributes to the social, cultural and economic prosperity of the people of the NWT.

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June 7, 2000

# Foreword

The Compendium of Research is an important part of the Aurora Research Institute's efforts to keep northerners and other researchers informed of research activities in the Northwest Territories. By participating in the research licensing requirements for the north, researchers ensure that their research information is accessible to all those who need to be informed and others who may be interested in these activities. The sharing of this information allows for greater involvement of northerners in the development of research programs that are pertinent to the needs of the north. This information also enables researchers to work collaboratively on related issues.

The need for scientific and technological knowledge and development for northern environments is increasingly recognized by the people, the governing agencies and the private sector of the Northwest Territories. Training in these areas is critical to allow for adaptation to the rapidly changing social and economic structure of the North. ARI actively promotes partnerships with community groups, government agencies, and private sector organizations in order to identify research needs and strategies to meet these needs. Researchers are also partners in these endeavours.

Through the research licencing and permitting requirements, aboriginal organizations and community groups have input into the research that is conducted and are kept informed of current and proposed research in their region. ARI in cooperation with researchers assist in training community members to participate in research projects within and outside their communities.

Researchers make a valuable contribution to the north as they provide information and education through schools and community presentations, and they also provide employment and training opportunities. There are an increasing number of partnerships and cooperative programs being developed with researchers and the people of the north. By sharing this information the people of north are able to help in shaping the future direction of research in their region.

The Aurora Research Institute works to connect the scientific community with the communities of the Northwest Territories by promoting and supporting studies which improve the understanding of the natural resources and indigenous knowledge and cultures of the NWT. The Compendium of Research is one means in which scientific and traditional knowledge is made available to people of the NWT.

Valoree Walker, PhD  
Director  
Aurora Research Institute

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# About This Book

This Compendium is a summary of research licences/permits that were issued in the Northwest Territories during 1996 and 1997. A separate Compendium, that includes licences/permits for Nunavut, can be acquired through the Nunavut Research Institute in Iqaluit. 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 Resources, Wildlife & Economic Development (RWED) and the Department of Fisheries & Oceans (DFO). The section for RWED also includes information on Wildlife research permits issued for Nunavut. The Compendium series began in 1986.

## **LICENSING IN THE NWT**

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

- ▶ Prince of Wales Northern Heritage Centre - Archaeology
- ▶ Department of Resources, Wildlife & Economic Development, Government of the Northwest Territories - Wildlife
- ▶ Aurora Research Institute - All other research in the NWT
- ▶ Nunavut Research Institute - All other research in Nunavut

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. Verification and additional information should be requested from the researcher.

## **HOW TO USE THIS BOOK**

This book is divided into two parts. Part I describes the research activities for 1996 and Part II describes research activities for 1997. In each part there are four main sections. Each of these sections reflect a specific licencing 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 each section and/or subject area begins on.

### **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 number given to each researcher. When requesting information from any of these agencies on specific research outlined in this 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) that the research took place in. 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:

<b>DC</b>	Deh Cho	<b>SS</b>	South Slave
<b>NS</b>	North Slave	<b>SA</b>	Sahtu
<b>IN</b>	Inuvik (includes Gwich'in and Inuvialuit Settlement regions)		

### **3. Index**

At the back of this book, you will find a index. This has been developed to help the reader cross reference material more easily. The numbers listed in the index refer to the number listed with each research description, not page number.

### **4. Glossary**

A glossary of scientific terms has been added to the compendium. The intent of the glossary is to allow readers to better appreciate the research descriptions

### **AVAILABLE IN PRINT OR ON CD**

The Compendium is available as a printed publication, on CD or is available on the Aurora Research Institute Web site. The Web site can be found at [www.auresint.nt.ca](http://www.auresint.nt.ca). The CD version is in a WordPerfect format and has limited search capabilities. Contact the ARI for further information regarding search capabilities and services. Both the printed publication and the CD are available from the Aurora Research Institute. We highly encourage photocopying of the printed publication to promote its distribution.

### **FOR MORE INFORMATION ABOUT THE RESEARCH LISTED IN THIS BOOK**

Please Contact:

#### **Aurora Research Institute**

Scientific Services  
Box 1450  
Inuvik, NT, X0E 0T0  
Tel: 867-777-4628  
Fax: 867-777-4264

#### **Prince of Wales Northern Heritage Centre**

Department of Education, Culture &  
Employment  
Box 1320  
Yellowknife, NT, X1A 2L9  
Tel: 867-920-8084  
Fax: 867-873-0205

#### **Department of Resources, Wildlife & Economic Development**

Wildlife & Fisheries Division  
Government of the NWT  
600, 5102-50th Ave.  
Yellowknife, NT, X1A 3S8  
Tel: 867-920-8064  
Fax: 867-873-0293

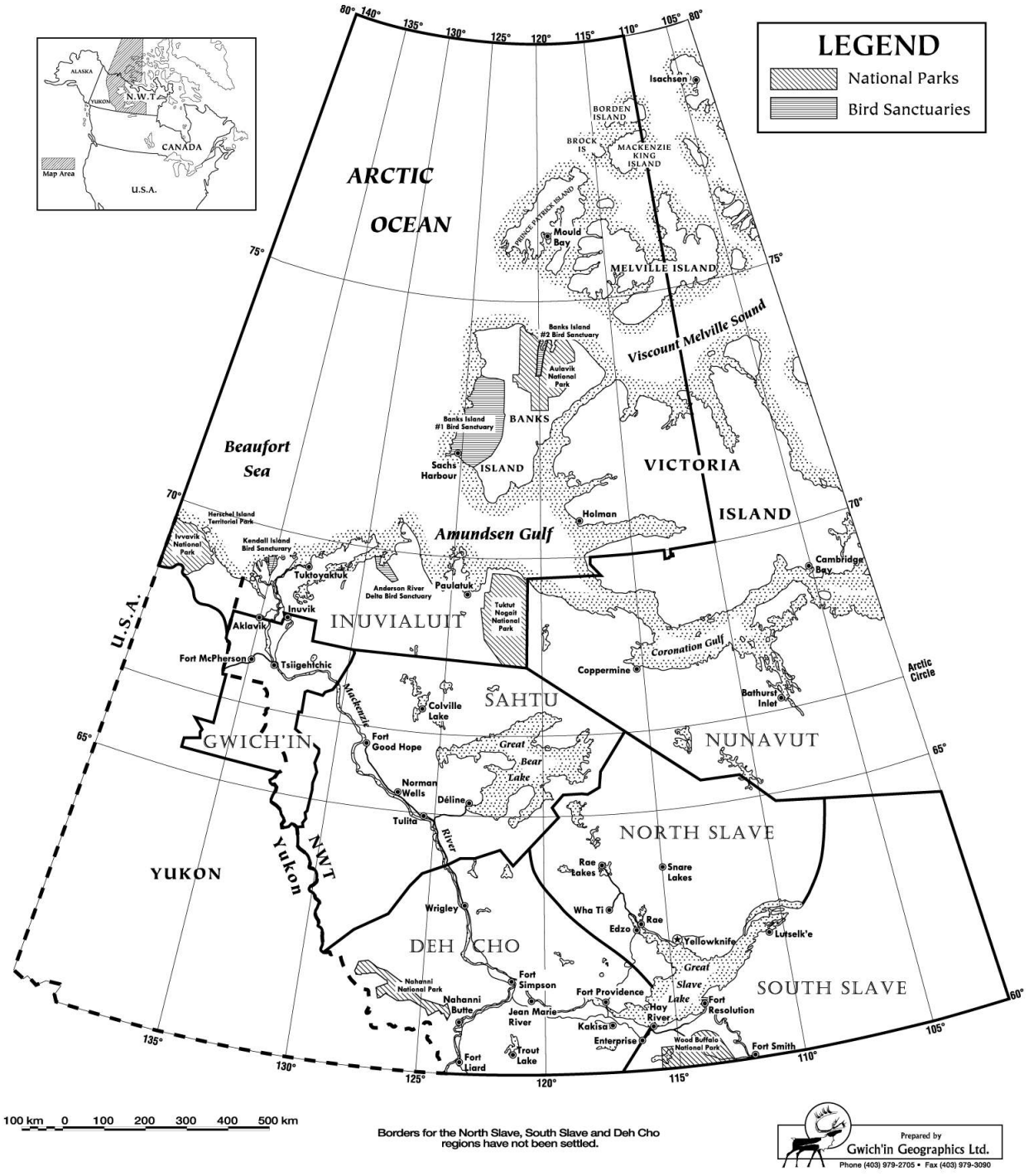
#### **Fisheries Management Department of Fisheries & Oceans**

42043 Mackenzie Highway  
Hay River, NT, X0E 0R9  
Tel: 867-874-5575  
Fax: 867-874-6922

### **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 or telephone.

# Figure 1: Land Claim Regions in the Northwest Territories





# Aurora Research Institutes Science Licences

## Biology

001 Biology

**Alexander, Martin E.**

Northern Forestry Centre

5320-122 St.

Edmonton, AB T6H 3S5

Reference No: 12 402 597 (ARI)

Region: DC Location: 50 km north of Fort Providence

Year of Research: 1998

Other Members of team: 40 fire scientists from 4 countries - Canada, Russia, USA & Germany

### **International Crown Fire Modeling Experiment, Ft. Providence, NWT**

The second phase (1998) of the International Crown Fire Modeling Experiment (ICFME) was successfully carried out between June 22 and July 9, 1998. However, as participants arrived on June 22 they were greeted by a downpour in Fort Providence. Over the next several days, a gradual drying trend produced conditions suitable for initiating crowning forest fires. After a few small-scale test fires, the first full-scale crown fire was ignited (Plot 8) followed by an additional successful high-intensity crown fire on the following day (Plot 7). Experimental fires were attempted on several other days but were canceled due to the lack of suitable wind speed and/or direction. The "burning window" for the second phase (1998) of the "ICFME-II" effectively closed four days earlier than planned due to the territorial wildfire situation. The third phase of ICFME is tentatively scheduled for June/July 1999. For further information, see the ICFME website at: <http://www.nofc.forestry.ca/fire/fmn/nwt/>

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002 Biology

**Anderson, David**

Department of Anthropology  
University of Alberta  
Edmonton, AB T6G 2H4

Reference No: 12 402 611 (ARI)

Region: IN Location: Inuvik, Fort McPherson

Year of Research: 1998

Other Members of team: Patrice Simon and Robert Wishart

**Sustainable Forestry in the Gwich'in Settlement Area**

The aim of this project is to assist with the development of long-term forest management plans for the Mackenzie Delta region and the Gwich'in land in particular. We want to understand the sustainability of forests under various use scenarios, based on both historic use and the history of natural disturbance/regeneration cycles, in an ecosystem at the limits of its distribution. The study involved both community and archival research. Anthropologists interviewed elders and collected Hudson Bay archival materials to provide an overview of the history of timber use and the local value attached to forest resources. We now have an understanding of the impact of the steamboats on the fuel-wood supply along the main rivers and how community members view the forest from a fuel-wood, construction-wood, and other forest resources point of view.

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003 Biology

**Ballantyne, James**

Department of Zoology  
University of Guelph  
Guelph, ON N1G 2W1

Reference No: 12 402 524 (ARI)

Region: IN Location: Holman, NT & Kugluktuk & Resolute

Year of Research: 1998

Other Members of team: Dr. E. Boulding, Dr. P. Hebert, Dr. P. Wright, graduate students and technical staff

**Enhancement of Arctic Charr Culture in Canada**

The project is intended to develop new, improved lines of arctic charr for the aquaculture industry by sampling arctic charr from sites throughout the Canadian arctic, characterizing the charr physiologically and genetically, and selectively breeding for traits desirable for hatchery culture (ex. improved survival at higher temperatures and salinities). Genetic characterization will facilitate future stock identification. Hunters and Trappers Committees (HTC/HTO's) will be partners in the project. Sample sites will be accessed by boat, small aircraft, or snow machine as necessary. At sites, movement for collections will also proceed by boat or snow machine as necessary. The technique of cryopreservation (freezing) of gametes in a dry shipper will be used. Two populations from any of the following watersheds will be sampled based on consultation with members of the local HTC and success at finding arctic charr in spawning condition (ex. in small lakes near Holman, the Kuuk, the Kagloryauk, the Naloagyok). Charr will be captured using gill nets or trap nets. Gametes will be collected and either superchilled or cryopreserved for transportation south. Adults may be sacrificed and placed on ice for later morphological and genetic characterizations, as well as for screening of parasites. Local guides will be employed to assist with sampling. This year, the project was aborted due to the inaccessibility of the spawning sites.

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004 Biology

**Brodie, Chris**

Hallam Knight Piesold Ltd.  
1450 - 750 W. Pender St.  
Vancouver, BC V6C 2T8

Reference No: 12 402 610 (ARI)  
Region: NS Location: Snap Lake  
Year of Research: 1998  
Other Members of team: Oscar Gustafson

**Snap Lake Fishery Inventory**

In September of 1998, sampling was done on Snap Lake (63° 35'N, 110° 51'W), south of Mackay Lake, to inventory the types of fish living in the lake. No previous inventory had been done on the lake. The study was conducted as part of baseline information gathering for a diamond exploration project. Fish were sampled using gill nets and a backpack electrofisher. In total, five fish species were collected from the Snap Lake Project area including longnose suckers, burbot, round whitefish, lake trout, and Arctic grayling. The presence of these species in the Snap Lake Project area is consistent with their known distribution. Large lake trout exceeded 700 mm in length and 4 kg in weight. Examination of the gut contents of several lake trout suggests that their diet consists almost exclusively of small fish. In general, the five fish species collected during the study appear to be concentrated along the shallow reefs and shorelines of Snap Lake. The exception may be the longnose sucker, which appears to be more abundant in deeper water. Fish are uncommon or absent in outlet and inlet streams and in the small lakes within the Snap Lake catchment.

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005 Biology

**Bryant, Wayne**

Bryant Environmental Consultants Ltd.  
P.O. Box 1324  
5016 - 50th Ave.  
Yellowknife, NT X1A 2N9

Reference No: 12 402 583 (ARI)  
Region: NS Location: Gazelle Lake, 20 km east of Ekati and Point Lake  
Year of Research: 1998  
Other Members of team: Laura Kalich, David Giroux, Joe Acorn and Marc Theriault (Vista Engineering)

**Gazelle Lake and Point Lake Preliminary Baseline Study**

At Gazelle Lake, fish were captured by gill nets, angling and baited minnow traps. A total of 10 arctic grayling were caught through gill netting and angling. Observations were made of each fish and statistics were recorded. Fish tissue samples of all fish were collected and kept for future analysis. Phytoplankton results indicate a large variation in total biomass and in species dominance, although diatoms were the dominant group at all stations. In total, eight species of zooplankton were detected and three of these species were most dominant, and for the benthic invertebrates, results indicate a low density of benthic invertebrates which included a variation of chironomids (worms), clams, mites, and ostracods (seed-shrimp). At Point Lake, a total of seven lake trout were caught by gill nets. Observations were made of each fish and recorded. Fish tissue samples were collected and kept frozen for future analysis. Phytoplankton results indicate considerable variation in total biomass (although low) and in species dominance. Golden brown algae were dominant at all stations. A total of eight species of zooplankton were found at all stations with four species being the most dominant.

**Isaac, George**

Atmospheric Environment Service  
Cloud Physics Research Division  
4905 Dufferin Street  
Downsview, ON M3H 5T4

Reference No: 12 402 603 (ARI)

Region: IN Location: Inuvik Airport, Clouds over Beaufort Sea

Year of Research: 1998

Other Members of team: Self

**FIRE III: An Arctic Cloud Study**

Canadian participation in the field portion of the First ISCCP Regional Experiment, Arctic Cloud Experiment (FIRE.ACE) occurred between April 1998 and May 1998 out of Inuvik, N.W.T.. FIRE.ACE is a project being led by NASA to improve our understanding of Arctic clouds and how they affect our climate. This project is fully coordinated with the Surface Heat Budget of the Arctic (SHEBA) project being led by the U.S. National Science Foundation. (The U.S. National Science Foundation leased the Canadian Coast Guard ice breaker Des Groseilliers to sit locked into the ice pack for one year; this ended in August 1998.). The Canadian effort was led by the Atmospheric Environment Service and the full participation of the National Research Council through the use of their precipitation microphysical properties, radiation fluxes, water and carbon dioxide fluxes, and air quality parameters including gas phase mercury. An onboard LIDAR looking up and down gave excellent data on cloud properties and aerosol layers. Most of the flights were over the Beaufort Sea just north of Inuvik. There were four flights over the SHEBA ice breaker located at approximately 76°N, 165°W. The FIRE.ACE data will be processed and sent to a NASA data archive facility to be used by all the project scientists. The Canadian team will contribute to the data analysis and assist in the development of improved parameterization for climate change models. More information on the FIRE Arctic Cloud Study can be found at the Internet site: <http://eosweb.larc.nasa.gov/ACEDOCS/> and additional information on SHEBA can be found at: <http://sheba.apl.washington.edu/>.

**Machtans, Hilary**

Golder Associates Ltd  
5007 Bryson Dr. Main Level YK Centre  
Box 255, Postal Service 9600  
Yellowknife, NT X1A 2R3

Reference No: 12 402 606 (ARI)

Region: DC Location: northwest Fort Liard, east of Liard River and north of Fisherman Lake. Near Ft. Liard and Nahanni Butte

Year of Research: 1998

Other Members of team: Laurie Buckland, Veronica Chisholm, Brian Ronaghan

**Fisheries & Vegetation analysis for the Ranger Oil Fort Liard P66 Pipeline Project**

Ranger Oil Ltd. proposed to construct a 27 km natural gas pipeline that would link the P-66A well site to the West coast Transmission pipeline in the Fort Liard area. Baseline information was obtained for use in an environmental impact assessment (EIA). The study area included the proposed preferred alignment, two optional alignment routes, and the proposed location of the dehydration facility. Surveys generally covered the alignments and a corridor up to 250 m on either side. A terrain evaluation was conducted using aerial photography to summarize the main features and helicopter survey was used to confirm information. Hydrology field studies documented stream geomorphic and floodplain characteristics at nine representative stream crossings in order to record bed and bank material types and gather soil and vegetation data. The vegetation survey focused on a 100 m corridor along the proposed pipeline route and the dehydration facility. Twenty-five sample plots were surveyed to map vegetation communities and identify rare plants. Soil pits were dug in conjunction with the vegetation plots. Wildlife field studies consisted of both ground and helicopter surveys, and focused on species of concern identified during community consultation and discussions with government agencies. Aerial surveys for raptors and Dall's sheep were conducted over a wider regional area. The pipeline routes were traveled on foot to document all wildlife or their signs, with emphasis on carnivore den sites, and potential denning habitat. Fisheries surveys were conducted to determine presence/absence of fish (using electro-shocking and/or angling) to describe fish habitat in various creeks. The Fisheries surveys were also used to document water quality at Fisherman Lake and Fisherman Creek. Water samples were collected and analyzed using standard lab techniques. Archaeology field studies consisted of visual examinations and subsurface shovel tests in areas considered to have potential. A directed traditional knowledge survey was also conducted by the communities of Fort Liard and Nahanni Butte. Geotechnical studies and the environmental impact assessment for the project are available as separate reports.

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008

Biology

**Melton, Derek**

Golder Associates

10th floor, 940 6th Ave. S.W.

Calgary, AB T2P 3T1

Reference No: 12 402 601 (ARI)

Region: DC Location: Suncor's development area near Nahanni Butte and Fort Liard

Year of Research: 1998

Other Members of team: Carol Stefan, Matt Kennedy, Hilary Machtans, Mark Ealey and community assistants from Fort Liard and Nahanni Butte

**Environmental Assessment for Exploratory Drilling Project**

This Environmental Impact Assessment (EIA) was conducted for Suncor Energy Incorporated, who proposed to drill a new gas exploration well and complete a re-entry on a previously drilled location, in the Fort Liard and Nahanni Butte area of the N.W.T. The scope of the EIA includes the site selection, construction, drilling, cleanup and reclamation of two exploration wells and associated access routes, camps and borrow pits. As part of the environmental assessment, a brief literature review, personal interviews and a field survey were carried out. The field survey consisted of on-site visits and/or aerial inspections of each proposed well site, associated access routes, preferred drilling camp locations, potential water source points, borrow pit sites and stream crossings. Terrestrial surveys were conducted to document the mammal and bird species and wildlife habitat in the area of the proposed development, while aquatic surveys were conducted to describe the fish habitat. The impact assessment considered air and noise, soil and vegetation, wildlife, fisheries, heritage sources, socioeconomic and cumulative effects issues. It was predicted that the use of proposed control measures will mean that no significant environmental impacts will occur as a result of the project.

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009

Biology

**Melton, Derek**

Golder Associates

10th Floor, 940 6th Ave. S.W.

Calgary, AB T2P 3T1

Reference No: 12 402 601 (ARI)

Region: DC Location: Paramount's development area near Nahanni Butte and Fort Liard

Year of Research: 1998

Other Members of team: Carol Stefan, Matt Kennedy, Hilary Machtans, Mark Ealey and community assistants from Fort Liard and Nahanni Butte

**Environmental Assessment for Exploratory Drilling Project**

Golder Associates conducted an environmental assessment for Paramount Resources Ltd., who proposed to drill four exploratory natural gas wells in the Fort Liard and Nahanni Butte area of the N.W.T. This report builds upon and complements an earlier report entitled *Environmental Impact Assessment for the Fort Liard Exploratory Drilling Project* (Golder Associates Ltd. and Western Oilfield Environmental Services Ltd., 1997). The report outlines the regulatory approvals and process required for the project, a brief literature review, field survey results, potential impacts (including cumulative effects), proposed control measures, and remaining negative impacts. Field surveys were conducted between December 2-5, 1998 and consisted of on-site visits and/or aerial inspections of each proposed well site, associated access routes, preferred drilling camp locations, potential water source points and major stream crossings. Terrestrial and aquatic habitats were examined for wildlife usage, vegetation and fish habitat were mapped, and potential water sources were assessed. Results of field work were then considered in relation to impact mitigation. It was predicted that the use of control measures as proposed will mean that no significant remaining environmental impacts will occur as a result of the project.

