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**225** **Wildlife****Haszard, Shannon**

Ducks Unlimited  
5017, 52<sup>nd</sup> Avenue  
Yellowknife, NT X1A 1T5

**File No:** 3037**Region:** DC **Location:** Deh Cho area**DEH CHO AERIAL WATERFOWL SURVEY**

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

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**226** **Wildlife****Hindmarch, Trevor**

Golder Associates  
1000-940, 6<sup>th</sup> Avenue SW  
Calgary, AB T2P 3T1

**File No:** 3001**Region:** DC, SS **Location:** Cameron Hills**POST CONSTRUCTION WILDLIFE MONITORING AND SITE ASSESSMENT WITHIN PARAMOUNT'S CAMERON HILLS SIGNIFICANT DISCOVERY AREA**

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

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**227** **Wildlife****Hines, Jim**

Canadian Wildlife Service  
Suite 301, 5204, 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2

**File No:** 3256**Region:** NS **Location:** Yellowknife to Rae Road**ABUNDANCE AND PRODUCTIVITY OF WATERFOWL IN THE BOREAL FOREST**

No report available.

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**228** **Wildlife****Hines, Jim**

Canadian Wildlife Service  
Suite 301, 5204, 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2

**File No:** 3285**Region:** IN **Location:** Banks Island and the Inuvialuit Settlement Region**SNOW GEESE POPULATION STUDY**

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

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**229** **Wildlife****Hines, Jim**

Canadian Wildlife Service  
Suite 301, 5204, 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2

**File No:** 3286**Region:** IN **Location:** Inuvialuit Settlement Region and Anderson River Bird Sanctuary**SNOW GEESE POPULATIONS**

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

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**230** **Wildlife****Hines, Jim**

Canadian Wildlife Service  
Suite 301, 5204, 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2

**File No:** 3287**Region:** IN **Location:** Inuvialuit Settlement Region**AERIAL SURVEYS TO DETERMINE THE DISTRIBUTION AND ABUNDANCE OF WATER BIRDS**

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

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**231** **Wildlife****Johnson, Deborah**

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

**File No:** 2856**Region:** DC **Location:** Fort Smith**BOREAL CARIBOU AND LAND USE PLANNING**

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

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**232** **Wildlife****Johnston, Vickie**

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

**File No:** 3288**Region:** SA, DC **Location:** East Side of Mackenzie River**STUDY ON SONGBIRDS AND THEIR HABITAT ON EAST SIDE OF MACKENZIE RIVER**

Objectives: To conduct study on shorebirds and their habitat.

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**233** **Wildlife****Kustan, Ed**

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

**File No:** 3032**Region:** DC **Location:** Deh Cho

**WINTER WILDLIFE TRACK COUNT SURVEY**

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

**234 Wildlife****Kustan, Ed**

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

**File No:** 3036

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

**MIGRATORY BIRD MONITORING PROGRAM FOR FORT LIARD DEVELOPMENT PROJECT**

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

**235 Wildlife****Larter, Nic**

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

**File No:** 3030

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

**WILDLIFE RECONNAISSANCE SURVEY AND DEVELOPMENT OF SATELLITE COLLARS ON BOREAL CARIBOU**

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

**236 Wildlife****Machtans, Craig**

Canadian Wildlife Service  
301, 5204-50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2

**File No:** 2866

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

**BASELINE SURVEYS ON FOREST BIRDS**

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

**237 Wildlife****Moore, Steve**

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

**File No:** 3261

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

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

No report available.

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**238** **Wildlife**  
**Mulders, Robert**  
 GNWT Department of Environment and Natural Resources  
 Scotia Centre  
 Yellowknife, NT X1A 3S8

**File No:** 3177  
**Region:** NS **Location:** Central Barrens

**WOLVERINE DNA SAMPLING ON THE CENTRAL BARRENS**  
 No report available.

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**239** **Wildlife**  
**Mulders, Robert**  
 GNWT Department of Environment and Natural Resources  
 Scotia Centre  
 Yellowknife, NT X1A 3S8

**File No:** 3262  
**Region:** NS **Location:** Central Barrens

**WOLVERINE HEALTH, CONDITION AND HARVEST PATTERNS IN THE CENTRAL BARRENS**  
 No report available.

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**240** **Wildlife**  
**Nagy, John**  
 GNWT Department of Environment and Natural Resources  
 Bag Service #1  
 Inuvik, NT X0E 0T0

**File No:** 3289  
**Region:** IN **Location:** Inuvialuit Settlement Region

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

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**241** **Wildlife**  
**Nagy, John**  
 GNWT Department of Environment and Natural Resources  
 Bag Service #1  
 Inuvik, NT X0E 0T0

**File No:** 3291  
**Region:** IN **Location:** Banks Island, north-west Victoria Island, and Melville Islands

**PEARY CARIBOU PRODUCTIVITY SURVEY**  
 Objectives: To conduct a study on Peary caribou on Banks, NW Victoria, and Melville Islands.

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

**File No:** 3002  
**Region:** SS **Location:** South Slave

**MACKENZIE WOOD BISON POPULATION MONITORING PROJECT**  
 Objectives: To measure calf, yearling, and bull: cow ratios during the post-calving period; to monitor the

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

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

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

**SLAVE RIVER LOWLANDS BISON POPULATION STUDY**

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

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

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

**VEGETATION AND BISON DISTRIBUTION**

Objectives: To monitor bison and vegetation along Highway 3.