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010 Biology

**Melton, Derek**

Golder Associates  
10th Floor, 940 6th Ave. S.W.  
Calgary, AB T2P 3T1

Reference No: 12 402 601 (ARI)

Region: SA Location: 13 km east of Norman Wells

Year of Research: 1998

Other Members of team: Hilary Machtans, Wayne Bessie, community assistants from Tulita & Norman Wells

**Grey Wolf Norman Wells Drilling Project**

This environmental impact assessment (EIA) was conducted on behalf of Grey Wolf Exploration Inc., who proposed to drill three exploration wells in the Mackenzie River Plain near Norman Wells, N.W.T. during the winter of 1998/99. The scope of the EIA includes the site selection, surveying, construction, drilling, cleanup and reclamation for the three well sites, and the siting of a temporary work camp. The report includes the baseline information. Field surveys were conducted in September 1998 in the area of the proposed development in order to: document the mammal and bird species present, document wildlife habitat, assess potential water sources, document baseline water quality and fish habitat, and identify fish species present. Potential impacts, proposed control measures and residual negative impacts were discussed for the following: air and noise, soils and vegetation, wildlife, fish, cultural resources, traditional land use, socio-economic impacts, and cumulative effects. It is predicted that the use of proposed control measures will mean that no significant residual environmental impacts will occur as a result of the project.

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011 Biology

**Nevitt, Zabey**

Box 25  
Rae Edzo, NT X0E 0Y0

Reference No: 12 402 612 (ARI)

Region: NS Location: Rae, NT

Year of Research: 1998

Other Members of team: Brian Dean

**Water, Sediment and Fish Testing of Marian River (Kagoti Deh) system**

Contaminants, water sediment and fish tissue were sampled from the Marian River system. The purpose of the sampling was to collect appropriate data to assess the levels of contaminants in the water and fish from the traditionally utilized Marian watershed. Water samples were collected and analyzed for metals and two radionuclides. The metals scan minimum detection limit varied with each parameter. Some of the guidelines are lower than the minimum detection limit for specific parameters and must be used cautiously. Aluminum concentrations were measured in water at the site. Sediment was collected from some of the sites and analyzed for metals and radionuclides (Radium 226 ( $Ra^{226}$ ) and Lead 210 ( $^{210}Pb$ )). The radionuclide levels found at the sites are considered slightly above background. Metals known to be toxic and potentially introduced into the Kagoti Deh (Marian River) system through industrial activity include Copper, Lead and Zinc. Metal concentrations found near local industrial activity were about 100 times higher for copper, 25 times higher for lead, and 3 times higher for zinc than in the Marian River. Fish tissue was sampled in Marian Lake for radionuclides. Fish tissue analyzed near upstream industrial activity contained the same  $Ra^{226}$  concentrations but  $^{210}Pb$  concentrations that were about 100 times lower. Analysis of fish tissue confirms the bio-availability of aluminum, calcium, potassium. Field results provide temperature, turbidity, specific conductance data and UTM locations of sampling sites. Field results for pH may not be reliable due to poor operating conditions in the field. This may have affected some of the results.

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012

Biology

**Osawa, Akira**

Ryukoku University

Seta-Ohe, Ohtsu

520-21, Japan

Reference No: 12 402 412 (ARI)

Region: SS Location: Wood Buffalo National Park along highway no. 5

Year of Research: 1998

Other Members of team: Nahoko Kurachi (Hiraoka Forest Inst.) and Shinya Sugita (University of Minnesota)

#### **Reconstruction of Forest Structure and Function in Canadian Taiga**

We collected stem cores of jack pine trees in the northern part of Wood Buffalo National Park. They were used to estimate how the structures of the forest changed over the past few centuries. (Note: tree rings record how thick a tree was at any year in the past so it is possible to determine the number of trees of certain sizes in a forest of the past). In conjunction, we have developed a method for estimating the number of already-dead trees, and have been testing if it works for detailed examination. The samples of stem cores (thousands) were prepared for detailed examination and are currently being examined. We also considered using our method to estimate the effect of global warming on the patterns of development in forest structure.

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013

Biology

**Poniatowski, Brian**

Monopros Limited

Box 2520

Yellowknife, NT X1A 2P8

Reference No: 12 402 602 (ARI)

Region: SS Location: Kennady Lake Camp

Year of Research: 1998

Other Members of team: Leann Collins, Jacques Whitford, Dave Eichenberg, Shirley Pfister

#### **Kennady Lake Wildlife Monitoring and Traditional Sites Identification Project**

A preliminary baseline study on wildlife, birds and vegetation in the area of Kennady Lake, N.W.T. was conducted from June 23- July 7, 1998. The first part of the field program involved a survey of bird species of various habitat types present at 23 transects around Kennady Lake. Over 36 species of birds were identified and recorded during field surveys. Wildlife surveys were conducted along an esker south of the Kennady Lake camp and in the 23 transects created for the bird survey. During the survey along the esker, evidence of caribou, fox, bear, hare, wolf, arctic ground squirrel and wolverine presence or use was found. Wildlife surveys in the area of the bird transects revealed evidence of wolf, caribou, hare, wolverine and arctic ground squirrel presence or use. During the wildlife and bird surveys, species of vegetation were identified and habitat types were divided into five main classes: black spruce forest or forest patch, large boulder or rock outcrop, tundra, marsh/grass, and shrubs, to correspond with the wildlife and bird observations. This baseline field program was designed to assist the community monitor in the collection of baseline data on wildlife, birds and vegetation present in the area of Kennady Lake. The program was not meant to be a wildlife assessment, but merely an inventory of species present at Kennady Lake during the period of the study. The report provides baseline information that can help focus detailed wildlife, bird and vegetation studies that may be conducted in the beginning of 1999.



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014

Biology

**Quinlan, Allyson**

Department of Bioscience

University of Alberta

Edmonton, AB T6G 2E9

Reference No: 12 402 604 (ARI)

Region: SS Location: Fort Smith - Fort Resolution, Hook Lake

Year of Research: 1998

Other Members of team: Troy Ellsworth, Rick Lanoville, & Paul Johnson

**Prescribed Fire and Vegetation Dynamics in the Slave River Lowlands, N.W.T.**

Prescribed fire is currently used in northern sedge/grass meadows in the Slave River Lowlands (SRL), N.W.T., for the purpose of renewing and maintaining bison habitat. The aim of this study was to determine whether plant community composition and willow shrub mortality differs between SRL meadows that were unburned, once-burned or three-times-burned since 1992. In July of 1998, plant species abundance, plant litter biomass, soil pH, and soil depth were recorded from 300- 1m<sup>2</sup> quadrats nested within 30 plots. The influence of burn type and environmental factors on community composition was determined by plotting graphs. Herbaceous plant community composition differed among the three burning treatments. Hay sedge and baltic rush were positively associated with the three burn regimes. Willow shrubs within 100m<sup>2</sup> plots were classified according to shrub growth. With respect to shrub mortality, single burns, multiple burns and soil depth had a negative effect on shrub survival while mean plant litter biomass had a small positive effect on shrub survival (p<0.05). Approximately 24% of willow shrubs were killed on meadows burned three times, compared to 12% on single-burn meadows. Repeated spring burning negatively affected willow shrub growth and survivorship but also influenced herbaceous plant community composition in SRL meadows.

---

015

Biology

**Raillard, Martin**

Parks Canada

Box 1840

Inuvik, NT X0E 0T0

Reference No: 12 402 607 (ARI)

Region: IN Location: entrance of Hornaday Canyon to Paulatuk & Brock River headwaters to One Island Lake

Year of Research: 1998

Other Members of team: Christian Bucher, Alan Fehr

**Vegetation Mapping at Tuk Tuk Nogait National Park**

The objective of this research was to map the vegetation of Tuk Tuk Nogait National Park. A total of 416 plots and 12 vegetation types were recorded throughout the two hiking trips. Four to five people participated in the groundtruthing expeditions from June 24 – July 4 and July 30 – August 9, 1998. The LANDSAT satellite map was used for orientation during hiking and the determination of the 12 vegetation communities. The results were sent to Yellowknife to be integrated into a GIS-based draft vegetation map, indicating the locations of each vegetation type in the park. This resulting map and the recommendations from 1998 field notes, will be used to identify problems with the classification. The researcher plans to fix these problems in the 1999 season. The plants collected in the park have been identified and mounted for the Parks Canada Herbarium.

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016

Biology

**Schryer, Rick**

Golder Associates

209, 2121 Airport Drive

Saskatoon, SK S7L 6W5

Reference No: 12 402 608 (ARI)

Region: NS Location: Fortune Minerals, Lou Lake and Dianne Lake

Year of Research: 1998

Other Members of team: Hilary Machtans, Laurie Buckland

**Fortune Minerals Nico and Dianne Lake Baseline Survey**

Baseline information for Fortune Minerals' NICO and Sue-Dianne properties was obtained through a literature review and aquatics field survey. The literature review documented existing wildlife, archaeology and fisheries information in the area and identified gaps in the existing data. The aquatics field survey was conducted from July 15-23, 1998 to collect data on fish, water and sediment in lakes in the project area. In total nine lakes were studied. Fish, water and sediment samples were collected, as well as water depth and fish habitat data. Aluminum levels in water samples from each lake exceeded the Canadian Water Quality Guidelines. Fish were present in each of the nine lakes sampled. A total of five species, all common to the area, were captured. Further aquatics studies would be required to assess the full impact of the project on lakes in the area. There is limited knowledge of wildlife and wildlife habitat in the area of the proposed development. Additional studies on raptors, furbearers, caribou, waterfowl, wetland habitat and vegetation would be required to meet environmental assessment needs. A search of the national archaeological database revealed 56 sites within the regional study area, none of which are located near the proposed development area. However, no heritage resource investigations have taken place in the immediate vicinity of the proposed development, and it is recommended that such an investigation, including consultation with local aboriginal groups, precede any major developments planned for this area.

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017

Biology

**Steinecke, Karin**

University of Bremen

FB 8, Department of Geography

P.O. Box 330440

D-28334 Bremen, Germany

Reference No: 12 402 594 (ARI)

Region: SS, NS Location: Yellowknife and surroundings, & Pine Point

Year of Research: 1998

Other Members of team: Dipl. Geogr. Bettina Wittenberg

**Studies on the past, present and future ecological impact on Canadian northern boreal forest and arctic ecosystems due to mining activities, shown at the Great Slave Lake area, Northwest Territories, Canada**

During 1997 and 1998, vegetation studies and environmental investigations were done at two different mining sites within the boreal forest at the shores of Great Slave Lake, Canada. When the zinc-lead open pit mine at Pine Point was shut down in 1986, after nearly twenty years of operation, a reclamation plan was developed by the mining company. Nevertheless, the investigations show that the rate of natural re-vegetation on the disturbed areas is very slow in climate-stressed subarctic environments. The vegetation cover ranges from dense weedy stands on the few spoil banks with assisted re-vegetation by alfalfa, to bare rock dumps with hardly any vegetation even after more than 20 years of abandonment. Best re-vegetation success could be reported from dumps which were covered by the former topsoil; here, initial stages of a natural forest development could be found.

**Thomas, Craig**

Dillon Consulting Ltd.

5102 51st Street, Suite 201

Yellowknife, NT X1A 1S7

Reference No: 12 402 605 (ARI)

Region: NS Location: Frank Channel, Stagg River, and km 318 to 333 near Yellowknife

Year of Research: 1998

Other Members of team: Mark Brobbel

**Highway #3 Reconstruction, Preferred Alignment Fisheries Habitat Assessments**

As a result of fisheries studies along the existing and proposed new Highway #3 corridor, a total of 42 watercourse/pond crossings were assessed within the Frank Channel to Stagg River and km 318 to km 330 sections. An additional 11 crossings were assessed between these two sections and identified as being the watercourse/pond environments with the greatest potential to support fish habitat. Three crossings, considered to contain highly significant fish habitat, are related to existing highway bridge structures which will not be altered as a result of construction of the new highway alignment. However, moderately significant habitat crossings will be affected by highway construction and appropriate controls will be required to limit potential impacts to existing and downstream habitats. Although some of the crossings identified as having potentially low significant habitats will not likely be negatively impacted, there will still be a need for appropriate controls to ensure potential downstream habitats are not affected. Management will include slight changes in the proposed new corridor alignment. This will ensure avoidance of potential fish habitats that are located in close proximity to the corridor right-of-way, but not close to the actual proposed roadway. As much as possible, management will also include construction timing that will respect the sensitivity of spring spawning fish and the high flow conditions that increase the potential for sedimentation. Also, low flow barriers must not block the potential migration of fish to overwintering habitats.

**Thomas, Craig**

Dillon Consulting Limited

5102 51 St. Suite 201

Yellowknife, NT X1A 1S7

Reference No: 12 402 605 (ARI)

Region: NS Location: Ekati Diamond Mine, Diversion Channel

Year of Research: 1998

Other Members of team: Mark Brobbel, Pat Hogan, Gary Strong

**1998 Aquatic Effects and Habitat Compensation Monitoring Program Panda Diversion Channel**

In 1994, BHP Diamonds Incorporated initiated the design and construction of the Panda Diversion Channel at its Ekati Diamond Mine in the Northwest Territories. In order to address the harmful alteration of fish habitat due to stream diversion, BHP prepared a Stream Compensation Program report, which outlined plans for creating and enhancing fish habitat within the Panda Diversion Channel, as well as details for implementing a monitoring program. Monitoring of the Panda Diversion Channel in 1998 resulted in the collection of valuable baseline (i.e., pre-habitat enhancement) data which resulted in the following observations and general conclusions. The 1998 open water season was considered to exhibit lower flows than average. This was primarily owing to the early onset of the melt period in the first weeks of May, coupled with only moderate precipitation at that time. The presence of both adult and juvenile Arctic grayling was observed within most existing habitat of the Panda Diversion Channel during the spring of 1998. Grayling larvae successfully hatched and emerged in the channel environment in 1998. Habitat assessments undertaken during both high and low flow conditions (at standard locations) revealed substantial decreases in flow between these two periods, as well as changes in habitat classification. For the most part, the Panda Diversion Channel has stabilized to a point where minimal sedimentation and bank erosion was observed in this low flow year. Habitat enhancements monitored during the 1998 season performed as expected and without any significant structural or functional variation. Benthic invertebrates are colonizing the Panda Diversion Channel and associated habitat structures quite rapidly. Preliminary investigations of microorganism communities within the Panda Diversion Channel and the constructed portion of Grizzly Creek indicate that a healthy microorganism community is being established within these areas. Constructed habitat enhancements, as observed and monitored in 1998, are successfully providing functional channel conditions to support the fish accessing the diversion channel.

**Thomas, Craig**

Dillon Consulting Ltd.

5102 51 Street, Suite 201

Yellowknife, NT X1A 1S7

Reference No: 12 402 605 (ARI)

Region: NS Location: Baker Creek point that traverses Royal Oak Mines Inc, Giant Mine site

Year of Research: 1998

Other Members of team: Mark Brobbel, Patrick Hogan

**Baker Creek Fisheries Habitat and Restoration Study**

Baker Creek, a watercourse that traverses Giant Mine near Yellowknife, has historically been altered as a result of mining operations. The specific objectives of this study were to research and compile relevant historic data regarding Baker Creek fish habitat; characterize creek habitat from Yellowknife Bay north (upstream) to the confluence with the effluent discharge point and Trapper Creek; determine existing habitat use by fish; identify options for creek habitat rehabilitation prior to and upon mine closure, and provide methods of enhancement that will ensure full recovery of the habitat. As expected during the period of effluent discharge from Giant Mine in August, 1998, there were few fish sampled as a component of this study throughout Baker Creek. Downstream of the mining activities, fish observed and/or sampled included spottail shiners and northern pike, whereas upstream of mining activity, the only fish captured were burbot. Fish community sampling during a period of no effluent discharge resulted in the capture of northern pike and longnose sucker at sample sites which provided no catch results during effluent discharge. From the assessment of creek habitat, a Phase I rehabilitation scenario was created to increase the potential spawning habitat within the current creek configuration and to enhance the stability of the channel. In addition, a Phase II rehabilitation scenario was created to provide either short-term habitat enhancements or to establish long-term sustainable habitat for Baker Creek.

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# Contaminants

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021 Contaminants

**Evans, Marlene**

National Hydrology Research Centre  
11 Innovation Boulevard  
Saskatoon, SK S7N 3H5

Reference No: 12 402 503 (ARI)

Region: DC Location: Cli Lake, Fort Simpson

Year of Research: 1998

Other Members of team: Dr. Lyle Lockhart, Jason Inkster, Katherine Gerein

**An Investigation of the Factors Affecting High Mercury Concentrations in Predatory Fish in the Mackenzie River Basin**

This study is investigating why mercury levels are so high in fish (such as pike, walleye, and lake trout) in some lakes in the Northwest Territories. The researchers are beginning their study by looking at the Cli and Little Doctor lakes near Fort Simpson. Last September, they visited the lakes and determined how deep the lakes are and the concentrations of plant nutrients. They also sampled the streams for mercury. Mercury concentrations were very high in some streams, but it is possible that the samples were accidentally contaminated. The sediment samples are still being analyzed. The researchers also sampled some of the animals that live on the lake bottom and caught some pike and whitefish for mercury analysis. They went back to Cli Lake in March and got sediment cores from two deep regions in the lake. They will determine how old the cores are at different depths (slices), and at what rate mercury has been coming into the lake over the past 100 years. The researchers also sampled snow, lake water, and one creek for mercury using different methods than in September. Mercury concentrations were low. They went back in July and continued studies focusing on Cli Lake.

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022 Contaminants

**Stephens, Glen**

DIAND, Contaminants Division  
P.O. Box 1500  
Yellowknife, NT X1A 2R3

Reference No: 12 402 609 (ARI)

Region: SA, DC Location: various lakes in the Sahtu and Deh Cho Region

Year of Research: 1998

Other Members of team: self

**Investigating the Importance of Water Chemistry on Mercury Concentration in Fish from Mackenzie River Basin Lakes**

The objective of the study was to try and establish if there are any relationships between basic lake water chemistry and mercury levels in fish from lakes in the Mackenzie River Valley that could be used to identify areas with potential contaminant problems. Towards this end, basic water chemistry samples (eg. ions, nutrients and metals) were collected from sixteen lakes in the Sahtu and Deh Cho regions. The lakes selected either had existing fish contaminant data or were requested by a community or organization. Interpretation of the results is being conducted, with a report to be produced and distributed to the communities and organizations.

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# Fossils

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023 Fossils

**Pratt, Brian**

University of Saskatchewan  
114 Science Place  
Dept. of Geological Sciences  
Saskatoon, SK S7N 5E2

Reference No: 12 412 038 (ARI)

Region: SA Location: Rockslide Pass - Wrigley Lake map sheet

Year of Research: 1998

Other Members of team: Katherine Gerein

**Trilobite Biostratigraphy of Rockslide Formation (Middle Cambrian)**

In July 1998, a month was spent conducting geological fieldwork in the Mackenzie Mountains at two localities near the Natla River. This was a follow-up of my earlier efforts on Cambrian strata in the Mackenzie Mountains which I carried out in the mid-1980's; the 1998 work was funded through the Natural Sciences and Engineering Research Council of Canada's LITHOPROBE program. Trilobite fossils were collected from the lower half of the Rockslide Formation, a 500 m thick sequence of deep water, silty shales and limestones that were deposited on the continental slope of northwestern North America over half-a-billion years ago. The purpose of collecting trilobites is to establish a relative time scale based on the sequence of fossils, and to compare that sequence with deposits from the same time period in different parts of the world. The comparison will be based on similarities and differences of the fossil composition. A further trip is planned to complete the study.

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024 Fossils

**Wilson, Mark V.H.**

Laboratory for Vertebrate Paleontology  
University of Alberta  
Edmonton, AB T6G 2E9

Reference No: 12 412 044 (ARI)

Region: DC Location: Avalanche Lake and Broken Skull River

Year of Research: 1998

Other Members of team: Dr. Brian D.E. Chatterton, Dr. Hans-Peter Schultze, Allan Lindoe, Brenda Hunda, Gavin Hanke, Kenneth Soehn

**Collection of Silurian Fishes and Trilobites and Articulated Remains of Devonian Chondrichthyans and other Fishes from the Mackenzie Mountains, N.W.T.**

During July of 1998, we visited two localities in the Mackenzie Mountains to collect fossils of early fishes and trilobites. Four researchers from the Biological Sciences Department, University of Alberta (Dr. Mark Wilson, graduate student Gavin Hanke, technician Allan Lindoe, and research assistant Kenneth Soehn), German palaeontologist Dr. Hans-Peter Schultze of Berlin, and two researchers from the Department of Earth & Atmospheric Sciences (Dr. Brian Chatterton and graduate student Brenda Hunda), participated in the study. Dr. Wilson is the leader of Project 406 of the International Geological Correlation Program. One goal of this study was to obtain samples from rocks of Late Ordovician to Lower Devonian age, and to dissolve these samples in acid to yield microscopic remains of trilobites and vertebrates. The microscopic remains were useful for dating the strata and for studying faunal changes such as ancient extinction events. A second goal was to find fossils showing the body form and scale structure of primitive vertebrates. The collected samples are already helping to date and correlate the rocks with those elsewhere and are revealing new details of the anatomy of early fishes.

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# Geology

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025 Geology

**Bleeker, Wouter**

Geological Survey of Canada

601 Booth Street

Ottawa, ON K1A 0E8

Reference No: 12 404 506 (ARI)

Region: NS Location: Yellowknife area, Hearne Lake to Gordon Lake, Beniah Lake to Lac de Gras, Acasta River area and Point Lake Area

Year of Research: 1998

Other Members of team: Dr. J. Ketchum, Bill Davis, Richard Stern, John Waldron, Keith Sircombe and assistants, Robert Sparks & Dr. Keith Benn and assistants

## **Thematic Structural, Stratigraphic and Geochronological Studies of the Slave Structural Province.**

The study focuses on the relationships between the very ancient rocks in the central, southern and western part of the Slave Province, and the adjacent volcanic and sedimentary rocks. A more detailed outline of the basement rocks has been proposed on the basis of work in previous years and has been generally accepted. The stratigraphy of the overlying volcanic and sedimentary has been refined and is being worked on in further detail by applying state-of-the-art isotopic dating techniques. Interim results are published in Geological Survey of Canada Current Research Papers. A special issue of the Canadian Journal of Earth Sciences on the Slave Structural Province is in press and will come out as the July issue of the year. This issue, guest edited by Drs. Wouter Bleeker and Bill Davis, contains 11 papers and represents the state-of-the-art on the geology of the Slave Province. Final results of the project will be compiled on maps and these will be incorporated in a new geoscientific atlas of the Slave Province. Detailed and up-to-date geological maps and geoscientific data are essential to land use planning by various governments and stakeholders. Results are also being disseminated yearly at the Yellowknife Geoscience Forum. Interim products were provided to the Government of the NWT as the basis for their "Protected Area Study".



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# Health

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026

Health

**DeRoose, Elsie**

Population Health Division

Dept. of Health & Social Services

Box 1320

Yellowknife

NT, X1A 2L9 Dept. of Health & Social Services, GNWT

Reference No: 12 408 115 (ARI)

Region: ALL Location: elsie\_deroose@gov.nt.ca

Year of Research: 1998

Other Members of team:Self

## **Baseline Data Study for the Canada Prenatal Nutrition Program (CPNP)**

The purpose of this study is to collect baseline information across Canada in a sample of communities that do not yet have or have just started CPNP or similar prenatal nutrition programs. This information will act as a baseline for comparison when looking at the ability of CPNP projects to improve the health of pregnant women and their babies. The baseline could also be useful in the planning and/or evaluation of other programs designed to improve the health of women and children. Data was collected during in-person interviews by community interviewers with women who had recently given birth, using a 45-item questionnaire and an Interviewer's manual to assist community interviewers. In the N.W.T. in 1998/1999, nineteen communities were identified to participate in the CPNP baseline data study. The study has been scheduled to be conducted from October 98 October 99. About 800-1000 surveys will be collected from First Nations and Inuit women, as well as "non-aboriginal" women (through Health Canada (HPPB)). Data collected from the communities will be sent by the GNWT Department of Health and Social Services to Health Canada. Health Canada has contracted with the Clinical Epidemiology Unit of the Ottawa Hospital to handle the data entry and analysis phase. The final report is expected in the Spring of 2000.

**MacNeil, Chuck**

Inuvik Regional Health &amp; Social Services Board

Bag Service #2

Inuvik, NT X0E 0T0

Reference No: 12 408 116 (ARI)

Region: IN, SA Location: Communities in Sahtu, Gwich'in and Inuvialuit Settlement region

Year of Research: 1998

Other Members of team: Jan Houseman, Bill Wrathall, Dr. Valoree Walker, Jody Walker, and community representatives

**Inuvik Regional Human Contaminants Monitoring Program**

The Inuvik Regional Human Contaminant Monitoring Program, managed by the Inuvik Regional Health and Social Services Board, is nearing the final stage of this three-year program. Baseline levels for exposure were determined for contaminants in the blood, umbilical cord blood, and hair from pregnant women in the Inuvik region, NWT. In addition to this baseline data, the amount of contaminant exposure through the diet of traditional food will be estimated. This analysis will include portion size data and contaminant levels in country foods calculated by the Centre for Nutrition & Environment of Indigenous peoples (CINE) for the Inuvik region. CINE will also use this information to develop a model that can be used to identify which parameters (maternal blood, cord blood, hair or dietary estimate) are better indicators of mercury exposure, and to develop a model that can be used to relate the exposure parameters. This model can then be used to interpret results generated from other monitoring programs in other regions. The study should be completed by March 2000 and a report will be available, including a detailed analysis of the information collected, at that point. Further information is available through the Inuvik Regional Health and Social Services Board (IRHSSB) Contaminant Project Coordinator.

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# Physical Science

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028 Physical Sciences

**Burn, C. R.**

Carleton University  
1125 Colonel By Drive  
Ottawa, ON K1S 5B6

Reference No: 12 404 325 (ARI)

Region: IN Location: Illisarvik, Garry Island , Inuvik area

Year of Research: 1998

Other Members of team: Doug Joe, Duncan Tanner, Dr. J.R. Mackay, Anne-Paseale Barleman

**Permafrost Investigations, Western Arctic Canada**

In 1998, research was concentrated on field investigations at Illisarvik, a drained lake on Richards Island, and near Inuvik. At Inuvik, we are monitoring the growth of ice wedges to see how the ground deforms each year as it warms and cools. We are also monitoring the tilting of trees on permafrost soil to understand the origin of the "drunken forest", where trees are tilted at various angles. In both the cases of ice wedges and trees, the movement is seasonal with back-and-forth oscillations each year. At Illisarvik we are studying the growth of a small pingo which appeared in 1995, 17 years after the lake drained. We are also examining the doming up of pond ice in the lake bottom which occurs every winter. The ice domes due to water being added to the pond from growth of permafrost in the drained lake sediments. This year we have a pressure gauge in the pond to monitor the force required to dome up the ice.

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029 Physical Sciences

**Dallimore, Scott R.**

Geological Survey of Canada  
601 Booth Street  
Ottawa, ON K1A 0E8

Reference No: 12 404 359 (ARI)

Region: IN Location: Mallik 2L-38 Drill site

Year of Research: 1998

Other Members of team: Participants from Geological Survey of Canada, US Geological Survey, Japan Petroleum Exploration Company & University groups of Canada, the United States and Japan

**Gas Hydrate Research Studies Related to Drilling of a Gas Hydrate Exploration Well at Mallik 2L-38, Mackenzie Delta, N.W.T.**

In March of 1998, a 1150 m deep gas hydrate research well, JNOC/JAPEX/GSC Mallik 2L-38, was completed at the northeastern edge of the Mackenzie Delta, Northwest Territories, Canada. This project brought together researchers from North America and Japan to undertake the first investigation of a natural gas hydrate occurrence beneath permafrost. Natural gas hydrates are known to represent a significant hydrocarbon reservoir in many Arctic basins, however prior to Mallik 2L-38, almost no field research had been undertaken to evaluate their properties in their normal environment. While gas hydrates may represent a significant energy source for the future, they also pose a potential hazard to conventional oil and gas drilling in Arctic areas. More recently, concern has been expressed that gas hydrates may be a significant source of additional greenhouse gas, which if released to the atmosphere may worsen future global climate warming. A primary objective of the well was to undertake a comprehensive scientific research program to study an Arctic gas hydrate accumulation. Field research conducted as part of the Mallik 2L-38 program included collection of permafrost and gas-hydrate-bearing core samples, downhole geophysical logging and a vertical seismic profile survey. Laboratory and modeling studies undertaken during the field program, and subsequently as part of a post-field research program, document the sedimentology, physical/physical properties, geochemistry, geophysics and reservoir characteristics of the Mallik gas hydrate accumulation. A final scientific results volume will be released by the Geological Survey of Canada in July, 1999.

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030

Physical Sciences

**Digel, Mark**

Golder Associates Ltd.

10th fl., 940-6th Avenue S.W.

Calgary, AB T2P 3T1

Reference No: 12 404 524 (ARI)

Region: SS Location: Thor Lake and Hay River

Year of Research: 1998

Other Members of team: Matt Kennedy, Hilary Machtans

**Environmental Baseline Study for the Thor Lake Beryllium Project**

A field survey was carried out to obtain additional information for the Thor Lake Bulk Sample Project as part of Highwood Resources Ltd.'s efforts to ensure that potential environmental impacts are avoided or minimized. Terrestrial field surveys took place at the Thor Lake site, while aquatic field studies took place at both the Thor Lake and Hay River sites. Additional wildlife studies consisting of aerial surveys for raptor nests and for beaver lodges took place in August 1998. A benthic invertebrate collection was conducted at the Hay River site in September 1998. Habitat use by ungulates was assessed using browse and pellet surveys. Incidental sightings of wildlife as well as wildlife signs were documented. Lichen samples were collected from three sites previously studied and analyzed for selected contaminants. Eight lakes in the Thor Lake area were sampled as part of the aquatics survey, as well as sections of the Hay River, to document baseline water and sediment quality, fish health, and fish habitat. Benthic invertebrates and sediment samples were collected from four locations in the Hay River area using an Eckman dredge. Water, sediment and fish tissue was analyzed for baseline metal and selected radionuclide concentrations. Adult fish from two levels of the aquatic food chain were collected using gill nets and/or angling. Fish habitat was mapped on each water body.

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031

Physical Sciences

**Dyke, Arthur S.**

Geological Survey of Canada

601 Booth Street

Ottawa, ON K1A 0E8

Reference No: 12 404 389 (ARI)

Region: IN Location: Cape Baring and Cape Ptarmigan (near Holman)

Year of Research: 1998

Other Members of team: J. Savelle

**Canadian Arctic Archipelago Paleoenvironments: Beaufort Sea Bowhead Whale History Component**

Over the last 10 years, the researchers have located the remains of about 1200 bowhead whales in the central and eastern Arctic Islands. They have determined the ages of about 400 of these (present-day to about 1000 years old). This information shows that there were times when the whales were able to get into certain channels, and times when they were not because the sea-ice conditions changed. The researchers wanted to see if the history of the bowhead whale in the western Arctic is similar to that in the eastern Arctic. Last summer, for a two-week period, they searched the area around Cape Baring, Victoria Island for bowhead fossils, and found the remains of 41 animals. From the elevations of these bones above sea level, the researchers expect that all of these fossils are between 8000-10000 years old. Over the winter of 1999, they will determine the true ages of 15 of these fossils by radiocarbon dating.

**Dyke, Larry**

Geological Survey of Canada

601 Booth St.

Ottawa, ON K1A 0E8

Reference No: 12 404 528 (ARI)

Region: IN Location: Niglintgak Island area (Kumak Channel), Mallik L-38 sump, Parsons Lake area

Year of Research: 1998

Other Members of team: Kristina Kamichaitis, Shawn Julian

**Using Drilling Mud Sumps to Determine how well Permafrost Contains Contaminants**

Oil and gas exploration in frontier arctic regions has relied on ice-bonded permafrost as a medium for containing waste fluids from drilling operations. Drilling mud is placed in pits (sumps) excavated in permafrost and covered once the contents are partially or completely frozen. However, the performance of permafrost as a containing medium for these wastes has not been verified. If the drilling fluids or other wastes are to be routinely disposed of in permafrost settings, the true suitability of permafrost as a waste container needs to be determined. Although the hydraulic conductivity of well ice-bonded permafrost may be low, it can be greatly increased depending on textural or environmental factors. Permafrost may be dry or it may contain appreciable amounts of unfrozen water. It may contain an ice fabric which, when warmed by disturbance or climate change, greatly increases hydraulic conductivity. Thawing ice fabric in the active layer can produce the same effect. These factors suggest that contaminant movement in frozen and thawing ground should be examined to gain a better understanding of the suitability of permafrost sites for waste disposal. Although existing drilling mud disposal sites in the Mackenzie Delta area are not an immediate environmental threat, they offer a unique opportunity for examining the effectiveness with which contaminants have been contained by ice-bonded sediments. Preliminary assessments of five sumps show that potassium chloride, present in muds as a freezing point depressant, is migrating away from sumps through the active layer to distances of tens of meters on level ground and hundreds of meters on sloping ground. It has also moved into ice-bonded permafrost sediments. Diffusion, solute exclusion ahead of freezing fronts, and advection where sumps are located on slopes, are the presumed causes of solute migration. These results suggest that neither permafrost nor fine-grained thawing sediments can be expected to completely contain contaminants.

**Haykin, Simon**

McMaster University  
Communications Research Laboratory  
1280 Main St. West  
Hamilton, ON L8S 4K1

Reference No: 12 404 539 (ARI)

Region: DC Location: Fort Simpson Airport

Year of Research: 1998

Other Members of team: David Hudak and Robert Nissen

**Radar Observations in Support of the Mackenzie GEWEX Study (MAGS)**

The Mackenzie GEWEX Study (MAGS) is the Canadian component of the international effort called the Global Energy and Water Cycle Experiment (GEWEX). MAGS supports a World Climate Research Program to observe, understand, and model the hydrological cycle and energy fluxes in the atmosphere, at the land surface, and in the upper oceans. One goal of the program is to reproduce and predict (by means of suitable models) the variations of the global hydrological regime. Having achieved this, a second goal is to predict the impacts of the global variations on atmospheric and surface dynamics. A third goal is to reproduce and predict variations in regional hydrological processes and water resources. Finally, the last goal is to predict the response of regional hydrological processes and water resources to changes in the environment such as the increase in greenhouse gases. GEWEX will provide significant improvements in the ability to model global precipitation and evaporation. It will also provide an accurate assessment of the sensitivity of atmospheric radiation and clouds to climate change. McMaster University's role in MAGS involves the location and operation of its experimental radar for measuring the precipitation and cloud properties within 75 km of the Fort Simpson airport. In 1998, radar measurements were taken during experimental periods in August/September/October and in early December. These measurements are being used to develop and validate models to be used over larger regional areas. The final experiment will take place in April/May 1999. More information on MAGS is available at: <http://www1.tor.ec.gc.ca/GEWEX/MAGS.html>

**Jones, Alan**

Geological Survey of Canada  
1 Observatory Crescent  
Ottawa, ON K1A 0Y3

Reference No: 12 404 525 (ARI)

Region: NS Location: North Slave - Big Lake, Indin Lake, Lac de Gras, Aylmer Lake, Wheeler Lake, Duncan Lake, Camsell Lake

Year of Research: 1998

Other Members of team: Dr. Alan D. Chave & Dr. Rob Evans Woods Hole Oceanographic Institution, Woods Hole, MA

**Deep Electromagnetic Studies of the Oldest Archean Craton: A Contribution to the Lithoprobe SNORCLE Transect**

In order to obtain broader regional coverage of the Slave craton at a minimal cost, a novel experiment is in progress involving deploying shallow-water electromagnetic instrumentation. This equipment was designed by staff of Woods Hole Oceanographic Institution to operate on the ocean bottom of the continental shelves and is in use in lakes on the craton. As such, this experiment is the first of its kind anywhere in the world. Using a float plane, the total complement of ten instruments was deployed in lakes around the Slave craton during early July 1998. The locations of the lake sites comprise roughly three east-west lines comprising: Northern Line: Point Lake, Contwoyto Lake, Rockinghorse Lake Middle Line: Indin Lake, Snare Lake, Big Lake, Lac de Gras Southern Line: Wheeler Lake, Duncan Lake, Lac Tet d'Ours. In July 1999 these instruments will be retrieved, and re-deployed in August 1999 in another ten lakes to give complete coverage over the whole of the Slave craton.

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035

Physical Sciences

**Jones, Alan**

1 Observatory Crescent

Geological Survey of Canada

Ottawa, ON K1A 0Y3

Reference No: 12 404 525 (ARI)

Region: NS Location: Yellowknife, Lac de Gras, Lupin Mine

Year of Research: 1998

Other Members of team: Prof. I.J. Ferguson, University of Manitoba Dr. Juanjo Ledo, University of Barcelona

**Magnetotelluric studies along the Lupin Mine winter road.**

A pilot magnetotelluric (MT) study along the winter road from Yellowknife to the Lupin mine on Contwoyto Lake took place during March-April, 1998. There were twelve MT sites. Three of these were at the southern end of the winter road close to Tibbet Lake, and the other nine were in an east-west profile from the northern end of Gordon Lake to the western end of MacKay Lake. This study showed the logistical complexities involved in making these measurements, and that they could be done successfully. Subsequently, the main phase of data acquisition took place during March 1999, and comprised seventeen sites from MacKay Lake to the northeastern end of Contwoyto Lake plus some sites down the road to Monopros' Kennady Lake camp. This main phase was cut short due to the warm weather that closed the road two weeks earlier than planned. Initial inspection of the MT data probing to great depths shows an anomaly at the Lac des Gras sites, suggesting shallower depth to the lithosphere-asthenosphere boundary in that region than elsewhere on the Slave craton. A final completion phase may take place in March 2000 to fill in missing information. This phase is contingent on funding.

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036

Physical Sciences

**Kah, Linda**

University of Missouri

Department of Geological Sciences

101 Geological Sciences Building

Columbia, MO 65211 USA

Reference No: 12 404 540 (ARI)

Region: SA Location: Dease Arm - Great Bear Lake

Year of Research: 1998

Other Members of team: Dr. Timothy W. Lyons, Dr. Tracy D. Frank, Dr. Julie K. Bartley, Micael Formolo, Burt Thomas

**Geochemical and Isotopic Constraints on Mesoproterozoic Ocean Chemistry**

The Mesoproterozoic Earth (1600 to 1000 million years ago) witnessed significant changes such as the tectonic activity that combined all the continental masses into the supercontinent of Rodinia. These mountain building events were a driving force in changing the chemistry of the Earth's oceans. These chemical changes, in turn, permitted the evolution and diversification of the first multicellular algae. In order to understand how these changes occur, we study the structure and composition of limestone that was originally deposited in these ancient oceans. In the case of the Dismal Lakes Group which outcrops between Kugluktuk (Coppermine) and the northern shore of Great Bear Lake, we can observe giant reefs that were growing in these oceans nearly 1300 million years ago. These reefs are comparable in structure to the Great Barrier Reef of Australia today, except that they were constructed entirely of microscopic bacteria instead of coral because coral had not yet evolved. By studying the structure of these reefs, we have been able to determine which parts were growing at the same time, which parts were added at a later time, and the water depths that different parts of the reef represent. We are currently examining the geochemistry of these rocks to understand how the chemistry of the oceans may have varied, both in time and in space, during the growth of these ancient reefs.

**Kershaw, G. Peter**

Dept. of Earth &amp; Atmospheric Sciences

University of Alberta

Edmonton, AB T6G 2E3

Reference No: 12 404 116 (ARI)

Region: SA Location: between Macmillan Pass and just east of Caribou Pass of the Canol Heritage Train, approx. 250 km south-west of Tulita

Year of Research: 1998

Other Members of team: Linda, Eric and Geoffrey Kershaw, Marlayne Gunning

**Ecological and Geomorphological Investigations in the Alpine Tundra of the Mackenzie Mountains, NWT.**

In 1998, researchers were in the Canol study area from mid-July until late August. Detailed studies were completed on the natural recovery of Canol Project disturbances between Macmillan Pass (Mile 231) and east of Caribou Pass (Mile 185) of the Canol Heritage Trail. Vegetation quadrats were assessed and permanently marked for a future survey. Plant studies included identification of plants and estimates of their ground cover. Data analysis continues on this study. An automated weather station in the head of Dale Creek valley was destroyed by a grizzly bear and all the data were lost. However, the automated weather stations installed in 1990 were intact and were left running to collect information on temperatures (soil and air), wind speed, global radiation, precipitation, and snowpack depth. The study of permafrost land forms in Caribou Pass was initiated with hand-coring of the features and trenching to remove samples for analysis. These data will be useful in the development of theories regarding the presence and status of permafrost land forms in the area.

**Kershaw, G. Peter**

Dept. of Earth and Atmospheric Sciences

University of Alberta

Edmonton, AB T6G 2E3

Reference No: 12 404 116 (ARI)

Region: SA Location: 10 km North of Tulita

Year of Research: 1998

Other Members of team: Marlayne Gunning, Linda, Eric and Geoffrey Kershaw

**Studies of the Environmental Effects of Disturbances in the Subarctic (SEEDS)**

On June 7, 1995, a forest fire burned through the SEEDS camp and research site that was established in 1984, 10 km north of Tulita. During May 1996, the research site was reactivated with new automated weather stations and an unburned forest site (3 km north of the original site) was instrumented for comparison. The research initiated in 1996 has continued to the present. In February each year, the camp is re-supplied by snowmobile and toboggan from the winter road. At that time, detailed snow sampling is also conducted to compare the snowpack on the burned and unburned areas. The 1998 summer field season began in May and continued until mid-August. During this period a number of studies were conducted. The automated microclimate stations were serviced and data in memory were retrieved. Permanently-marked vegetation plots were re-sampled to measure plant cover and regrowth following the fire. The depth of thaw was measured at location across the site. Further work was done on the base camp to protect goods stored on the site. The electric bear fence was checked and a new battery was installed.



**Kochtubajda, Bob**

Environment Canada  
Room 200, Twin Atria Building  
4999-98 Ave.  
Edmonton, AB T6B 2X3

Reference No: 12 404 537 (ARI)

Region: DC, SA Location: Fort Simpson Airport, Checkpoint, Lindberg Cabins, Fort Good Hope

Year of Research: 1998

Other Members of team: Ron Stewart, Paul Louie, Bob Crawford, Chris Spence

**MAGS Ground-Based Measurement Studies**

A critical issue facing the Mackenzie GEWEX Study (MAGS) concerns the lack of adequate surface weather observations over the Mackenzie Basin. An enhancement of the surface weather-observing network was set in place to support the scientific studies of MAGS, and to provide additional weather data for use in weather forecasts and warnings. Several new meteorological stations, or improvements of existing ones, were installed at Fort Simpson Airport, Lindberg Landing, near Checkpoint and at Fort Good Hope in data-sparse areas that were representative of the different land cover regimes across the Mackenzie River Basin. Each of the stations measures air temperature, humidity, air pressure, wind speed and direction, precipitation, snow depth, and records them on computer data loggers. Some sites contain additional instrumentation for observing soil moisture and/or solar radiation information. The MAGS weather stations transmit meteorological observations via satellite hourly to the Edmonton auto-station data centre within 20 minutes of the initial upload. The station at Fort Good Hope on the other hand, transmits its data over a phone line. Initial quality control protocol procedures are applied and the data decoded. These "semi-quality controlled" data are then transferred to the MAGS web site (<http://www.tor.ec.gc.ca/GEWEX/>), a day later and are available to researchers in accordance with the MAGS data policy and with a caveat that the data have not been fully quality controlled. The weather data are now undergoing a more careful quality control program.

**Lauriol, Bernard**

Department of Geography  
University of Ottawa  
Ottawa, ON K1N 6N5

Reference No: 12 404 534 (ARI)

Region: IN Location: Fish Creek, south of White Mountains

Year of Research: 1998

Other Members of team: Iannick Lamirande, Kevin Butler

**Mass Movements in the Aklavik Mountains and Water Quality in the Richardson Mountain Catchments**

The main objective of this research was to study mass movements and water quality in the Richardson Mountains catchments. The project was started in 1997 by I.D. Clark. Similar studies have been done in the past near Old Crow and in the British Mountains (Firth River). The aim of the study of mass movements in the Richardson Mountains was to understand the processes of erosion related to climate changes. The site studied is located south of Little Fish Creek. The landscape looks like bench forms which are named Cryoplanation terraces. This site was visited in 1997 for 2-3 hours. The formation of the terraces is not really understood but it is suspected that the melting of snow plays an important role. One way to study their formation was the analysis of clay and pebbles. Water analysis from snow banks also provided information. Water quality in the Richardson Mountains was examined to understand the springs in Fish Creek. The researchers tried to answer the following questions: 1) origin and age of water; 2) temperature and salinity; 3) common points between Cache Creek springs and Fish Creek springs; and 4) extension of the icing a century ago.

**Lesack, Lance**

Department of Geography  
Simon Fraser University  
Burnaby, BC V5A 1S6

Reference No: 12 404 485 (ARI)

Region: IN Location: Mackenzie Delta near Inuvik

Year of Research: 1998

Other Members of team: Margaret Squires, Christopher Teichreb, Amy Schultz

**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. Ultimately, the a more general ecosystem model for lakes in the floodplains & deltas of major world rivers that could help assess the effects of multiple stresses on rivers as a result of global climate change. Specific goals for the 1998 season include evaluating the distributions of aquatic plants and their relation to water clarity and flooding regime among a system of nine connected lakes ranging from turbid to clear (Ph.D. project, Squires), and evaluating how changes in ultraviolet (UV) light affects dissolved organic carbon (DOC) levels and growth of bacteria among lakes of the delta (M.Sc. project, Teichreb). Squires spent July and August measuring amounts of aquatic plants, water clarity, sediment characteristics, and was successful in characterizing the distributions of larger plants in a system of lakes. During July and August, Mr. Teichreb set up a series of enclosures (large plastic bags in South Lake) with differing transparencies to UV light and differing amounts of DOC, and was successful in measuring the response of bacteria to the experimental conditions. The results from the enclosures were also successfully compared to bacteria and DOC levels among 40 other lakes near Inuvik. Analysis of data from earlier work has lead to a publication in "Hydrological Processes" entitled "Lake Sedimentation in the Mackenzie Delta, N.W.T." (Authors: Marsh; Lesack; and Roberts).

**MacNaughton, Robert**

Department of Geological Sciences  
Queen's University  
Kingston, ON K7L 3N6

Reference No: 12 404 529 (ARI)

Region: SA Location: Mackenzie Mountains, Backbone Ranges, Shale Lake, Brokensull River, Bluefish Creek

Year of Research: 1998

Other Members of team: D. Kisilevsky

**Terminal Proterozoic Events in Northwestern Canada**

Our research addressed two main problems. The first dealt with the type section of a unit of rock called the Backbone Ranges Formation, located in the Brokensull River region. (All formations must have a type section — a section that defines the formation's typical nature.) The Backbone Ranges Formation is recognized elsewhere in the Mackenzie Mountains, but it is difficult to correlate these areas with the type section. We spent ten days re-examining the type section, and found that it contains a major erosion surface, representing erosional removal of two formations that are present elsewhere in the Mackenzie Mountains. This explains the difficulties in correlation, and we have developed a scheme for correlating the type section with other areas. The second problem was related to the Twitya Formation, a unit of rock containing the oldest-known animal fossils. It is important to know what environments these animals lived in, and our studies at Stoneknife River and Bluefish Creek indicate that they lived in very deep water, probably on the continental slope.

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043

Physical Sciences

**Marsh, Philip**

11 Innovation Blvd

National Hydrology Research Institute

Saskatoon, SK S7N 3H5

Reference No: 12 404 378 (ARI)

Region: IN Location: Havikpak Creek & Trail Valley Creek

Year of Research: 1998

Other Members of team: Dr. J. Pomeroy, Mr. C. Onclin, Mr. M. Russell, Dr. B. Quinton, Ms. N. Neumann, Dr. W. Rouse

**Snow accumulation / runoff in high latitude permafrost basins.**

Detailed field studies were done in the Inuvik area during 1998 to look 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. Our work in 1998 concentrated on measuring or estimating all of the water entering into and being stored in the two research basins (Trail Valley Creek and Havikpak Creek). These include snow fall, blowing snow into/out of the basin, sublimation of snow during blowing events, rainfall, evaporation, stream flow and meltwater storage. Results from last year clearly show that storage of meltwater in the snowpack, unfrozen soil, and stream channels can be very large. This results in a long delay between snowmelt and stream runoff. Our ongoing work will compare results from a number of different years so that we can understand the change from year to year, 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 on these environments.

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044

Physical Sciences

**McGuinness, Michaela**

1140 Fisher Ave. #1508

Ottawa, ON K1Z 8M5

Reference No: 12 404 536 (ARI)

Region: IN Location: Along Campbell Lake

Year of Research: 1998

Other Members of team: 2 local research assistants

**Geomorphology of the Campbell Uplift, Northwest Territories**

The aim of the research project was to document and describe the land forms and lithology of the 18 km<sup>2</sup> Campbell Uplift which is about 10 km southeast of Inuvik, Northwest Territories. The general hypothesis of the study was that the present land forms of the Paleozoic bedrock of the Campbell Uplift developed as a result of both karst and periglacial processes acting upon a landscape mainly of glacial origin, and that these processes are seen principally through the filter of lithological variation. During seven weeks of field work, in July and August 1999, a geomorphological survey of the area was completed and included the documentation and description of the land forms and lithology of six field areas in the Campbell Uplift. Dimensions, characteristics, and locations of the land forms were recorded in the field and these data were supplemented by rock samples and photographs. Analysis of these data (which is not yet finished) led to the creation of a landscape development model of the Campbell Uplift. Final results and conclusions are not yet complete although lithology was determined to be a filter of the geomorphological processes acting in the Campbell Uplift.

**Moorman, Brian**

University of Calgary  
Department of Geography  
Calgary, AB T2N 1N4

Reference No: 12 404 480 (ARI)

Region: IN Location: Yaya Lake & Peninsula Point

Year of Research: 1998

Other Members of team: Mira Kunes

**Ground Ice Investigation**

This project involved the investigation of tabular massive ground ice, the most poorly understood and most difficult to locate type of massive ice. Ground penetrating radar (GPR) surveys were conducted at three locations to map the presence and geometry of ground ice. In addition, where possible, the stratigraphy of exposures was recorded and ice samples were taken for laboratory analysis. The higher than normal temperatures in the summer of 1998 resulted in the activation of many retrogressive thaw flows and the exposure of a number of tabular massive ice bodies. The general layering consists of glacial sediments above the ice and sand below the ice was observed in some locations, but other ice masses were covered with sand and gravel. Although high electrical conductivity interferes with imaging through glacial sediments with GPR, more than 15 m of ice could be imaged below up to 10 m of diamicton, with low frequency antennas. In locations where the ice was covered with sand or gravel, the top and bottom of the massive ice was clearly imaged to greater depths. Even though this was only a preliminary investigation it can be concluded that GPR is an effective tool for mapping tabular massive ice bodies, and the location and size of these bodies is generally not apparent from the ground surface or even shoreline exposures.

**Murton, Julian**

University of Sussex  
School of Chemistry, Physics  
& Environmental Science  
Brighton, UK BN1 9QJ

Reference No: 12 404 538 (ARI)

Region: IN Location: Liverpool Bay area and Eskimo Lakes area

Year of Research: 1998

Other Members of team: Dr. Jane Hart, Dr. Darrel Maddy, Dr. Richard Waller, Dr. Colin Whiteman

**The Origin of Deformed Massive Ice, Pleistocene Mackenzie Delta, Western Canadian Arctic**

Geological fieldwork was carried out in two areas between June 29-August 18, 1998:

Liverpool Bay between Cliff Point and the mainland "cutoff" with Nicholson Point.

Massive underground ice was seen under stony clay containing fold and lens structures. The ice and sediment have been deformed beneath a glacier that previously covered this region. Deformation took place while the sediment was frozen because it contains blocks of ice ripped up from the underlying massive ice. Windblown sand underlies the ice. The ice, in terms of field characteristics, shows similarities with both ice that has grown in pre-existing sediment and, locally, with glacier ice. Central Eskimo Lakes Massive underground ice beside the central Eskimo Lakes has lies a variety of sediments, some of which are glacially deformed. In places, a stony clay above the ice merges laterally and/or vertically into a sandy, stony layer directly above the ice. This stony layer may represent a deposit formed by meltwater erosion of the stony clay. Beneath the massive ice bodies, ice lenses in glacially deformed pebbly sand were observed. The massive ice has field characteristics similar to ice formed in pre-existing sediment. Laboratory analysis of the ice and sediments are in progress.

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047 Physical Sciences

**Narbonne, Guy**

Department of Geological Sciences  
Queen's University  
Kingston, ON K7L 3N6

Reference No: 12 412 040 (ARI)

Region: SA Location: Mackenzie Mountains - Backbone Ranges, Brokenskill River area, Shale Lake, Silverberry River area

Year of Research: 1998

Other Members of team: R.W. Dalrymple, N.P. James

**Neo-proterozoic Glacial Events, Mackenzie Mountains Northwestern Canada**

Two of the greatest ice ages the Earth has ever known occurred 600 million years ago and 750 million years ago, and glacial rocks of these ages are found around the world. These ice ages affected the Mackenzie Mountains, where the rocks of the older ice age are called the Rapitan Group and the rocks of the younger ice age are called the Ice Brook Formation. Our 1998 research focused on the rocks under the ice age deposits (which tell us how the ice ages started) and the rocks on top of them (which tell us how they stopped). Carbonate caps mark the end of each ice age, and contain unusual features not known from any other rock formations in Northwestern Canada. Perhaps the most amazing are mounds shaped like reefs, but containing only long, delicate crystals of the mineral aragonite. There is no evidence of fossil life of any sort in these "reefs". The cap carbonates (and the crystal reefs within them) seem to have formed as the ice sheets melted and sea level rose, producing an ocean chemistry very different from that of our modern ocean.

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048 Physical Sciences

**Nixon, Mark**

Geological Survey of Canada  
601 Booth Street  
Ottawa, ON K1A 0E8

Reference No: 12 404 398 (ARI)

Region: IN, SA, DC Location: Fort Simpson, Norman Wells, Inuvik

Year of Research: 1998

Other Members of team: Fred Wright

**Active Layer Monitoring Network in the Mackenzie Valley**

During July and August 1998, the 8th annual survey of the active layer monitoring system in the Mackenzie Valley was completed from Fort Simpson to the Arctic coast. Water-filled, clear plastic observation tubes record the maximum depth of thaw each year. Air and ground temperature data loggers provide a thermal record at many sites. When possible, sites are close to automatic weather stations and are shared with research groups doing complimentary work. Along this 1400 km transect, active layer thickness varies more as result of local factors (related to situation) than the regional climate (which is associated with latitude). Over the last five to seven years, though the spacial changes are complex, thaw penetration is increasing at many sites in the system. Thaw was similar last season to that recorded in the cold summer of 1996. Many of the sites were visited late in the season, and all indications are that the thaw for 1998 will be the greatest yet recorded because of the warm temperatures. In the future, measurements from this transect will be used to help model climate change impacts on the near-surface permafrost of this fragile environment.

**Peterson, Rorik**

University of Colorado  
Department of Chemical Engineering  
Campus Box 424  
Boulder, CO, USA 80309-0424

Reference No: 12 404 541 (ARI)

Region: IN Location: Inuvik-area of 1968 forest fire

Year of Research: 1998

Other Members of team: Jennifer Wardowski

**Development of a Differential Frost Heave Model: Application to Patterned Ground Formation.**

The objective of this work is to make physical measurements of the size, shape and distribution of earth hummocks in areas where the 1968 forest fire did not occur. We are developing a mathematical model which predicts hummock size and activity based on soil properties and environmental conditions. Because hummock activity appears to be very sensitive to environmental changes, our model, coupled with field measurements and available soil property data, may provide indications of global climate change. The measurements made in this study will aid in model validation and refinement. Although this was the proposed study, it has not yet been conducted due to scheduling difficulties.

**Spence, Chris**

Suite 301, 5204 50th Ave.  
Environment Canada  
Yellowknife, NT X1A 1E2

Reference No: 12 404 535 (ARI)

Region: NS Location: Lower Carp Lake

Year of Research: 1998

Other Members of team: Dr. Al Pietroniro, Bob Reid, Dr. Phil Marsh, Dr. Wayne Rouse, Dr. John Gibson

**Hydrologic Investigation of a Canadian Shield Basin**

The objective of the project is to learn more about northern Canadian Shield water flow; specifically spring snowmelt, seasonal permafrost thawing, and water stored in wetlands and lakes. In 1998, eight trips were made to Lower Carp Lake to take measurements of snow depth, water in the ground and streamflow. In June, an automatic climate tower was constructed. In July, another climate tower was installed as well as instruments to automatically measure water flowing off hillslopes. 1998 results suggest that little evaporation occurs during the snowmelt period in April and May. Evaporation rates increase and precipitation decreases in June and July. Water stored in the ground is at its lowest during these two months. In contrast, river water levels are at their highest at the end of June and beginning of July as water from snowmelt reaches the major streams such as the Yellowknife and Cameron Rivers. Because the days get shorter, the sun lower, and the temperature cooler by August/September, evaporation decreases. Precipitation tends to increase at this time, which increases the water in the ground and sometimes creates water flow on hillslopes and raises lake water levels. A significant amount of rainfall is needed to make water flow off hillslopes, and an even larger amount is needed to increase streamflow from lakes. This suggests that water flowing off hillslopes does not always reach the larger lakes and streams. The amount of precipitation needed to get an increase in streamflow, from hillslopes as well as large lakes and streams, depends on evaporation and storage of water in the soil and fractures in the rock. If the ground is frozen, like during the snowmelt, and ice in the ground prevents water from escaping to the soil, there is a greater chance that water from hillslopes will reach the larger lakes. Therefore, the amount that the streamflow rises for a given amount of precipitation changes all of the time depending on the different rates of evaporation, how much water is in the ground, and whether or not the ground is frozen. This research is still ongoing.

**Strong, G.S.**

11 Innovation Blvd.  
Environment Canada  
Saskatoon, SK S7N 3H5

Reference No: 12 404 542 (ARI)

Region: DC Location: Fort Simpson Airport

Year of Research: 1998

Other Members of team: John Gyakum, Ron Stewart, Bob Kochtubajda, Dave Gudak, H.R. Cho

**MAGS Moisture Budget Studies (using instrumental weather balloons)**

The objective of this study was to obtain quantitative information on atmospheric temperatures, moisture, and winds from ground level to 15,000 km (or higher) above sea level (ASL), using instrumented weather balloons (radiosondes). It was proposed to release radiosondes on inflated helium-filled balloons 2-6 times daily, depending on weather conditions, for three or four months during the period from September, 1998 through September 1999. These data are essential to determine sources and sinks of moisture in different seasons and weather regimes. The sources of moisture include transpiration from vegetation over the basin (primarily during summer), evaporation from open water (mostly during late summer through until freeze up), and moisture carried into the basin from the Pacific (all seasons). Sinks of moisture include precipitation over the basin and discharge through the Mackenzie into the Beau fort Sea, and atmospheric moisture carried out of the basin by upper winds. This work was motivated by the need to resolve the critical balance between atmospheric moisture and surface water discharge and storage in the current climate case, with precipitation (rain and snow) and evaporation being the two process linkages. The results will be used in complex numerical computer models of the climate to determine the water balance of the Mackenzie resulting from any climate warming.

**Tod, Joan**

NRCan, Geological Survey of Canada  
615 Booth Street  
Ottawa, ON K1A 0E9

Reference No: 12 404 543 (ARI)

Region: SA Location: Sahtu Region, Mackenzie Corridor, NWT

Year of Research: 1998

Other Members of team: Contractor: SIAL Geosciences Inc.

**Mackenzie Valley Aeromagnetic Survey**

The Geological Survey of Canada (GSC) commenced the first phase of a multi-year airborne magnetic survey over the Mackenzie Corridor region of the Northwest Territories in September 1998. The survey area covered parts of the National Topographic Survey 95 (60-64°N, 120-128°W) and 96 (64-68°N, 120-128°W). The purpose of the survey was to improve public knowledge and understanding of the geology of this area, since no publicly-available magnetic coverage existed. The survey recorded the variation in the earth's magnetic field caused by magnetic minerals contained in the rocks of the earth's crust. The patterns obtained are indicative of the subsurface geological structure, and will be used as an important element of geological mapping and resource exploration. The cost of data acquisition was jointly funded by the GSC and three partners. The GSC was responsible for preparation of the survey contract, monitoring the survey operation, and public distribution of the data. The aerial survey was operated out of Norman Wells by SIAL Geosciences Inc. of Montreal. Approximately 72,668 line kilometers of data were acquired. All data will be released to the public by the GSC on or after October 31, 1999. Maps and digital data will be available from the Geophysical Data Center, 241-615 Booth Street, Ottawa, Ontario, K1A 0E9. For more information contact GSC at Telephone: (613) 995-5326; Fax:(613) 952-8987; E-mail: [infogdc@agg.NRCan.gc.ca](mailto:infogdc@agg.NRCan.gc.ca); Internet: <http://gdcinfo.agg.NRCan.gc.ca/gdcinfo>

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# Social Sciences

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053 Social Sciences

**Dressler, Wolfram**

University of Manitoba  
Natural Resources Institute  
70 Dysart Road  
Winnipeg, MB R3T 2N2

Reference No: 12 410 545 (ARI)

Region: IN Location: Inuvik, Aklavik, Tuktoyaktuk

Year of Research: 1998

Other Members of team: Darrell Joe

## **Nature-based Tourism in the Mackenzie Delta Region: Potential and Pitfall. An Analysis of Stakeholder Perceptions**

The overall purpose of this study was to provide a comprehensive review of the positive and negative social, economic and environmental impacts of nature-based tourism within the communities of Inuvik, Tuktoyaktuk, and Aklavik, in the Beaufort-Delta Region, of the Northwest Territories. The specific goals of the study were to: 1) find out institutional, Inuvialuit elders', visitor and tour operator perspectives regarding the present and desired conditions of nature-based tourism; 2) identify and assess any discrepancies between present and desired conditions; and 3) assess existing tourism guidelines and suggest new guidelines and sustainable nature-based tourism planning objectives. The study was based on structured and unstructured interviews with Inuvialuit elders, tour operators and institutional representatives. The study also used a questionnaire survey targeting non-resident visitors at Inuvik.

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054 Social Sciences

**Irlbacher, Stephanie**

Beaufort Delta Self Government Office  
P.O. Box 2273  
Inuvik, NT X0E 0T0

Reference No: 12 410 495 (ARI)

Region: IN Location: Inuvik, Aklavik, Tuktoyaktuk, Paulatuk, Fort McPherson, Tsiigehtchic

Year of Research: 1998

Other Members of team: Lois Edge (University of Alberta), community researchers in Beaufort Delta region

## **Inuvialuit and Gwich'in Traditional Governance Research Project**

The traditional governance research project was conducted in the eight communities of the Beaufort Delta region between October 1998 and March 1999. Ten Inuvialuit and Gwich'in field workers interviewed Elders about how each respective community governs itself according to its own culture. Interviews were taped and recorded and/or transcribed. The results will be used to develop principles of Inuvialuit and Gwich'in governance. These principles will be available for communities to use in developing their own structures and processes of governance to take on self government responsibilities in accordance with the self government agreement currently being negotiated. A final report is being produced which will describe the research and training process and research results. The report will be presented in all the Beaufort Delta communities. The project was based on a participatory action research model. Extensive training was provided to fieldwork researchers. The research was an aspect of the consultation on self government being conducted by the Beaufort Delta Self Government Negotiations Office.



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055

Social Sciences

**King, David**

12 West River Rd.

Box 1131

Walkerton, ON N0G 2V0

Reference No: 12 410 532 (ARI)

Region: NS Location: Yellowknife

Year of Research: 1998

Other Members of team: Dr. Peter Kulchyski (Trent University), Andrew Pagak Sr. (Iqaluit)

**The History of the Federal Government of Canada's Residential School System for the Inuit 1955-1970.**

The purpose of this study was to research the history of the Federal government of Canada's Inuit residential school system in order to demonstrate the roles of the three major operators of the Inuit school system, these being the Roman Catholic church, the Anglican church and the Canadian federal government. Another objective was to document the residential school systems' introduction of a foreign language, diet, religion, clothing and customs on the Inuit. The archives of the Department of Northern Affairs, the Roman Catholic church and the Anglican church were investigated during the research. It was found that the churches were manipulating the residential school system, while in competition with each other, for the purpose of converting Inuit children to their particular sect of Christianity. The Department of Northern Affairs, on behalf of the federal government of Canada, had financially maintained the residential school system for the Inuit so as to assimilate them into mainstream Canadian society. This was done to prepare the Inuit for the "white economy" that the government believed would soon dominate the north.

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056

Social Sciences

**Kuhnlein, H.V.**

Centre for Indigenous Peoples'

Nutrition and Environment

Macdonald Campus, McGill University

Ste Anne de Bellevue, PQ H9X 3V9

Reference No: 12 408 067 (ARI)

Region: IN Location: Aklavik, Tuktoyaktuk, Paulatuk and Holman

Year of Research: 1998

Other Members of team: Olivier Receveur, L. Chan, P.R. Berti, E. Loring

**Assessment of Dietary Benefit: Risk in Inuit Communities**

Overall, this project gathered information about traditional and market food among Inuit in five regions (Inuvialuit, Kitikmeot, Keewatin, Baffin and Labrador). The objectives of this study were to derive quantitative estimates of traditional and market food intake, to build databases of nutrient and contaminant contents of traditional food as prepared and consumed, to define the benefits of traditional food in terms of nutritional, socioeconomic and cultural significance, and lastly, to define the levels of dietary exposure to contaminants (Mercury, Cadmium, Arsenic, Lead and organochlorides). This was the second year of a three year initiative. During the fall (Oct-Nov) of 1998 and the late winter (Feb-March) of 1999, 212 food samples were collected for analysis of nutrients and contaminants. At this time dietary survey data was also collected by six project field coordinators in the 18 representative communities (Aklavik, Tuktoyaktuk, Paulatuk, Holman, Kugluktuk, Cambridge Bay, Baker Lake, Chesterfield Inlet, Rankin Inlet, Resolute Bay, Pond Inlet, Igloodik, Kimmerut, Qikiqtarjuaq, Nain, Hopedale, Makkovik, and Rigolet). A draft report will be produced by February 2000 and will be discussed in a workshop with delegates from all regions.

**Labrentz, Arnold**

P.O. Box 1132

Fort Smith, NT X0E 0P0

Reference No: 12 410 542 (ARI)

Region: SS Location: Thebacha Campus, Fort Smith

Year of Research: 1998

Other Members of team: self

**Negative Self-Attribution of Adults in Mathematics: case studies of origin and function.**

Questionnaire surveys of students taking mathematics in Academic Studies at Thebacha Campus, Aurora College, were undertaken in 1998/99 in an exploratory research of negative feelings about math, math anxiety, and math helplessness. Forty-six students were assessed on *Math Attitude* (Fennema-Sherman, modified), thirty-seven on the *Canadian Achievement Survey Tests for Adults (Cast Level 2/3)* by Canadian Testing Service), eleven on the *Math Anxiety Rating Scale (Mars--A)* by Dr. R. Suinn), and seven on the *Attribution Style Questionnaire (ASQ)* by Dr. M. Seligman). Three of the scales assessed degrees of negative feelings and attitudes, whereas the *CAST* measured general math ability in contrast to attitude. Of the 47, only four displayed more than average negativity and/or math anxiety, three of which agreed to a recorded interview of approximately 65 questions designed to explore possible causes. None of the subjects showed characteristics of "learned helplessness in mathematics", even to a mild degree. Suspected factors related to math negativity/anxiety included: a late school start (started grade one at age eleven) and difficulty in understanding and performing a certain skill (long division) leading to pupil and teacher frustration, and a breakdown of confidence, relationship, and further work in math. Analysis of the interviews is continuing and a second phase of research is being considered, including subjects outside of the College.

**Matiation, Nicole**

789 Garwood Ave.

Winnipeg, MB R3M 1M5

Reference No: 12 410 544 (ARI)

Region: NS Location: Yellowknife, Rae-Edzo

Year of Research: 1998

Other Members of team: self

**Connecting the North: Northern Aboriginal Peoples Advocate for a Northern Information Highway**

The objective of this research project was to gather information on the development of government policy for a northern information highway, and the first steps to implement that policy. The period of time studied was from 1993 to 1998. Initial research involved viewing tapes of the interactive broadcast symposium *Connecting the North* and analyzing government documents and policy statements from other stakeholders (northern aboriginal organizations and northern communications companies). Onsite personal interviews were conducted from June 1 to 7, 1998 in Rankin Inlet, Nunavut, Yellowknife and Rae Edzo, Northwest Territories. Those interviewed included:

- \* Government workers involved in policy development with regards to a digital communications network (DCN).
- \* Ardicom Digital Communications Inc., the company awarded the contract to build the DCN.
- \* Potential users of the DCN (educators, health workers, Internet Service Providers).

Some additional telephone interviews and e-mail exchanges were conducted during the six months before as well as the six months after these dates. This research resulted in the publication of a Master's thesis in Media Studies entitled: "A Plea for Time: Northern Aboriginal Peoples Advocate for the Right to Communicate on the Information Highway."

**McLean, Ed**

Sahtu Renewable Resource Board  
P.O. Box 490  
Norman Wells, NT X0E 0V0

Reference No: 12 410 548 (ARI)

Region: SA Location: Sahtu Settlement communities of: Tulita, Norman Wells, Ft. Good Hope, Colville Lake, Deline

Year of Research: 1998

Other Members of team: Harvest study working group - Alfred Lenny, Joe Blondin Jr., Michael Lafferty, Dr. Paul Latour, Fred Taptuna, and Alasdair Veitch

**Sahtu Settlement Harvest Study**

Initiated as part of the Sahtu Dene and Metis Comprehensive Land Claim Agreement, the Sahtu Settlement Harvest Study started in 1998 and is scheduled for completion in 2003. The two goals of the investigation are to: 1. determine the minimum needs of claimants so that their harvesting traditions can be protected; and 2. provide information on the level of harvesting needed for the effective management of wildlife. The communities of Tulita, Norman Wells, Fort Good Hope, and Colville Lake currently participate in the study. All harvesters in these communities are interviewed each month, and the confidential records of their hunt are stored on spreadsheets. It is hoped that the harvesters in Deline will participate in the study in the near future. The Harvest Study will ultimately give the Sahtu Renewable Resource Board, in conjunction with other government agencies and local Renewable Resources Councils, the ability to effectively manage wildlife in the Sahtu so that the numbers of animals do not decline significantly. For more information, contact Jim Moore at: [jmoore@srrb.nt.ca](mailto:jmoore@srrb.nt.ca)

**Pisani, Shane**

University of Guelph  
571 Strathcona Crt.  
Milton, ON L9T 3B6

Reference No: 12 410 550 (ARI)

Region: IN Location: Inuvik

Year of Research: 1998

Other Members of team: self

**Constraints to Multi-Stakeholder Collaboration in the Development of a Sustainable Tourism Industry**

Tourism is one of the fastest growing industries in Canada's Western Arctic. Many opportunities are available to stakeholders to expand tourism into a year-round industry with a wealth of cultural and natural resources. In order for these opportunities to be realized, tourism stakeholder collaboration must occur not only at the macro-level but also at the community level. Research was undertaken in Inuvik, N.W.T. with both public and private sector stakeholders to determine the constraints that stakeholders face in the development of a viable tourism industry in the Western Arctic. As tourism is an industry that encompasses a wide-ranging number of services and organizations, a number of different categories of stakeholders were identified. These categories are reflected in the diverse number of identified stakeholders who play a role in tourism development for Inuvik. The primary mode of data collection was through interviews with tourism stakeholders but also included observations and secondary research collection from May-October 1998. The tourism stakeholders identified ranged from government organizations such as RWED, Aboriginal groups such as the Inuvialuit Development Corporation, as well as local hotel and restaurant operations. Preliminary analysis has identified a number of constraints to greater stakeholder collaboration, such as the need for greater tourism education among stakeholders and lack of organization and vision for tourism in Inuvik, as well as various cultural constraints and economies of a certain scale operating within the tourism industry in the Western Arctic. A complete summary will be provided upon completion of the analysis.

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061

Social Sciences

**Scott, Ray**

Box 1747

Inuvik, NT X0E 0T0

Reference No: 12 410 549 (ARI)

Region: IN SA Location: Inuvik Health & Social Services Region, Tuktoyaktuk, Aklavik, Fort McPherson, Fort Good Hope, Deline

Year of Research: 1998

Other Members of team: self

### **Self-Empowered Community Teams**

The Inuvik Regional Health and Social Services Board (IRHSSB) provides social services and primary health care to residents of twelve communities. The opportunity pursued by this project was to develop an organization that would engage all community employees in one of these communities - Fort Good Hope was chosen. This project advanced the opportunity through an action research strategy in order to: 1) stimulate participation for all community employees; 2) further develop a collaborative approach toward service provision; and 3) reinforce the benefits of a team approach in fostering healthy communities. The project provided an example of a "Self-Empowered Community Team" (SECT) to serve as a model for the development of other community teams. The results of the project identified components necessary for the achievement of this type of organizational culture. The results suggest that the design, implementation, and evaluation of SECT needs to be a collaborative process and include all stakeholders. The project supports literature that suggests physical co-location is an important factor and optimally should precede the SECT process. Recommendations are made for additional work in order to understand the relationships between various components of an empowered team culture and other factors that may impact the implementation and success of SECT's.

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062

Social Sciences

**Sharkey, Irene**

Box 2255

Inuvik, NT X0E 0T0

Reference No: 12 410 546 (ARI)

Region: IN Location: Inuvik

Year of Research: 1998

Other Members of team: self

### **The Role of the Adult Educator in a Cross-Cultural Context: Adult Education in the NWT Context: Aurora Campus, Inuvik, Adult Basic Education**

This project began with a historical overview to set the political, social and economic context for the discussion of Adult Education practices in the Northwest Territories. The focus of analysis is the role of the Adult Educator as an employee of Aurora College. This topic will be examined in relation to the academic literature central to the theme of adult education and cross-cultural communication. Experiences in the field of Adult Education at Aurora Campus over the past six years will be used in the project; this includes personal reflections exploring current practices and drawing attention to the purpose and place of cultural understanding in constructing meaning and respecting the process of emerging knowledge. The study will also address the need for reflection and inclusionary practices within this field. The tentative completion date is September 1999.

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# Traditional Knowledge

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063 Traditional Knowledge

**Anderson, David G.**

University of Alberta

Department of Anthropology

13-12 Tory Building

Edmonton, AB T6G 2H1

Reference No: 12 402 611 (ARI)

Region: IN Location: Fort McPherson

Year of Research: 1998

Other Members of team: Rob Wishart

## **Local Caribou Ethologies in the Circumpolar Arctic**

The purpose of the project was to learn about traditional Gwich'in understandings of caribou behavior and migration and to compare this knowledge to that of other circumpolar peoples. Due to a deteriorating situation in the Russian Federation, the exchange of Evenki and Dolgan caribou hunters to the Gwich'in Settlement Area had to be delayed until 1999. In the 1998 season, Rob Wishart (research student) worked with elders and youth in sponsoring several hunting camps where different generations of Gwich'in exchanged knowledge on caribou. During the fall of 1998, there were several research outings involving community members from Fort McPherson. In October 1998, Mr. Wishart assisted with a "learning on the land" camp with an elder and several more youth. They did not find caribou until they traveled to Horse Shoe where the elder harvested three young bulls, two cows and two calves. The meat and hides were processed in a traditional manner and this information was recorded. There were few opportunities to hunt caribou, so the project did not document much in terms of traditional harvesting or processing of meat. A great number of narratives were noted and recorded instead on the variability of caribou migrations and how the behavior of people impacts the movement of the animals. A formal research report was written and there is an archive of still camera photographs. The results of these trips were presented at an international conference in Japan and are being prepared for publication. In autumn of 1999, results based on preliminary year will be worked upon for curriculum materials for the school.

**Collignon, Beatrice**

University Paris I. Patheon-Sorbonne

191 rue Saint-Jacques

75 005 Paris, France,

Reference No: 12 410 370 (ARI)

Region: IN Location: Holman

Year of Research: 1998

Other Members of team: self

**Transmission of Geographical Knowledge in Inuinnait Society**

In April of 1998 a four-week fieldwork project took place in Kugluktuk and Holman, which was the first of a multi-year project and focused on the micro-scale of the house. The objectives were to understand the link between knowledge transmission and the places in which it occurs. An elder was hired as a translator and lengthy open interviews were conducted with eight elderly women. These women were first asked to describe igloos and tents of yesterday, their inside space organization and the daily routines which took place. Then, similar questions were asked about the permanent prefabricated houses in which they have been living for more than 30 years now. These mothers, who had raised their older children in igloos and tents, and their younger ones in permanent houses, were asked their reflections on these experiences. The interviews expressed the strong connection between places and actions for the Inuinnait and revealed the deep cultural loss resulting from the move into foreign architecture. This loss goes far beyond that of a technical-building-knowledge, as the mobile though highly stable round-shaped Inuit house, was in itself a cultural expression through which values were transmitted, notably a specific person / space relationship. Interviews were videotaped and a 20' video is under completion.

**Spak, Stella**

117 Sunkist Close

Victoria, BC V9B 5S4

Reference No: 12 410 543 (ARI)

Region: SS Location: Lutsel K'e

Year of Research: 1998

Other Members of team: self

**Co-management of Northern Resources: The Beverly and Qamanirjuaq Caribou Management Board as an Example of Knowledge Integration.**

Unstructured, open-ended interviews were conducted in Lutsel K'e in May 1998. Many interviews were conducted with the help of a translator (and transcripts were returned to the community). The aim of the study was to gain an understanding of the community's experience with the Beverly and Qamanirjuaq Caribou Management Board (BQCMB) which is a co-management board. The people of Lutsel K'e are represented on the board by a community representative. The community members appeared to have very little information about the BQCMB and its activities. When the BQCMB met in the community three years ago, many elders did not have the impression that it was an open meeting for them to attend. Communication between the BQCMB and the community thus seems to be poor and should be improved. A special emphasis on informing and involving the elders (who have a vast amount of knowledge about caribou) should be made.

**Wolki, Lena**

General Delivery

Sachs Harbour Elders Committee

Sachs Harbour, NT X0E 0Z0

Reference No: 12 410 547 (ARI)

Region: IN Location: Aulavik National Park, Banks Island

Year of Research: 1998

Other Members of team: Geddis Wolke, Kyle Wolki, John Lucas, Samantha Lucas, Jean Harry, Shirley Esa, Heather Swystun, Ian Brown

**Aulavik National Park Traditional Place Names Project 1998**

The objective of this study was to collect Traditional Place Names used in Aulavik National Park and Northern Banks Island. In addition to Traditional Place Names, other forms of traditional knowledge were to be taught and recorded opportunistically. One form of traditional knowledge that was planned for collection was traditional plant use. The project took place in July 1998 in Aulavik National Park. In total, six elders and nine youth participated in the project. The Elder Council Chair, Lena Wolki, assisted with the design of the project and Jean Harry was the official co-interviewer and translator for the project. Sites visited included: Green Cabin; Johnston Point; Polar Bear Cabin/Nangmangavik Lake; Mercy Bay; and Muskox River/Head Hill. Twenty three different place names were identified, mostly for southern Banks Island where people traveled more frequently. Inuvialuktun names and traditional uses were collected for ten plant species and twenty different string games were recorded. Information was documented on the Johnston Point site and other varied articles of traditional knowledge were collected.

# Prince of Wales Northern Heritage Centre Archaeology Permits

067 Archaeology

**Bussey, Barbara Jean**

Points West Heritage Consulting Ltd.

Langley, BC

Reference No: 98-870 (PWNHC)

Region: NS Location: Snap Lake and North of Lac de Gras

Year of Research: 1998

## **BHP Diamonds Inc. Project**

Investigations for Winspear Resources Ltd. took place near Snap Lake. A preliminary assessment of the project area was undertaken and it was recommended that field investigations be conducted if any development activity was required to the east or south of Snap Lake in the vicinity of a number of eskers and similar land forms. Late in September, the project engineer identified two possible gravel sources: one on an esker-like remnant, and the other on a portion of a large, well defined esker. The potential for locating archaeological sites was sufficient to require an inventory and impact assessment of both locations. Because of an urgent need for the gravel this year, fieldwork was attempted in early October, but due to the sudden arrival of winter, it was not possible to complete the assessment. Also, archaeological investigations were conducted for BHP Diamonds Inc. in its claim block north of Lac de Gras. Tours of a representative sample of the previously recorded sites were first conducted with local Elders. Of the four traditional use sites identified, three are associated with Lac de Gras; the fourth is on a large unnamed lake southwest of Exeter Lake. The ten sites found in 1998 consist of small to large lithic scatters, some of which contained tools. All are located on elevated, well-drained land forms and most are associated with well defined eskers. Selected surface artifacts from a fourth site were collected because they are representative of the Arctic Small Tool Tradition and were threatened by erosion. Analysis of all collected artifacts will be undertaken during the winter.



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068 Archaeology

**Cuthbertson, Brent**

Lakehead University

Thunder Bay, ON

Reference No: Letter of Authorization (PWNHC)

Region: NS Location: Black River

Year of Research: 1998

**A Black River Cultural Inventory**

This project was to attempt to make a more complete inventory of the cultural sites along the Black River from Aylmer Lake to Chantrey Inlet. A research team of six people investigated known sites, surveyed for undocumented ones, and recorded the features and conditions of each site along the way. It has been decades since some of the major sites had been initially recorded. Using the information of previous research projects (most were in the early 1970's), the crew documented the addition of tent rings and other features in order to update the cultural picture of each site. In most of the well-known sites, evidence of use after the 1970's was noted. The newer features did not differ significantly in the way they were constructed from the older ones, meaning that these camps were possibly occupied after the 1970's. Information about a number of previously undocumented sites along the river corridor will be submitted to the Canadian Museum of Civilization and sent to the communities of Baker Lake and Gjoa Haven. Much of the River corridor could not be investigated due to limitations of time, and in some cases, weather. The inventory can grow and take on an historical perspective of how land is used by the people of the region.

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069 Archaeology

**Fitzpatrick, Patricia**

Indian Affairs and Northern Development

Yellowknife, NT

Reference No: 98-878 (PWNHC)

Region: Slave Geological Province Location: NS

Year of Research: 1998

**The Esker Management Project - Archaeological Component**

A two-week helicopter survey was undertaken on the tundra in the Slave Geological Province, a large area north of the East Arm of Great Slave Lake and east of Great Bear Lake. Forty-seven sites were visited in an area bounded by Contwoyto Lake to the Arctic Ocean and from Bathurst Inlet to the Tree River. These included eleven previously unrecorded sites in the northern area of study. All of the sites proved to be former habitations. They were photographed, recorded and digitally mapped. The purpose of this study was to determine if there is a relationship between archaeological sites and physical features, namely eskers on the inland tundra. The site information had been previously gathered through an ongoing Traditional Knowledge study by the Nunavut Planning Commission and from the Archaeological Survey of Canada.

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070 Archaeology

**Friesen, T. Max**

Department of Anthropology

University of Toronto

100 George St.

Toronto, ON

M5G 3G3

Email: mfrissen@chass.utoronto.ca

Reference No: 98-864 (PWNHC)

Region: IN Location: Cache Point, Mackenzie Delta

Year of Research: 1998

**Qilalugaq Archaeology Project**

The Cache Point site, located on the East Channel of the Mackenzie River, is the earliest Inuvialuit beluga whale-hunting site known from the region. It is a large site, containing a minimum of 22 driftwood-and-sod houses, as well as many artifacts and beluga whalebones eroding from the bluff edge. Two houses at the site were excavated as part of the Qilalugaq Archaeology project. Excavation of the best-preserved house revealed a deep and long entrance tunnel, a single main room with a sleeping bench located along its side, and a separate kitchen area in front of the house. Many artifacts were recovered, including harpoon heads, ulus, and fishing equipment. In addition, a number of tools made of soapstone and copper were found, which must have been traded from the Coppermine River area to the east. Many animal bones were also recovered, mostly from beluga whales confirming that the ancient hunters of the Cache point site relied on beluga for most of their food. Several earlier Palaeo-Eskimo stone tools were found which closely match similar Alaskan tools perhaps as much as 4000 years old. The information obtained from this project will help us to understand how the earliest Inuvialuit in the Mackenzie Delta lived, and what methods they used to hunt beluga whales in the distant past.

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071 Archaeology

**Hanks, Christopher**

BHP Diamonds Inc.

1102, 4920-52nd St.

Yellowknife, NT

X1A 3T1

Reference No: 98-871 (PWNHC)

Region: NS Location: North of Lac de Gras

Year of Research: 1998

**BHP Archaeological Management Program**

A preliminary survey was conducted along the proposed route of the Pigeon haul road. The route extends northeast for approximately 2 kilometers from the Long Lake road to the Pigeon Kimberlite Pipe at Ekati Mine north of Lac de Gras. Based on the proximity of the road to the traditional Lac de Gras / Long Lake / Exeter Lake canoe and sled route of the Dogrib and Inuit, it was believed that the hill at the Long Lake end of the road had potential as a game lookout. The hill was examined for the remains of hunting stands and rock meat caches but no remains were located. Subsurface testing was not undertaken as the dense rocky soil made it unlikely that there were any buried remains. Further, the road is constructed of a rock fill placed on the surface and any remains would have simply been buried more deeply and left undisturbed. The preliminary survey was followed up by Points West Heritage Consulting Ltd. which performed an assessment of the Pigeon Kimberlite Pipe for BHP Diamonds Inc.

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072 Archaeology

**Hart, Elisa**

Inuvialuit Social Development Program

Inuvik, NT

Reference No: 98-866 (PWNHC)

Region: IN Location: Kitigaaryuit, east channel of Mackenzie River

Year of Research: 1998

**Kitigaaryuit Archaeological Inventory and Mapping Project-1998**

The Inuvialuit Social Development Program (ISDP) conducted an oral history and archaeology project at a former Royal Canadian Air Force and United States Air Force Loran navigation station. The station, code named Yellow Beetle, was also referred to as Kittigazuit. It was located on the east channel of the Mackenzie River about 12 km west along the coast from the old village of Kitigaaryuit (listed on topographic maps as Kittigazuit). Construction started in 1947 and the Loran system operated from 1948 to 1950. The experiences of the Inuvialuit who worked at the station were documented and a collection of artifacts were obtained that could be used in an exhibit on its history. Ruins were also documented. ISDP had conducted archival research on the station before obtaining funding from Department of National Defense (DND). Information from the elders, from a former meteorological technician who worked there, and the archival documents will be used to write a report on the history of the station.

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073 Archaeology

**Lobb, Wayne Murray**

University of Calgary

Calgary, AB

Reference No: 98-873 (PWNHC)

Region: SS Location: Hay River, Enterprise and Kakisa

Year of Research: 1998

**Improved Image Interpretation Methods for Subarctic Archaeology**

A reconnaissance survey was conducted along the Hay River for archaeological sites belonging to the indigenous peoples of the area, the Slavey. In addition, several places were selected as potential archaeological sites from aerial photos in which visible clues were observed in aerial photos dating from 1948 to 1994. The air photos were examined intensively for cues such as natural clearings, pathways, and differential tree growth which might denote a fishery or encampment. Also, any oddities that were continually observed in the aerial photos were selected as possibilities to consider for later ground survey. Thirteen possible locations were identified for preliminary investigation in Hay River and the surrounding area. Eight kilometers of the Hay River from the east arm to the main river were surveyed and three sites were discovered. These sites were then compared to early aerial photos and their visual properties noted for later photo interpretation. A fourth possible site was located during a survey of a natural clearing of trees observed in the aerial photographs near the Hay River VOR radar site near the airport. Though no features were observed at the natural clearing, a survey was completed of the nearby clearing created for the VOR radar site nearest to the Hay River. On this road and its surrounding grasses, apparent circles of rocks, which could be tipi ring features, were discovered and recorded. This fieldwork is important in order for local groups and the community as a whole to understand the area's cultural resources and what archaeology can mean to the community. The other side of this project is to find better visual cues to help archaeologists understand the subarctic living environment.

**Morrison, David**

Canadian Museum of Civilization

Hull, QC

Email: david.morrison@civilization.ca

Reference No: 98-865 (PWNHC)

Region: IN Location: South Amundsen Gulf

Year of Research: 1998

**Amundsen Gulf Thule Project**

Archaeological excavation was undertaken at the Tiktalik site (NkRi-3), located near Pearce Point on the southern coast of Amundsen Gulf. Tiktalik is a five-house Thule Inuit village, first reported in 1989 by William E. Taylor. Previous fieldwork in 1998 resulted in the nearly complete excavation of one house. It proved to be a small, rectangular structure with a planked wooden floor set about 70 cm below present ground level. Walls were made of added wooden planks, with a roof supported by interior posts. The house had a long entrance tunnel and, perhaps most strikingly, a separate kitchen where cooking took place over an open fire. This kitchen appears to have been a conical shape, with pole walls and a floor paved with boards and flagstones. The site is named for a Sachs Harbour elder, Susie Tiktalik, now deceased. Artifacts recovered from Tiktalik suggest an early occupation date, perhaps in or near the 12th century A.D. Many of the artifacts suggest that the site's inhabitants were relatively recent immigrants from northwestern Alaska. Radiocarbon dating and detailed artifact comparisons with other sites in the Amundsen Gulf area (such as Nelson River) and further afield (the Ruin Island sites on eastern Ellesmere Island) should help archaeologists better understand how, when, and why early Inuit first came to the Canadian Arctic.

**Ronaghan, Brian**

Golder Associates Ltd.

Calgary, AB

Reference No: 98-874 (PWNHC)

Region: DC Location: Fort Liard north and west of Fisherman Lake

Year of Research: 1998

**Fort Liard P-66 Pipeline**

Ranger Oil Limited will apply for permission to construct a 30-km pipeline to link a well north of Fort Liard on the west side of the Liard River with the existing pipeline north of Fisherman Lake. Areas proposed for development were examined for sites of archaeological and cultural interest. The areas examined were the preferred pipeline route, two alternate routes, and two alternate locations for a small plant to remove liquids from gas. The proposed pipeline would parallel the base of the Mackenzie Mountains, then cross the first range before descending into the stream valley that feeds Fisherman Lake. Although many archaeological and historical sites are known to occur along the shores of Fisherman Lake, none of these will be affected by the project because construction ends well north of the lake. The routes examined occur in very dense forest and pass over several deeply cut mountain stream valleys. No archaeological sites were found, but one hunting camp used in the 1980's by Johnny Klondike Jr., was recorded nearby the pipeline route. This site will be avoided by construction. If approved, the pipeline will follow existing cutlines where possible and will be constructed during the winter, so, below snow cover, only a one-metre wide trench to hold the pipe will be excavated. Information provided by community advisors indicate that most traditional uses to this area took place along the Liard River or at Fisherman Lake and that there is little chance that important sites or areas will be affected by this project.

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076

Archaeology

**Thomson, Callum**

Jacques Whitford Environmental Limited

Calgary, AB

Reference No: 98-879 (PWNHC)

Region: NS Location: Kennady Lake

Year of Research: 1998

**Monopros Kennady Lake Project**

At the request of Monopros Limited, a preliminary survey and assessment were conducted at Kennady Lake, 120 km northeast of Lutselk'e. The locations investigated included areas proposed for ground disturbance during the winter of 1998-99, involving excavation of construction materials from an esker, and use of winter roads to haul material from the esker to a tailings pond construction site. The main objective of the project was to identify sites and advise Monopros on how best to avoid them. Six new precontact sites were found. One is located on the esker, three are near the esker and the winter road on sandy terraces, and two are on old beach terraces beside Kennady Lake. It was concluded that precontact sites in the vicinity of Kennady Lake will most often be found associated with a lake and an esker or other feature such as an old beach terrace where game can be observed. Eight precontact sites are now known from this area. Each of the new sites was marked for clear identification and avoidance by construction crews, and these and additional areas of archaeological potential were identified on maps. Artifacts such as stone spear points, knives, and hide scrapers were photographed and left in place. It was also recommended that additional investigations be conducted at the six sites found in 1998, and that a broader survey be conducted to identify any other sites in the region. This will allow more accurate prediction of site types and locations. Any further work would benefit from more intensive participation by representatives of local communities who use the land, have knowledge of the resources and seasons of availability, and who can interpret site use and advise on how future investigations should be conducted. The conclusion of this survey and assessment of activities proposed by Monopros for the winter of 1998-99 is that the known sites are unlikely to be disturbed by the planned development.

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077

Archaeology

**Unfreed, Wendy**

Fedirchuk McCullough and Associates Ltd.

Calgary, AB

Reference No: 98-869 (PWNHC)

Region: NS Location: Lac de Gras

Year of Research: 1998

**Diavik Diamonds Project, Lac de Gras, NT: Historical Resources Impact Mitigation Program**

Investigations were conducted at a selection of sites located within the proposed Diavik Diamond Mine area, on a small island near the eastern shore of Lac de Gras. The study consisted of mapping and surface collection of 24 quarry sites and artifact scatters located throughout the island. The quarry sites, characterized by outcropped bedrock quartz veins, were found to cluster in areas of high relief, often near inland lake edges. Artifacts associated with the quarry sites were dominated by debitage scatters, much of which was quartz shatter. Artifact scatters were found in a greater variety of sites, but were also often associated with high bedrock outcrops, or on terraces near the shorelines of lakes or along eskers. Although debitage was also a dominant artifact type associated with these sites, cores and bifaces were also identified in the assemblages. Excavation also occurred at a Pre-Dorset campsite located in an eroded sand area in a protected bay on the eastern mainland shore of Lac de Gras. Surface collection and ten square meters of excavation within the site area revealed the presence of artifacts of basalt, quartz and chert. The assemblage was dominated by bifacial thinning flakes of both chert and basalt. Formed tools were primarily of chert, and included scrapers and scraper fragments, bifaces and one basically concave projectile point. From the distribution of the cultural materials and the occurrence of clusters of fire-broken rock, it is thought that this site represents a single occupation with a very tight activity cluster.

# Department of Resources, Wildlife & Economic Development

## Wildlife Research Permits

078 Wildlife

**Abernethy, Dave**

Regional Wildlife Technician

Resources, Wildlife and Economic Development (RWED)

Arviat, NT X0C 0E0

Permit No: 1589.

Location: Within a 12 mile radius of Rankin Inlet

### **Rankin Inlet Peregrine Falcon Study**

*Peregrine Falcon*

Collect peregrine population and pesticide contamination data to establish production and population parameters, determine population growth and mortality rates and to monitor changes in pesticide contamination.

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079 Wildlife

**Alisauskas, Dr. Ray T.**

Biologist

Canadian Wildlife Services (CWS)

Saskatoon, SK S7N 0X4

Permit No: 1592.

Location: Banks Island #1 Migratory Bird Sanctuary

### **Productivity of Lesser Snow Geese on Banks Island, NWT**

*Lesser Snow Geese*

Study the nesting biology, effects of predators and weather on production, and the arrival condition of lesser snow geese on Banks Island.

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080 Wildlife

**Attew, Jasen**

Environmental Manager

Canamera Geological Ltd

Vancouver, BC V6B 1M9

Permit No: 1577.

Location: In the vicinity of Lytton Minerals Ltd. Jericho Diamond Project

**Monitoring Wildlife in the Proximity of the Lytton Minerals- Jericho Diamond Project**

*All Species, All Wildlife Habitat.*

Collecting data from wildlife observation logs maintained by project personnel in the vicinity of Jericho Diamond Project in an effort to record incidental wildlife sightings. To determine the ecological, economic and environmental impact on wildlife and wildlife habitat around the project.

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081 Wildlife

**Baker, Allan**

Head, Centre for Biodiversity & Cons. Biol.

Royal Ontario Museum

Toronto, ON M5S 2C6

Permit No: 2023.

Location: Jenny Lind Island NWT

**Genetic Variation, Population Differentiation and Migration Patterns of Selected Shorebird Populations in the Americas**

*Red Knot, Sanderling, White-rumped Sandpiper, Golden Plover, Other Bird Species and Collared Lemming.*

To compile mtDNA profiles for North American Shorebirds and Collared Lemmings to assist in assessing their evolutionary relationships and migratory pathways. In particular, we want to determine levels of genetic variation in arctic animals and to search for birds previously banded in Argentina and the United States.

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082 Wildlife

**Balsillie, Don**

Chief

Deninu Kue First Nation

Fort Resolution, NT X0E 0M0

Permit No: 2034.

Location: Hook Lake

**Bison Field Post-Mortem/Disease Identification Course**

*Bison*

Harvest 6 bison of either sex from the Hook Lake herd to conduct a field post-mortem/disease identification course

---

083 Wildlife

**Boucher, Maurice**

Environmental Coordinator  
Fort Resolution Environmental Working Committee  
Fort Resolution, NT X0E 0M0

Permit No: 2001.

Location: Slave River delta and surrounding area near Fort Resolution, NT

**Uptake of Contaminants in Beaver and Muskrat of the Slave River Delta**

*Beaver, Muskrat.*

Biological samples collected from 12 each of beaver and muskrat analyzed for contaminant content.

---

084 Wildlife

**Boyle, Barbara**

Wildlife Biologist  
United States Fish & Wildlife  
Fairbanks, AK 99701

Permit No: 2031.

Location: Arctic coastal Plain in Alaska and Canada

**Distribution and Abundance of Fall Staging Snow Geese on the Arctic Coastal Plain**

*Lesser Snow Geese*

- 1) Determine the chronology of migration and staging.
- 2) Estimate distribution and numbers of snow geese present on the Alaskan and Canadian arctic coastal plain during peak of staging.
- 3) Identify areas used consistently by staging snow geese.
- 4) Estimate adult:juvenile ratios as indices of reproductive success.

---

085 Wildlife

**Bradley, Mark**

Regional Biologist  
Resources, Wildlife and Economic Development (RWED)  
Fort Smith, NT X0E 0P0

Permit No: 2008.

Location: along Slave River between Fort Resolution and Point Ennuyeuse

**Slave River Biodiversity Study**

*Birds, Vegetation.*

Investigation of the effect of fire and logging on biodiversity includes:

1. Assessment of bird communities along Slave River using singing bird counts and mist netting.
2. Vegetation studies in plots to estimate percentage cover.



---

086 Wildlife

**Bradley, Mark**

Regional Biologist

Resources, Wildlife and Economic Development (RWED)

Fort Smith, NT X0E 0P0

Permit No: 1573.

Location: Lutsel K'e area in proximity of Muskox Management Area H3/1

**Lutsel K'e Muskox Census**

*Muskox*

Standard aerial transect survey to estimate size of muskox population and to assess if a hunting quota increase can be implemented.

---

087 Wildlife

**Branigan, Marsha**

Wolf/Bear Biologist

Resources, Wildlife and Economic Development (RWED)

Inuvik, NT X0E 0T0

Permit No: 2012.

Location: Richardson Mountains

**Grizzly Bear Reproductive Rates and Cub Survival in the Richardson Mountains, Northwest Territories (NT) and Yukon Territory (YT)**

*Grizzly Bears*

Ongoing project using radio collars to enable monitoring grizzly bear reproductive rates and cub survival. Provides information for determining sustainable grizzly bear harvest rates.

---

088 Wildlife

**Braune, Birgit M.**

Biologist

Canadian Wildlife Services (CWS)

Hull, QC K1A 0H3

Permit No: 2017.

Location: Prince Leopold Island

**Contaminants In Arctic Seabird Eggs**

*Northern Fulmar, Black-legged Kittiwake, Thick-billed Murre, Black Guillemot, Glaucous Gull.*

To monitor contaminant levels in seabird eggs of species which represent a variety of habitats and trophic levels in the Canadian Arctic.

---

089 Wildlife

**Buckland, Laurie**

Environmental Assessment Biologist

Golder Associates Ltd.

Yellowknife, NT X1A 2R3

Permit No: 2025.

Location: Well site west of Fort Liard, NT

**Fort Liard P-66 Pipeline Project - Wildlife Studies**

*Moose, Caribou, Dall's Sheep, Wood Bison, Black & Grizzly Bear, Wolves, Raptors, Waterfowl & Birds and Other Species.*

To fill gaps in knowledge and/or to update information previously documented for the area. This information will then form the basis of an impact assessment of the pipeline and associated facilities.

---

090 Wildlife

**Campbell, Mitch**

Regional Biologist

Resources, Wildlife and Economic Development (RWED) - Keewatin Region

Arviat, NT X0E 0E0

Permit No: 1570.

Location: Southampton Island

**Southampton Island Caribou Study**

*Barren-ground Caribou*

Will provide data to support caribou management decisions. Data on caribou condition, pregnancy rate, and calf survival provide a measure of herd productivity. This baseline data will provide insight into herd stability. To have residents participate in caribou research.

---

091 Wildlife

**Campbell, Mitch**

Regional Biologist

Resources, Wildlife and Economic Development (RWED)

Arviat, NT X0C 0E0

Permit No: 1568.

Location: Qamanirjuaq caribou range, Keewatin.

**Qamanirjuaq Caribou Spring Composition and Satellite Collaring**

*Barren-ground Caribou*

- a) Aerial and/or ground based classification counts in March/April;
- b) Deploy 5 additional satellite collars on adult female caribou and maintain collar deployment at 10 collars.

Spring classification counts provide estimate of over winter survival and recruitment rates. Satellite data will assist in locating caribou concentrations during biological surveys, assist hunters in locating caribou, as well as provide insight into winter and calving ground distribution, and seasonal movements.

---

092 Wildlife

**Carriere, Suzanne**

Ecosystem Management Biologist  
Resources, Wildlife and Economic Development (RWED)  
Yellowknife, NT X1A 3S8

Permit No: 1595.

Location: Various communities in the Northwest territories

**Project 1: "Northwest Territories Small Mammal Survey"  
Monitoring"**

*Lemmings, Mice, Voles, Snowshoe Hare.*

To quantify density indices for small mammal and snowshoe hare populations to determine population cycles.

**Project 2: "Snowshoe Hare Population**

---

093 Wildlife

**Case, Ray**

Manager, Technical Support  
Resources, Wildlife and Economic Development (RWED)  
Yellowknife, NT X1A 3S8

Permit No: 1593.

Location: 200,000 square km area in northwest portion of the Slave Geological Province

**Population Ecology of Grizzly Bears in the Slave Geological Province**

*Barren-ground Grizzly Bear*

- 1) Identify population units based on long-term movements of grizzly bears;
- 2) Define critical habitats;
- 3) Determine the geographic extent of impacts of resource extraction activity;
- 4) Describe seasonal range use and denning habitats; and
- 5) Document seasonal forage selection and habitat use.

Up to 17 grizzly bears will be captured, radio collared and tracked during 1998. The bears collared in 1997 will be tracked until September when the collars will be removed.

---

094 Wildlife

**Caswell, Dale**

Chief, Migratory Birds Division  
Canadian Wildlife Services (CWS)  
Winnipeg, MB R3C 4W2

Permit No: 2028.

Location: West Baffin Island - Great Plains of the Koukdjuak (Cape Dominion to Koukdjuak River)

**Habitat Mapping and Assessment of the Dewey Soper MBS**

*Coastal Wetland Vegetation*

- create habitat maps to provide a basis for looking at changes in habitat characteristics in these and other area.
- to provide a habitat map for use in surveys and designs of surveys for a variety to other species.
- to provide habitat assessment and monitoring requirements for Ramsar sites.

---

095 Wildlife

**Caswell, Dale**

Chief, Migratory Birds Division  
Canadian Wildlife Service  
Winnipeg, MB R3C 4W2

Permit No: 2021.

Location: West Hudson Bay - Manitoba border to Whale cove

**Population Assessment, Distribution and Chronology of Migration of Eastern Arctic Small Canada Geese, Ross Geese and Snow Geese**

*Small Canada Geese, Ross Geese, Lesser Snow Geese.*

Legbanding and collaring of individuals to document the spatial and temporal aspects of their migrations to and from breeding and wintering areas.

---

096 Wildlife

**Caswell, Dale**

Chief, Migratory Birds Division  
Canadian Wildlife Services (CWS)  
Winnipeg, MB R3C 4W2

Permit No: 2015.

Location: West Hudson Bay, Thaane River to Arviat, NWT

**Ground Truthing of Goose Colonies for Aerial Photography Census along West Hudson Bay, NWT**

*Ross' geese, Lesser Snow Geese.*

Ground based survey of snow and Ross geese in the Arviat area to determine color phase and species ratios and to outline the extent of nesting colonies of each goose species.

---

097 Wildlife

**Cluff, Dean**

Biologist  
Resources, Wildlife and Economic Development (RWED)  
Yellowknife, NT X1A 2P9

Permit No: 2005.

Location: Lac de Gras

**Analysis Of Esker Use By Wolves Denning In The Central Arctic, NWT**

*Wolves*

Wolves will be radio collared to provide baseline information on their movements. The effort will identify critical habitat for wolves that may be sensitive to economic development.

---

098 Wildlife  
Diavik Diamond Mines Inc.  
Yellowknife, NT X1A 2P8

Permit No: 1582.

Location: Diavik Diamonds Project area in Lac de Gras area

**1998 Wildlife Monitoring Program for the proposed Diavik Diamonds Project in the Lac de Gras area, NWT**

*Caribou, Grizzly Bears, Wolves, Wolverine, Foxes, Raptors, Waterfowl, Shorebirds, Small Mammals, Hares.*

Monitor wildlife in Diavik project area in support of the Environmental Effects Assessment and associated environmental management/ protection plans.

---

099 Wildlife  
**Dickson, Lynne**  
Canadian Wildlife Services (CWS)  
Edmonton, AB T6B 2X3

Permit No: 1594.

Location: Holman Island and possibly along coast just northwest of Holman, NT

**Eider Migration and Harvest at Holman**

*King Eider and Pacific Common Eider.*

Document the migration of eiders past Holman and determine the proportion harvested and the condition of harvested birds.

---

100 Wildlife  
**Dickson, Lynne**  
Biologist  
Canadian Wildlife Services (CWS)  
Edmonton, AB T6B2X3

Permit No: 2011.

Location: Kagloryuak River valley on Victoria Island

**Use of Satellite Telemetry to Locate the Molting and Wintering Areas of King Eiders that Nest on Victoria Island**

*King Eiders*

Implant satellite transmitters in 10 king eiders in Kagloryuak River valley and to track them to molting and wintering areas in the Chukchi and Bering seas.

---

101 Wildlife

**Ellsworth, Troy**

Bison Technician

Resources, Wildlife and Economic Development (RWED)

Fort Smith, NT X0E 0P0

Permit No: 1575.

Location: Hook Lake and Fort Resolution

**Hook Lake Wood Bison Recovery Project**

*Bison*

Capture 22 newborn bison calves from Hook Lake herd and hand rear and treat for disease and use them to maintain a captive breeding herd in Fort Resolution.

---

102 Wildlife

**Ellsworth, Troy**

Bison Technician

Resources, Wildlife and Economic Development (RWED)

Fort Smith, NT X0E 0P0

Permit No: 1576.

Location: Slave River lowlands

**Little Buffalo Bison Population Census - Feb/March 1998**

*Bison*

Census Little Buffalo bison herd in the Slave River lowlands in the area west of the Slave River. Standard aerial survey methods employed.

---

103 Wildlife

**Ellsworth, Troy**

Bison Technician

Resources, Wildlife and Economic Development (RWED)

Fort Smith, NT X0E 0P0

Permit No: 1571.

Location: Fort Providence area

**Anthrax Research and Surveys of the Mackenzie Wood Bison Population**

*Bison*

Monitor the Mackenzie bison herd for disease and parasites and census the population and determine herd composition using standard methods.

---

104 Wildlife

**Gaston, Dr. A.J.**

Canadian Wildlife Services (CWS)

Hull, PQ K1A 0H3

Permit No: 1597.

Location: Coats Island

**CWS Seabird Monitoring Program**

*Thick-billed Murre, Glaucous Gull, Iceland Gull, Black Guillemot.*

Monitor population parameters and trends for seabirds on Coats Island as part of the Hudson Bay and Hudson Strait Seabird Monitoring Program.

---

105 Wildlife

**Gauthier, Dr. Gilles**

Departement de Biologie

Ste. Foy, PQ G1K 7P4

Permit No: 1591.

Location: Bylot Island greater snow goose colony

**Breeding Ecology of Greater Snow Geese and Interactions with their Habitat**

*Greater Snow Geese, Snowy Owl, Lapland Longspur, Lemmings, Arctic Fox.*

1. Examine long term variations in gosling growth and the effects on survival through summer and the fall migration.
  2. Determine the role of fox predation in limiting annual goose production.
  3. Monitor the impact of goose grazing on Bylot Island vegetation.
  4. Complete aerial survey of Bylot Island geese during brood rearing period to estimate total population size.
- 

106 Wildlife

**Gilchrist, Grant**

Biologist

Canadian Wildlife Services (CWS)

Yellowknife, NT X1A 1E2

Permit No: 2022.

Location: The communities of Lake Harbour and Cape Dorset, the eastern & western boundaries.

**Distribution and Abundance of the Northern Common Eider (*Somateris mollissima borealis*) Off Southern Baffin Island, NWT**

*Northern Common Eider*

To determine the population status of common eiders nesting in the south Baffin Island area using Traditional Ecological Knowledge, and ground-based boat surveys. Identify key breeding sites and establish studies of eider demography at some of these locations so that future population trends can be monitored.

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---

107 Wildlife

**Gilchrist, Grant**

Biologist

Canadian Wildlife Services (CWS)

Yellowknife, NT X1A 1E2

Permit No: 2003.

Location: East Bay, southeast Southampton Island

**Population Studies of King and Common Eider Ducks in East Bay, Southampton Island**

*Common Eider and King Eider.*

Evaluation of East Bay as long term study site for eiders. Collecting information on adult survival and philopatry and migration and distribution. Studying reproductive ecology of eiders. Monitoring contaminant levels in these eiders. Collecting information on duckling mortality and important brood rearing areas.

---

108 Wildlife

**Gilchrist, Grant**

Biologist

Canadian Wildlife Services (CWS)

Yellowknife, NT X1A 1E2

Permit No: 2014.

Location: Coburg Island - beach to the north of Cambridge Point and the seabird cliffs

**Comparative Studies of Seabird Foraging and Reproductive Ecology at the Northwater Polynya, Baffin Bay, 1997**

*Thick-billed Murres, Black-legged Kittiwakes.*

1. Collect data on Kittiwake (surface feeder) reproductive timing, clutch size, provisioning rates, chick diet, and chick growth.
2. Collect data on Thick-billed Murre (deep diver) reproductive timing, provisioning rates, adult attendance patterns, chick diet, and chick growth.
3. Collect seabird feathers, tissues and eggs.



---

109

Wildlife

**Gilchrist, Grant**

Biologist

Canadian Wildlife Services (CWS)

Yellowknife, NT X1A 1E2

Permit No: 1574.

Location: Belcher Islands

**Winter Ecology of the Hudson Bay Common Eider (*Somateria mollissima sedentaria*) in the Belcher Islands, Northwest Territories**

*Common Eider*

1. Quantify distribution and movements of eiders in relation to changing ice conditions.
2. Quantify the diet and time budgets of eiders wintering in open water leads near the Belcher Islands as a foundation for subsequent physiological modeling by Environment Canada.
3. Quantify and identify causes of mortality of eiders wintering in the leads.
4. Interview hunters and residents of Sanikiluaq to identify whether residents have sensed population declines, and if so, to identify potential natural and human-induced causes.
5. Determine the availability of open-water areas within the pack-ice that can be used by eiders for feeding, using satellite imaging and field work.
6. If possible, count the number of eiders in the various polynyas to estimate the population size of common eiders wintering in the Belcher Islands.

---

110

Wildlife

**Gonzalez, Francisco X.**

PhD Student

Brigham Young University

Provo, UT 84602

Permit No: 1567.

Location: Kugluktuk area and Taloyoak area.

**Molecular Systematics of the Genus *Lepus* in North America**

*Arctic Hare*

Collect 5 hares from Kugluktuk area and 5 hares from Taloyoak area for use in molecular systematics analysis to investigate the evolutionary relationships among North American hares.

---

111 Wildlife

**Gunn, Anne**

Ungulate Biologist

Resources, Wildlife and Economic Development (RWED)

Yellowknife, NT X1A 3S8

Permit No: 1583.

Location: Rae-Edzo, Kugluktuk, Umingmaktok, Cambridge Bay, Snare Lakes, Wha Ti, Rae Lakes and Lutsel k'e

**Movements Of The Bathurst Caribou Herd**

*Caribou*

To capture and remove collars from six bathurst cows and to fit 10 cows with new satellite collars.

---

112 Wildlife

**Gunn, Anne**

Ungulate Biologist

Resources, Wildlife and Economic Development (RWED)

Yellowknife, NT X1A 3S8

Permit No: 1600.

Location: Hood River, Bathurst Inlet

**Bathurst Caribou Calving Ground Studies: Influence of Nutrition and Human Activity on Calving Ground Location**

*Barren-ground Caribou*

This research project will study:

- 1· caribou calving ground habitat and how it is changing;
- 2· relative value of calving and post-calving habitats to caribou;
- 3· the possible impacts of displacement by human activity.

---

113 Wildlife

**Gunn, Anne**

Ungulate Biologist

Resources, Wildlife and Economic Development (RWED)

Yellowknife, NT X1A 3S8

Permit No: 1584.

Location: Lutsel K'e, Gjoa Haven, Umingmaktok, Cambridge Bay

**Movements of Queen Maud Gulf Caribou**

*Caribou*

To capture and remove collars from four Queen Maud Gulf cows.

---

114 Wildlife

**Gunn, Anne**

Ungulate Biologist

Resources, Wildlife and Economic Development (RWED)

Yellowknife, NT X1A 3S8

Permit No: 2036.

Location: Selwyn-Logan-Mackenzie Mountains includes eastern half of Nahanni National Park Reserve

**South Nahanni Mountain Caribou Research 1998-1999**

*Caribou*

1. Remove the existing active collars and replace them.
2. Determine fall calf and bull to cow ratios.
3. Determine genetic relationships with neighboring herds.
4. Determine winter range use.

---

115 Wildlife

**Gunn, Anne**

Ungulate Biologist

Resources, Wildlife and Economic Development (RWED)

Yellowknife, NT X1A 3S8

Permit No: 2018.

Location: Bathurst Island and its satellite islands

**Peary Caribou and High Arctic Wolf Monitoring on Bathurst and its Satellite Islands in 1998**

*Peary Caribou, Arctic Wolf.*

- 1) Determine the sex-age composition of Peary caribou.
- 2) Determine the relationships between climate and plant productivity.
- 3) Determine if live:dead biomass ratio have changed for dwarf shrubs between 1991 and 1998.
- 4) Determine if genetic differences are significantly greater between than within samples from Bathurst, its satellite islands and southern Ellesmere Island.
- 5) To determine wolf diet after a caribou and muskox population collapse.
- 6) To determine if wolves continued to breed.

---

116 Wildlife

**Hines, James E.**

Biologist

Canadian Wildlife Services (CWS)

Yellowknife, NT X1A 1E2

Permit No: 2013.

Location: Tuktoyaktuk Peninsula, the deltas of the Anderson, Kugalak, Smoke/Moose rivers and Campbell Island.

**Distribution, Abundance, and Survival of Pacific Brant from the Mainland of the Inuvialuit Settlement Region**

*Black Brant*

Determine:

- 1) The fall and winter distribution of black brant from the mainland of the ISR
- 2) The annual survival rates of brant from this area
- 3) The abundance and productivity of mainland brant

---

117 Wildlife

**Hines, James E.**

Wildlife Biologist

Canadian Wildlife Service (CWS)

Yellowknife, NT X1A 1E2

Permit No: 1599.

Location: 400m of each side of the Yellowknife Hwy.

**Abundance and Productivity of Waterfowl Breeding in the Boreal Forest**

*Waterfowl*

To determine factors that limit the size, composition, and productivity of the breeding populations of ducks.

---

118 Wildlife

**Kerbes, Richard**

Wildlife Biologist

Canadian Wildlife Services (CWS)

Saskatoon, SK S7N 0X4

Permit No: 2019.

Location: Queen Maud Gulf Migratory Bird Sanctuary

**Air Photo Inventory of Ross' and Snow Geese in Queen Maud Gulf Area**

*Ross' Geese, Lesser Snow Geese.*

To update the inventory on the location & sizes of the nesting colonies of Ross' Geese and Snow Geese in the Queen Maud area, with estimates of +/- 15% for the total numbers of each species. The last time we did a complete inventory of Snow and Ross' Geese in the Queen Maud Gulf area was ten years ago, in 1988. At that time we estimated that there were almost 280,000 Snows and 190,000 Ross' nesting there. We believe that the total geese may be up to three times as large as it was in 1988. The numbers of Snow Geese on the west and south coasts of Hudson Bay have increased so much in the past 30 years that they have overgrazed the vegetation. It has actually been permanently damaged by too many geese. Getting an up-to-date photo count on Queen Maud Gulf is part of our program to determine the status of Snow Geese and their habitat in all the major nesting areas of Arctic Canada. A special committee set up under the Arctic Goose Joint Venture has concluded that harvest of Snow Geese should be increased - by both subsistence hunters in the north and sport hunters in the south.

---

119 Wildlife

**Kershaw, Dr. G.P.**

Associate Professor  
University of Alberta  
Edmonton, AB T6G 2E3

Permit No: 2006.

Location: Studies of the Environmental Effects of Disturbances in the Subarctic (SEEDS) research site near Tulita

**Studies of the Environmental Effects of Disturbances in the Subarctic**

*Small Mammals*

Part of the SEEDS ecosystematic study of disturbances in subarctic. Small mammals live trapped and marked for later recapture and identification.

---

120 Wildlife

**Krebs, Charles J.**

Zoologist  
University of British Columbia  
Vancouver, BC V6T 1Z4

Permit No: 2010.

Location: various locations in the NWT

**Lemming Population Fluctuations in the Eastern and Western Arctic**

*Brown & Collared Lemmings, Red-backed Vole, Tundra Vole.*

Timing lemming cycles in the western arctic east and west of the Mackenzie River and finding out how cycles in the Cambridge Bay area are synchronized with those in the west.

---

121 Wildlife

**Krizan, Peter**

Polar Bear Biologist  
Resources, Wildlife and Economic Development (RWED)  
Iqaluit, NT X0A 0H0

Permit No: 2027.

Location: Davis Strait polar bear population area

**Davis Strait Polar Bear Population Inventory**

*Polar bear*

To inventory the Davis Strait polar bear population and to finish the delineation of the population boundary. The remaining radio collars are to be removed from the bears and a 3 year mark-recapture population estimation project will be started. The spring mark-recapture study is proposed to occur annually until 2001. It is proposed that as many polar bears are to be captured, marked and released for population estimation purposes.

---

122

Wildlife

**Kutz, Susan**

Regional Biologist

Resources, Wildlife and Economic Development (RWED) - Kitikmeot Region

Kugluktuk, NT X0E 0E0

Permit No: 1556.

Location: Mainland Keewatin, Sahtu and Inuvialuit regions

**A Survey of the Keewatin, Sahtu and Inuvialuit Regions for Evidence of Lungworm in Muskoxen**

*Muskoxen, Barrenland Caribou, Moose and Dall's Sheep.*

To determine of geographic range of *U. pallikuukensis* in muskoxen of the mainland. To determine if other sympatric species are infected with the parasite.

---

123

Wildlife

**Kutz, Susan**

PhD. Candidate

Western College of Veterinary Medicine, University of Saskatchewan.

Saskatoon, SK S7N 5B4

Permit No: 1566.

Location: Basil Bay area and sites along ATV trails between Kugluktuk, Bloody Falls and Hope Lake

**Overwinter Survival of Terrestrial Slugs Infected with Muskox Lungworm**

*Lungworm Larvae (Umingmakstrongylus pallikuukensis), Terrestrial Slug (Deroceras laeve).*

To determine the overwinter survival of the intermediate host terrestrial slug under the environmental conditions west of Kugluktuk. Muskoxen become infected with the lungworm when they inadvertently eat the slugs containing mature larvae.

---

124

Wildlife

**Kutz, Susan**

Ph.D. Candidate

Western College of Veterinary Medicine, University of Saskatchewan.

Saskatoon, SK S7N 5B4

Permit No: 1569.

Location: Mainland Kitikmeot, Keewatin, Sahtu and Inuvialuit regions

**A Survey of the Kitikmeot, Keewatin, Sahtu and Inuvialuit Regions for Evidence of Umingmakstrongylus pallikuukensis, a Lungworm of Muskoxen**

*Muskoxen, Barrenland Caribou, Moose and Dall's Sheep.*

Collect samples from hunter killed wildlife to examine for evidence of the lungworm to determine the geographic range of the parasite in muskoxen of the mainland and to determine if other sympatric species are infected with the same parasite.

---

125 Wildlife

**Larter, Nicholas**

Caribou/Muskox Biologist

Resources, Wildlife and Economic Development (RWED)

Inuvik, NT X0E 0T0

Permit No: 1587.

Location: Banks Island

**Banks Island Range Study**

*Muskox, Peary Caribou.*

Monitor and analyze the diets and the condition and health of caribou, Muskoxen and wolves and their habitats on Banks Island.

---

126 Wildlife

**Latour, Paul**

Habitat Biologist

Canadian Wildlife Services (CWS)

Yellowknife, NT X1A 1E2

Permit No: 1590.

Location: Liard Valley, primarily between the BC border and Blackstone River and within 2 km of the highway.

**Liard Valley Forest Songbirds**

*Approximately 50 Species of Forest Songbirds in the Area.*

Determine the species composition, relative abundance and habitat relationships of songbirds using the mature forest in the Liard Valley. Information can have use in resource management planning for the Liard Valley.

---

127 Wildlife

**Marshal, Jason**

Wildlife Biologist

Gwich'in Renewable Resource

Inuvik, NT X0E 0T0

Permit No: 2040.

Location: Area around Dempster Highway between Inuvik and Tsiigehtchic area

**Moose Population Survey in the Inuvik-Tsiigehtchic Area**

*Moose*

As part of the moose research that has begun in the Inuvik-Tsiigehtchic area, we propose to conduct herd composition and trend surveys over the winter of 1998-1999. This will be the third year of surveys to establish some basic population abundance that can be compared to previous years' surveys to determine if the population is increasing, decreasing, or stationary. As we are still evaluating methods and timing of surveys, this survey will be in November 1998 or March 1999, depending on the outcome of a March 1998 survey. November surveys will provide more detailed herd composition data. But March surveys will give a better idea of calf over-winter survival.

---

128 Wildlife

**Marshal, Jason**

Wildlife Biologist

Gwich'in Renewable Resource Board

Inuvik, NT X0E 0T0

Permit No: 2009.

Location: Area around Dempster Highway between Inuvik and Tsiigehtchic

**Moose Habitat and Harvest in the Inuvik-Tsiigehtchic Study Area**

*Moose, associated habitat Plants.*

To identify and characterize important moose habitats and to collect information and moose jaws from hunters who harvest moose.

---

129 Wildlife

**Marshal, Jason**

Wildlife Biologist

Gwich'in Renewable Resources Board

Inuvik, NT X0E 0T0

Permit No: 1588.

Location: Campbell Lake

**Gwich'in Territorial Park Waterfowl Survey**

*Waterfowl*

Waterfowl survey to monitor changes from 1996 baseline survey of distribution, relative abundance and timing.

---

130 Wildlife

**Mech, Dr. L. David**

Senior Scientist

U.S. Department of the Interior

St. Paul, MN 555108

Permit No: 2007.

Location: Eureka area, Ellesmere Island

**Behavioral Ecology of an Arctic Wolf Pack**

*Wolf, Muskoxen, Arctic Hare, Caribou.*

To determine the long-term productivity and survival of various wolf pack members, their social roles in the packs, and the details of their feeding, caching, scent marking, and howling behavior.



---

131 Wildlife

**Melton, Derek A.**

Biologist

Golder Associates Ltd

Calgary, AB T2P 3T1

Permit No: 1581.

Location: Thor Lake project site

**Thor Lake Beryllium Project - Wildlife Baseline Survey**

*Moose, Caribou, Furbearers, Raptors, plus incidental sightings of all species.*

The study of aquatic organisms, water quality, hydrology, terrestrial plants, wildlife, and archaeology. This process will help focus the impact analysis to especially valued or key species.

---

132 Wildlife

**Melton, Derek**

Biologist

Golder Associates Ltd.

Calgary, AB T2P 3T1

Permit No: 2035.

Location: 2 oil wells near Norman Wells

**A Wildlife and Habitat Survey for Grey Wolf Exploration's Exploratory Oil Drilling Project Near Norman Wells**

*All Mammals and Birds.*

To record wildlife or their signs in the study area. All wildlife observations will be recorded to location using a GPS unit. Analysis will consider potential impacts of the winter drilling program and suggest any necessary mitigation measures.

---

133 Wildlife

**Morrison, Dr. R.I.G.**

Research Scientist, Shorebirds

Canadian Wildlife Services (CWS)

Hull, PQ K1A 0H3

Permit No: 2004.

Location: Alert, Ellesmere Island

**Studies of the Migration, Ecophysiology and Energetics of High Arctic Shorebirds at Alert, Ellesmere Island**

*Red Knot, Ruddy Turnstone, Sanderling Baird's Sandpiper, all Birds but particularly Shorebirds.*

Study migration strategies, ecophysiology and energetics of high arctic shorebirds. Includes:

- (1) banding to monitor weight changes
- (2) abdominal profiling
- (3) radio tracking
- (4) general bird observations.

---

134 Wildlife

**Muggli, Deborah**

Biologist

Rescan Environmental Services

Yellowknife, NT X1A 3S9

Permit No: 2002.

Location: Hope Bay area

**Hope Bay Belt Project Environmental Baseline Study**

*Caribou, Muskoxen, Grizzly Bears, Wolverines, Wolves, Foxes, Waterfowl and Sandhill Cranes.*

To continue development of a comprehensive baseline inventory of animals and habitat within the Hope Bay Belt.

---

135 Wildlife

**Oestreich, Allanna**

Researcher

Smithers, BC V0J 2N0

Permit No: 2026.

Location: South Mackenzie Mountains NWT

**Demography and Seasonal Distribution of Dall's sheep in the Liard Range, Mackenzie Mountains, NT**

*Dall's Sheep*

To determine lamb production and the proportion of those that are added recruited to the adult portion of the population. To identify seasonal distribution and habitat use patterns of sheep within the Liard range study area. Areas used for lambing, nursing of lambs, summer range, rutting activity in the fall and winter range. To determine the vegetation composition and forage use for Dall sheep within the study area.

---

136 Wildlife

**Panayi, Damian**

Wildlife Technician

Resources, Wildlife and Economic Development (RWED)

Kugluktuk, NT X0E 0E0

Permit No: 1565.

Location: Kugluktuk, Cambridge Bay, Holman, Gjoa Haven, Taloyoak, Pelly Bay, Umingmaktok, Bathurst Inlet

**Body Condition and Parasite Status of Kitikmeot Wildlife**

*All but primarily Caribou and Muskoxen.*

Wildlife samples submitted by domestic and commercial hunters will be analyzed for disease and parasite occurrence. Samples will be collected to determine body condition and age.

---

137 Wildlife

**Probst, Christopher**

Biological Expedition Leader  
Groupe de Recherches en Ecologie Arctique  
Strasbourg, France 67000

Permit No: 2016.

Location: Cambridge Bay(Mount Pelly area) - Victoria Island NWT

**Groupe de Recherches en Ecologie Artique (G.R.E.A.) Expedition 1998**

*Collared Lemming*

To continue the study initiated in 1996 on the Collared Lemming winter ecology through description of their winter nests which become visible in summer after the snow melting. To study the distribution and densities for their main predators and determine yearly fluctuations.

---

138 Wildlife

**Ross, Ian**

Arc Wildlife Services Ltd.  
Calgary, AB T2N 0S8

Permit No: 1578.

Location: Vicinity of Meliadine Lake

**Meliadine West Wildlife Baseline Study**

*All Wildlife including Caribou, Sandhill Cranes, Waterfowl, Raptors.*

To document wildlife use of the area prior to any future mine development. Wildlife distribution and abundance will be investigated.

---

139 Wildlife

**Solberg, John**

Wildlife Biologist/Pilot  
U.S. Fish & Wildlife Services  
Klamath Falls, OR 97601

Permit No: 2020.

Location: Mills Lake Marsh on the Mackenzie River (18km west of Ft. Providence)

**Western Canada Cooperative Waterfowl Banding Program - Mills Lake Station**

*Ducks*

Preseason banding of 2,000 Mallards, 1,500 northern Pintails and 1,000 of all other waterfowl species at each of the 18 banding stations in Canada.

---

140 Wildlife

**Stefan, Carol**

Wildlife Ecologist

Golder Associates

Calgary, AB T2P 3T1

Permit No: 2042.

Location: Centered on 4 oil wells near Fort Liard and Nahanni Butte

**A Wildlife And Habitat Survey**

*All Mammals and Bird Species.*

To record wildlife or their signs in the project area. Analysis will consider potential impacts of the winter drilling program and suggest any necessary mitigation measures.

---

141 Wildlife

**Stout, Bonnie E.**

PH.D Candidate

Dept of Biological Sciences, Simon Fraser University

Burnaby, BC V5A 1S6

Permit No: 1596.

Location: 400m of each side of the Yellowknife Hwy

**Pair Bonds in Red-neck Grebes and Horned Grebes**

*Red-neck Grebe and Horned Grebe.*

Mark and research the ecology and behavior of grebes in Yellowknife study area.

---

142 Wildlife

**Taylor, Mitch**

Polar Bear Biologist

Fisheries and Wildlife (Nunavut)

Iqaluit, NT

Permit No: 2032.

Location: Akamiski and Twin Island

**Southern Hudson Bay Polar Bear Telemetry Project**

*Polar Bears- Nanuk*

- 1) Locate 4 polar bears currently instrumented with satellite radio collars.
- 2) Remove radio collars.
- 3) Instrument up to 4 different (i.e., new) adult female polar bears with radio collars
- 4) Mark and recapture as many other polar bears as possible.

---

143

Wildlife

**Taylor, Mitch**

Polar Bear Biologist

Resources, Wildlife and Economic Development (RWED)

IQUALUIT, NT X0A 0H0

Permit No: 1579.

Location: Gulf of Boothia area south of Bernier Bay

**Gulf of Boothia and M'clintock Channel Polar Bear Population Inventory**

*Polar Bear, Species that are used by Polar Bear for Prey.*

The number of polar bears and their rates of birth and death will also be estimated using mark-recapture methods.

Bears are to radio collared up to 7 adult female polar bears in Gulf Of Boothia.

---

144

Wildlife

**Veitch, Alasdair**

Supervisor, Wildlife Management

Resources, Wildlife and Economic Development (RWED)

Norman Wells, NT X0E 0V0

Permit No: 1572.

Location: Mackenzie Valley approximately 20Km NW of Norman Wells in the Tulita district of Sahtu Settlement Area

**Juvenile Dispersal of Martens in the Boreal Forest of the Northwest Territories**

*Marten*

- 1) Determine the location and structure of dens where the young are born and determine the time of birth for martens in the Sahtu.
- 2) Determine if dispersal of juvenile martens occurs, and if so, to determine the timing, direction, and distance of that dispersal. In addition, if dispersal is found to occur, to determine if there are any differences between males and females in the timing, direction, and distance of the dispersal.
- 3) Monitor the population trends of small mammals (mice and voles) and snowshoe hares in the study area.

---

145

Wildlife

**Veitch, Alasdair**

Supervisor, Wildlife Management

Resources, Wildlife and Economic Development (RWED)

Norman Wells, NT X0E 0V0

Permit No: 2041.

Location: Kelly-Willow Lake and the lower Keele-Redstone Rivers - the total area covered is 950 square miles

**Population Size, Composition, and Harvest of Moose in the Tulita Area, NT, November 1998**

*Moose*

- 1) Estimate, as precisely as possible, the number of moose in the Tulita area population.
- 2) Determine the composition (bulls, cows, calves) of the Tulita area moose population. This provides a picture of the overall "health" of the population.
- 3) Estimate current harvest of moose from the study area to determine if it is within sustainable limits.
- 4) Determine how fires in the study area in the last five years (including extensive portions of the lower Keele and Redstone Rivers burned in 1998) have affected moose numbers and distribution, and establish baseline information to monitor future population performance in relation to burns.

---

146

Wildlife

**Veitch, Alasdair**

Supervisor, Wildlife Management (Sahtu Region)

Resources, Wildlife and Economic Development (RWED)

Norman Wells, NT X0E 0V0

Permit No: 2038.

Location: Loretta Canyon, Mackenzie Mountains, NT

**Parasites, Body Condition and Health Status of Dall's Sheep in the Mackenzie Mountains. Northwest Territories**

*Dall's Sheep*

- 1) To determine the incidence and prevalence of lung, gut and muscle parasites present in Dall's Sheep from Loretta Canyon in the Front Range of the Mackenzie mountains.
- 2) To collect fresh adult lungworms from freshly killed sheep that will be used by the University of Saskatchewan to identify the possible new species of lungworm.
- 3) To collect baseline information on the body condition, health status, and nutritional status of the collected animals.

---

147 Wildlife

**Veitch, Alasdair**

Supervisor Wildlife Management  
Resources, Wildlife and Economic Development (RWED)  
Norman Wells, NT X0E 0V0

Permit No: 2029.

Location: Willow Lake also known as Brackett Lake- north of Tulita

**Western Canada Cooperative Duck Banding Program at Willow Lake, Sahtu Settlement Area NWT - 1998**

*All Dabbling Ducks*

To band 800 to 2,000 mallards and 400 to 1,500 northern pintails, and all incidentally captured waterfowl prior to the opening day of the hunting season.

---

148 Wildlife

**Voelzer, James F.**

Chief, Waterfowl Population Surveys  
US Fish and Wildlife Services (USFWS)- Migratory Birds Management Office (MBMO)  
Portland, OR 97232-4141

Permit No: 2030.

Location: Between Yellowknife and Ft. Rae

**Operational Waterfowl Banding Station**

*Ducks*

To obtain representative sample of ducks from Yellowknife banding reference area. As in part, our main interest is in sampling mallard and pintail populations. Historically, banding samples have been low in the areas east of the sedimentary portions of the Mackenzie Valley so there is a great deal of interest in recoveries of all species banded in the area. To reduce fears of the introduction of noxious weeds, we use only cleaned grains as bait in our traps in all northern locations.

---

149 Wildlife

**Voelzer, James F.**

Chief, Waterfowl Population Surveys  
U.S. Fish and Wildlife Service - Migratory Bird Management Office (MBMO)  
Portland, OR 97232-4181

Permit No: 1586.

Location: Mackenzie River drainage, Fort Smith to Tuktoyaktuk

**Cooperative U.S./Canada Waterfowl Population Surveys**

*All Waterfowl*

Ongoing study to determine and monitor size and species composition of the breeding population of ducks and other waterfowl in the Mackenzie River drainage by conducting aerial surveys.

---

150 Wildlife

**Wheatley, Michelle**

Integrated Resources Specialist

Sahtu Renewable Resources

Norman Wells, NT X0E 0V0

Permit No: 2033.

Location: Tulita area, 1995 burn area

**Beaver(Castor canadensis) Repopulation of an Area After a Forest Fire**

*Beaver*

The area east of Tulita was burnt in the 1995 forest fire. This area, south of Great Bear River and north of the Mackenzie River covers 69Km<sup>2</sup>. This area provides an ideal study area. The burnt area is bordered on 2 sides by rivers, which will provide an access route for beaver dispersing from other areas. The area is also easily accessible from Tulita, with little ferry time required for the aerial survey.

---

151 Wildlife

**Wheatley, Michelle**

Integrated Resources Specialist

Sahtu Renewable Resources Board

Norman Wells, NT X0E 0V0

Permit No: 1598.

Location: Fort Good Hope area, vicinity of Tukweye Lake - Rampart River - Hume River complex

**Beaver Family Size and Dispersal**

*Beaver*

Live trapping, mark and release program to estimate beaver family size and composition in representative lodges and to estimate the dispersal distances of beavers in the Sahtu Settlement area.



---

152

Wildlife

**Wheatley, Michelle**

Integrated Resources Specialist  
Sahtu Renewable Resources Board  
Norman Wells, NT X0E 0V0

Permit No: 2039.

Location: Tulita area, south of Willow Lake (Brackett Lake)

**Beaver (*Castor canadensis*) Trapping Strategies**

*Beaver*

When compared to the price for Marten pelts, the financial return on beaver pelts is much lower. As a result trappers have moved away from beaver trapping. In turn, due to the effort required to trap under the ice, most beaver harvesting that does occur is now done by spring hunting rather than trapping. This results in poorer quality furs, which are past prime, and damaged pelts. These pelts do not qualify for the guaranteed fur-pricing program and bring much lower returns at the fur auction. The objectives of this proposed study are:

- 1) To determine the long term effects of two different trapping strategies on beaver population levels.
- 2) To compare the effort required by two different beaver trapping strategies.
- 3) To demonstrate the effectiveness of the trapping-out strategy and promote under ice beaver trapping among Sahtu participants.

---

153

Wildlife

**Williams, Scott**

Manager Environment and Resource Development  
BHP Diamonds Inc.  
Yellowknife, NT X1A 3T1

Permit No: 1580.

Location: Lac de Gras, BHP diamond project area

**Wildlife Monitoring Program - 1997**

*Caribou, Grizzly Bears, Furbearers, Birds.*

Wildlife monitoring under Environmental Agreement.

## Department of Fisheries and Oceans Fisheries Scientific Licences

154 Fisheries

**Chiperzak, Doug**

Department of Fisheries and Oceans

Box 1871

Inuvik, NT X0E 0T0

Chiperzak@dfo-mpo.gc.ca

Reference No: SLI-98/99-012 (DFO)

Region: IN Location: Mackenzie Delta area- Campbell Creek

**Campbell Creek- Habitat Availability/Utilization**

The objective of this project was to determine species utilization of the Upper Campbell Creek Lakes and the availability of overwintering habitat. The species studied were inconnues, Broad whitefish, Lake whitefish, Northern pike, and burbot.

---

155 Fisheries

**Gyselman, Eric**

Department of Fisheries and Oceans

501 University Crescent

Winnipeg, MB R3T 2N6

gyselmane@dfo-mpo.gc.ca

Reference No: SLI-98/99-017 (DFO)

Region: IN Location: Beaufort Sea

**SHEBA/JOIS Biological Sampling Program During the Transit of the CCGS Louis St. Laurent Through the Northwest Passage**

The objective of this research project was to conduct field research and fishing activities including: population dynamics, genetics, diet, contaminants, and related biological sampling in support of other projects being conducted (ex. physical, chemical and biological oceanography). This research was part of the Region's SHEBA/JOIS program during the transit of the CCGS Louis St. Laurent through the Northwest passage and surrounding areas.

---

156 Fisheries

**Harwood, Lois**

Department of Fisheries and Oceans

Box 1871

Inuvik, NT X0E 0T0

HarwoodL@dfo-mpo.gc.ca

Reference No: SLI-98/99-020 (DFO)

Region: IN Location: Hornaday River

**Arctic Charr Studies- Hornaday River**

This project is an on-going assessment of Hornaday River charr. The objectives were to observe, examine and sample current-year spawners at the base of La Ronciere Falls during spawning, and to measure fecundity and assess timing of spawning.

---

157 Fisheries

**Harwood, Lois**

Department of Fisheries and Oceans

Box 1871

Inuvik, NT X0E 0T0

HarwoodL@dfo-mpo.gc.ca

Reference No: SLI-98/99-021 (DFO)

Region: IN Location: Kuujjua River downstream of Tatik Lake, including the estuary

**Kuujjua River Arctic Charr Studies**

One objective of this study was to observe, examine and sample current-year spawners at the Kuujjua River, Holman Island, NT and in Tatik Lake, NT. Another objective was to determine the usage of deep boles in the Kuujjua River downstream of the weir site, and the Kuujjua River estuary, by charr during fall and winter. The last objective was to locate and document rearing and spawning areas (past and present) used by Kuujjua River charr.

---

158 Fisheries

**Innes, Stuart**

Department of Fisheries and Oceans

501 University Crescent

Winnipeg, MB R3T 2N6

innes@dfo-mpo.gc.ca

Reference No: SLI-98/99-001 (DFO)

Region: IN Location: Beaufort Sea

**SHEBA/JOIS - Ringed Seal Pup Production**

The objective of this research project was to estimate ringed seal pup production at several locations in the pack ice of the Beaufort Sea in the vicinity of the ice-locked C.C.G.S. Des Groseilliers (i.e. the SHEBA platform). The project did not go forward, however, because the ship moved too far out of range for the helicopter to reach it, even with refueling support.

---

159 Fisheries

**Innes, Stuart**

Department of Fisheries and Oceans.

501 University Cres.

Winnipeg, MB R3T 2N6

inness@dfo-mpo.gc.ca

Reference No: SLI-98/99-018 (DFO)

Region: IN and Nunavut Location: Beaufort Sea, Eureka, Resolute and Arctic Bay.

**Ringed Seal Contaminant and Parasite Loads, Food Habits, and Basic Biology - SHEBA/JOIS Transit**

The objective of this research project was to collect seals and seal stomachs for analysis of contaminants such as mercury. This would help to describe the trophic web and the concentrations of mercury in seal food. This research is important as seals are an important Inuit food source. Unfortunately, no ringed seals were caught; the few that presented themselves did so with the ship (C.C.G.S. Lois St. Laurent) in the background.

---

160 Fisheries

**Innes, Stuart**

Department of Fisheries and Oceans

501 University Crescent

Winnipeg, MB R3T 2N6

inness@dfo-mpo.gc.ca

Reference No: SLI-98/99-019 (DFO)

Region: IN and Nunavut Location: Admiralty Inlet

**Distribution and Movement of Ringed Seals in the Canadian Archipelago**

The objective of this research project was to develop a better understanding of the distribution and movements of ringed seals in the Canadian Archipelago. This was to be accomplished by live-capturing and flipper-tagging seals found at a variety of locations in Canadian arctic waters. Unfortunately, only one neonate ringed seal was caught. It was tagged and the tag came off during the molt.

---

161 Fisheries

**Johnston, Thomas A.**

Department of Fisheries and Oceans

501 University Crescent

Winnipeg, MB R3T 2N6

JohnstonT@dfo-mpo.gc.ca

Reference No: SLI-98/99-006 (DFO)

Region: SA Location: Trout Lake

**Intrapopulation Variation of Walleye**

The objective of this research project was to sample walleye from a spawning run on the south side of Trout Lake in May 1998 in order to examine the intrapopulation variation in egg size and fecundity with respect to female age and size. However, because the spawning run ended earlier than anticipated, it was not possible to catch any walleye and so there are no data or results yet for this study.

---

162 Fisheries

**Low, George**

Department of Fisheries and Oceans

42043 Mackenzie Highway

Hay River, NT X0E 0R9

LowG@dfo-mpo.gc.ca

Reference No: SLI-98/99-004 (DFO)

Region: NS,SS, DC Location: Great Slave Lake

**Great Slave Lake Fishery Management Programs**

There were two projects conducted for this licence. For the first project, experimental netting was used to estimate the biomass distribution of whitefish amongst length and weight frequency classes in the Great Slave Lake. The second project used the same technique to determine/estimate the short and long-term effects of reducing the commercial mesh size from 133 mm (5 1/4 in) stretched mesh, to 127 mm (5 in) stretched mesh on lake whitefish and other by-catch species in Great Slave Lake.

---

163 Fisheries

**Low, George**

Department of Fisheries and Oceans

42043 Mackenzie Highway

Hay River, NT X0E 0R9

LowG@dfo-mpo.gc.ca

Reference No: SLI-98/99-005 (DFO)

Region: ALL Location: NWT West, all areas

**NWT West- Fishery Management Programs**

This research project was a cooperative fishery management program. The objectives were to collect up to 200 walleye for a mobile walleye hatchery, and to collect walleye egg samples for a comparative study from all or any of Mosquito Creek, Trout Lake, Dore Creek and Little Buffalo River.

---

164 Fisheries

**Papst, Michael H.**

Department of Fisheries and Oceans

501 University Crescent

Winnipeg, MB R3T 2N6

PapstM@dfo-mpo.gc.ca

Reference No: SLI-98/99-022 (DFO)

Region: IN Location: Kuuk River

**Kuuk River Arctic Charr Radio Tagging**

The objectives study were to locate the over-wintering site of the none spawning portion of the Kuuk River charr run using radio-tags, and to re-examine the possible importance of the Kuuk stock to the existing Holman fishery. This was a joint project with FJMC and Holman HTA.

---

165 Fisheries

**Tallman, Ross**

Department of Fisheries and Oceans

501 University Crescent

Winnipeg, MB R3T 2N6

tallmanr@dfo-mpo.gc.ca

Reference No: SLI-98/99-015 (DFO)

Region: IN Location: Peel River

**Assessment of Peel River Fishery Resources**

The objectives of this study were to monitor the seasonal migration of coregonids into the Peel River, to assess the spawning habitats of each species (whitefish, inconnu, cisco, pike, walleye and grayling), and to develop a fishery monitoring program for the Peel River.

---

166 Fisheries

**Tallman, Ross**

Department of Fisheries and Oceans

501 University Crescent

Winnipeg, MB R3T 2N6

TallmanR@dfo-mpo.gc.ca

Reference No: SLI-98/99-007 (DFO)

Region: IN Location: Campbell Lake and Campbell Creek

**Assessment of Campbell Lake and Campbell Creek Fishery Resources**

The objective of this study was to conduct a stock assessment of the fisheries resources in Campbell Lake and Campbell Creek, near Inuvik, NWT. The fish studied were whitefish, inconnu, cisco, pike, walleye, and grayling.

# Researchers and Agencies Index 1998

## Aurora Research Institute Science Licences

001 Alexander, Martin E.  
 002 Anderson, David  
 063 Anderson, David G.  
 003 Ballantyne, James  
 025 Bleeker, Wouter  
 004 Brodie, Chris  
 005 Bryant, Wayne  
 028 Burn, C. R.  
 064 Collignon, Beatrice  
 029 Dallimore, Scott R.  
 026 DeRoose, Elsie  
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 031 Dyke, Arthur S.  
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## Prince of Wales Northern Heritage Centre Archaeology Permits

067 Bussey, Barbara Jean  
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 072 Hart, Elisa  
 073 Lobb, Wayne Murray  
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## Department of Resources, Wildlife & Economic Development Wildlife Permits

078 Abernethy, Dave  
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# Glossary of Scientific Terms

<b>aerosol:</b>	very fine solid or liquid particles suspended in a gas. Smoke and fog are aerosols that occur in nature.
<b>anthropology:</b>	the study of human beings and their beliefs and ways of life. It deals with the development of these features of culture from prehistoric times to the present.
<b>anthropologist:</b>	a specialist in the study of man.
<b>aquaculture/aquiculture:</b>	raising of fish in an enclosed pond or pool.
<b>archaeology:</b>	the study of the way humans lived a long time ago. Archaeologists dig up the remains of ancient cities and towns and then study the tools, weapons, pottery and other things they find.
<b>asthenosphere:</b>	a deep layer of earth that is partly melted by heat.
<b>atmosphere:</b>	the layer of gases that surrounds the Earth. The atmosphere is made up of oxygen, nitrogen, carbon dioxide and other gases.
<b>atmospheric radiation:</b>	infrared <b>radiation</b> emitted by the atmosphere in 2 directions, up into space and down towards Earth.
<b>basalt:</b>	a kind of volcanic rock that is hard, heavy, dark and glassy in appearance.
<b>bathymetric:</b>	measurement of the depth of water in bodies of water.
<b>bedrock:</b>	the solid rock that is below loose material, such as soil, sand, clay, or gravel.
<b>benthic invertebrates:</b>	animals without backbones that live at the bottom of a body of water.
<b>biface:</b>	a stone which has been flaked on both faces or sides
<b>bifacial thinning flakes:</b>	flakes removed from a core in order to shape or thin a two sided tool
<b>biogeochemistry:</b>	science that deals with the relation of the Earth's chemicals to plant and animal life in an area

<b>biomass:</b>	the total amount of all living things within a specific volume/area of the environment.
<b>biostratigraphy:</b>	a branch of <b>paleontology</b> that is concerned with the recognition of fossils and the relative position of their occurrences in space and time.
<b>browse:</b>	tender shoots, twigs and leaves
<b>carbonate caps:</b>	a layer of rock which doesn't allow gas or oil to pass through it
<b>catchment:</b>	a catching or collecting of water, especially rainwater
<b>chert:</b>	very hard rocks (e.g. flint)
<b>chondrichthyans:</b>	fish whose skeletons are made of cartilage instead of bone
<b>chronology:</b>	study of time sequences
<b>confluence:</b>	flowing together of 2 or more streams
<b>contemporaneous:</b>	existing or occurring at the same time
<b>coregonids:</b>	white fish- fish belonging to the whitefish family
<b>cores:</b>	An archaeological term describing a lump of stone which is left after flakes have been removed (flakes act like blades in prehistoric tools)
<b>correlation:</b>	a mutual relationship between 2 comparable things
<b>craton:</b>	a stable area of the Earth's crust forming a significant mass of a continent
<b>Cryoplanation terrasses:</b>	land surface that has been changed by intensive frost action and by erosion of running water and moving ice
<b>debitage:</b>	by-products of tool making (e.g. pieces of wood or bone that are thrown away after tools are made from these materials)
<b>debitage scatter:</b>	accumulation ofdebitage indicating that tool making was an activity in an area of interest
<b>diamicton:</b>	glacial soils with of clay, sand, gravel, and boulders mixed together
<b>diatom:</b>	microscopic one-celled marine or freshwater alga having cell walls that contain silica (a white or colorless glass-like solid that doesn't dissolve).



<b>ecophysiology:</b>	study of the relationship between an organism's physical functioning and its environment
<b>effluent:</b>	an outflowing branch of a main stream or lake
<b>electrical conductivity:</b>	the transmission of electricity
<b>electrofisher:</b>	piece of equipment that uses an electric current to stun and kill fish, usually for scientific purposes
<b>electromagnetic:</b>	magnetism caused by electricity
<b>electron:</b>	a very tiny particle that moves around the nucleus of an atom and has a negative electrical charge
<b>erosion:</b>	group of natural processes (weathering, disintegration, abrasion, corrosion, transportation) where the Earth's surface is worn away and removed
<b>esker:</b>	a long, narrow ridge of coarse gravel deposited by a stream flowing in or under a decaying glacial ice sheet
<b>etiology:</b>	branch of science dealing with the causes of particular phenomenon
<b>faunal changes:</b>	changes in an animals life, or in the kinds of animals living in a given area
<b>fecundity:</b>	the capacity for producing offspring, especially in abundance; productiveness
<b>fossil:</b>	trace of an organism of a past age, embedded and preserved in the Earth's crust
<b>gas hydrate:</b>	gas that has molecules of water attached to it
<b>genetic characterization:</b>	description of the essential genetic elements
<b>geochemical:</b>	a science that deals with the chemical composition of and chemical changes in the solid matter of the earth
<b>geochronological:</b>	timeline of the past as seen from geological data instead of human records
<b>geological:</b>	the science that deals with the structure of the earth.
<b>geologists:</b>	scientists who study rocks, mountains and cliffs to find out what the earth is made of and what changes have taken place over the years.
<b>geomorphological:</b>	the study of the physical features of the Earth's surface

<b>geotechnical:</b>	a science that deals with the application of geology to engineering
<b>glacial:</b>	of ice, icy, produced by the pressure of ice
<b>global radiation:</b>	energy given off by the Earth
<b>herbaceous plant:</b>	a plant which has little or no woody tissue and usually lasting for one growing season
<b>herbarium:</b>	a collection of dried plants orderly arranged for reference purposes
<b>hummocks:</b>	a rounded or conical small hillock (slight rise of ground above a level surface)
<b>hydraulic conductivity :</b>	rate of flow of water over a set time, space, direction and temperature
<b>hydrocarbon:</b>	compounds consisting of carbon and hydrogen often associated with the oil and gas industry
<b>hydrology:</b>	science dealing with the properties, distribution and circulation of water
<b>invertebrates:</b>	an animal that has no backbone or skeleton (e.g. worms, insects)
<b>isotope:</b>	one of two or more atoms with the same atomic number but with different numbers of neutrons (weight will differ) (e.g. carbon <sup>13</sup> which is stable versus carbon <sup>14</sup> which is radioactive)
<b>isotopic dating techniques:</b>	used in geology, <b>archaeology</b> , <b>paleontology</b> , and physics, to find out the actual or relative age of an object, of a natural phenomenon, or of a series of events. It is based on the natural <b>radioactivity</b> of certain minerals found in rocks therefore allowing for a comparison between the amount of any <b>isotope</b> and its decay product
<b>karst:</b>	a limestone region marked by sinks, ridges, irregular rocks sticking out, caverns and underground streams
<b>landforms:</b>	a natural feature of land surface (e.g. plains, mountains, valleys)
<b>lithic scatter:</b>	a scatter of several culturally made stone flakes and/or tools over a small area on an archaeological site
<b>lithological:</b>	relating to the study of rock and stones
<b>lithosphere:</b>	the outer layer of soil and rock on a planet
<b>magnetotelluric:</b>	study of the underground magnetic fields of the earth

<b>microclimate:</b>	the climate close to the Earth's surface or the climate of a small area
<b>microphysical:</b>	relating to the physics of molecules, atoms and elementary particles
<b>microscopic:</b>	so small or fine as to be invisible or not clearly seen without a microscope
<b>morphological:</b>	relating to or concerning form or structure
<b>neonate:</b>	child less than 1 month old
<b>ordination plots:</b>	a statistical method for analyzing complex data sets
<b>oscillation:</b>	swinging or moving backward and forward like a pendulum
<b>paleontology:</b>	the science that deals with fossils of prehistoric animal and plant life.
<b>paleoenvironment:</b>	environments of past geological periods
<b>paleozoic:</b>	era of the Earth's early history from about 570 to 225 million years ago.
<b>parameters:</b>	one of a set of measurable factors, such as temperature and pressure, that define a system and determine its behavior and are varied in an experiment.
<b>parameterization:</b>	expressing in terms of parameters.
<b>pedosphere:</b>	the thin outer layer of the Earth which is made of soil.
<b>pellet surveys:</b>	study/survey of animal droppings.
<b>periglacial:</b>	relating to the area at the edges of a frozen or ice covered region.
<b>periphyton:</b>	organisms attached to underwater surfaces such as rocks.
<b>permafrost:</b>	permanently frozen layer of soil, subsoil and other deposits occurring at variable depths below the Earth's surface in the Arctic and subarctic.
<b>philopatry:</b>	an animal's instinct to return to a particular location (e.g. spawning grounds).
<b>phytoplankton:</b>	the passively floating tiny plant life in a body of water.

<b>plankton:</b>	very small plants and animals that float in seas and lakes.
<b>polynyas:</b>	space of open water in the midst of ice in the Arctic Ocean.
<b>post-mortem:</b>	after death.
<b>precipitation:</b>	falling water in the form of rain, sleet, hail or snow.
<b>proterozoic:</b>	geological period containing the oldest forms of life
<b>quadrats:</b>	small, rectangular plot for the study of vegetation or animals
<b>radiation:</b>	energy given off in the form of waves or very tiny particles.
<b>radioactivity:</b>	The giving off of energy in the form of rays. The rays are given off during a process in which atoms of an element are split apart.
<b>radiocarbon dating:</b>	method of determining age in years by measuring the concentration of carbon <sup>14</sup> ( <b>isotope</b> ) in formerly living matter.
<b>radionuclide:</b>	A type of atom that shows a spontaneous discharge and spread of energy in the form of rays or waves.
<b>reefs:</b>	strip or ridge of rocks, sand or coral that rises to or near the surface of a body of water.
<b>residual:</b>	what is left over at the end of a process
<b>retrogressive:</b>	go or move backwards
<b>shale:</b>	a rock formed from mud that is hardened
<b>silt:</b>	fine particles of sand, clay, dirt and other materials
<b>silty shale:</b>	shale that has no more than 1/10 of its make up as sand and has twice as much silt as clay.
<b>socioeconomic:</b>	of or involving both social and economic factors
<b>stratigraphy:</b>	arrangement of different layers of rock in a pattern
<b>sublimation:</b>	going from a solid to a vapour without melting to moisture (e.g. changing from ice to steam without melting into water first).
<b>sympatric:</b>	taking/occupying the same space
<b>tabular:</b>	broad and flat like a table; having a flat surface

<b>tectonic:</b>	relating to, causing, or resulting from structural deformation of the earth's crust.
<b>Thule:</b>	A culture which arose in Northwestern Alaska about 1100 years ago. It is believed that this group of people were the ancestors of many of today's Inuit
<b>topography:</b>	the shapes and forms of the land in a particular region. Topography of an area will include mountains, valleys, plains and lakes etc.
<b>transects:</b>	a sample area of vegetation (usually a narrow continuous strip) used for the recording of data
<b>transpiration:</b>	the passage of water through a plant from the roots to the air
<b>Trilobite fossils:</b>	a type of ancient animal which lived in oceans, lakes and other wet areas (see picture) often found preserved in rock
<b>trophic web:</b>	food web (as opposed to a food chain)
<b>turbidity:</b>	the state of having a cloudy or muddy physical appearance
<b>ungulates:</b>	animals with hooves
<b>vertebrate:</b>	an animal that has a backbone
<b>zooplankton:</b>	small floating or weakly swimming organisms that drift with water currents consisting of animal life