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

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

**MONITORING OF THE LIARD WOOD BISON POPULATION**

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

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**246** **Wildlife**  
**Panayi, Damian**  
 Golder Associates Ltd.  
 4910 - 50th Avenue, Unit 200  
 Yellowknife, NT X1A 2P1

**File No:** 2983  
**Region:** NS **Location:** Baker Creek (Giant Mine) near Yellowknife, NT

**MUSKRAT SAMPLE COLLECTION PROGRAM**

No report available.

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**247** **Wildlife**  
**Panayi, Damian**  
 Golder Associates Ltd.  
 4910 - 50th Avenue, Unit 200  
 Yellowknife, NT X1A 2P1

**File No:** 3260**Region:** NS    **Location:** Tundra Mine area (between MacKay and Courageous Lake)**ENVIRONMENTAL INVESTIGATIONS OF RECLAMATION PLANNING AT THE TUNDRA MINE**

No report available.

**248****Wildlife****Poole, Kim**Aurora Wildlife Research &  
Rescan Environmental Services Ltd.  
Yellowknife, NT X1A 3S9**File No:** 2865**Region:** NS, SS    **Location:** Along the proposed Taltson River transmission line to Snap Lake**BASELINE WILDLIFE MONITORING OF THE PROPOSED TALTSON HYDRO PROJECT**

Objectives: To determine the distribution and relative abundance of selected wildlife along the proposed transmission line corridor.

**249****Wildlife****Povey, Andrew**Mackenzie Project Environment Group  
Suite 1100, 815-8<sup>th</sup> Avenue SW  
Calgary, AB    T2P 3P2**File No:** 2858**Region:** SA    **Location:** Sahtu Settlement Area**2004 WINTER TRACKING STUDIES WITHIN THE SAHTU SETTLEMENT AREA**

Objectives: To conduct winter track count and surveys in South Sahtu.

**250****Wildlife****Povey, Andrew**Mackenzie Project Environment Group  
Suite 1100, 815-8<sup>th</sup> Avenue SW  
Calgary, AB    T2P 3P2**File No:** 2869**Region:** SA    **Location:** Sahtu area**2004 SPRING WILDLIFE STUDIES WITHIN THE SAHTU SETTLEMENT AREA**

Objectives: Pellet group distribution data will provide information on occurrence, distribution, and habitat use by hares and ungulates. Species that will be particularly focused on in the surveys will include caribou and moose with a potentially high vulnerability to possible pipeline related impacts. These species are also those of importance for ecological and socio-economic reasons. Incidental observations on scat from other species will also be collected. Information collected will be used to support habitat modeling exercises and would compliment information obtained from other past or concurrent studies.

**251****Wildlife****Povey, Andrew**Mackenzie Project Environment Group  
Suite 1100, 815-8<sup>th</sup> Avenue SW  
Calgary, AB    T2P 3P2**File No:** 3034**Region:** DC    **Location:** Deh Cho area

**2004 SPRING WILDLIFE STUDIES WITHIN THE DEH CHO REGION**

Objectives: To conduct spring pallet group surveys that will provide information on occurrence, distribution and habitat use by hares and ungulates.

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**252 Wildlife****Povey, Andrew**

Mackenzie Project Environment Group  
Suite 1100, 815-8<sup>th</sup> Avenue SW  
Calgary, AB T2P 3P2

**File No:** 3035

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

**2004 WINTER TRACKING STUDIES IN THE DEH CHO REGION**

Objectives: To conduct winter track surveys that will provide information on occurrence, distribution, and habitat use by furbearer's species and ungulates.

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**253 Biology****Schryer, Richard**

Golder Associates Ltd.  
4910 - 50th Avenue, Unit 200  
Yellowknife, NT X1A 2P1  
rschryer@golder.com

**File No:** 3255

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

**SNAP LAKE DIAMOND PROJECT WILDLIFE MONITORING PROGRAM**

No report available.

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**254 Wildlife****Slattery, Stuart**

Ducks Unlimited Canada  
Institute for Wetland and Waterfowl Research  
P.O. Box 1160  
Stonewall, MB R0C 2Z0

**File No:** 3284

**Region:** GW, SA      **Location:** Mackenzie Valley

**BREEDING DUCK POPULATION STUDY**

Objectives: To conduct a study on breeding duck populations in the Mackenzie Valley with emphasis on scoters and scaup.

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**255 Wildlife****Stirling, Ian**

Canadian Wildlife Service  
5320 133 Street  
Edmonton, AB T6H 3S5

**File No:** 3277

**Region:** IN      **Location:** Beaufort Sea and Amundsen Gulf

**POLAR BEAR POPULATION ASSESSMENT**

Objectives: To conduct a population assessment of polar bears in the Beaufort Sea and Amundsen Gulf. To delineate the boundaries of the southern Beaufort and northern Beaufort regions for management purposes, and to determine the size of each population so that sustainable quotas for Inuvialuit hunters can be determined. A total of 258 bears were caught, 111 in the northern Beaufort, and 147 in the southern

Beaufort. There were no mortalities from handling. Several bears were recaptured from previous year's studies; in particular, several bears from Alaska were captured in the vicinity from Herschel Island to Tuktoyaktuk. Bears from a full age range and both sexes were well represented and in proportion to what would be expected from a healthy population. Four satellite radio collars and one VHF radio collar deployed in earlier years were removed. Prototype satellite ear tags were deployed but none worked for more than a few days. Future development of this part of the project is not expected. Several litters of cubs of the year were captured, including one litter of three. Abandoned maternity dens were found on Herschel Island, and will be plotted on a map. A large abundance of male-female breeding pairs were found, suggesting there will be a large abundance of females with cubs next year. An adult female with a cub, and a sub-adult of unknown gender were found killed by an adult male a few kilometres north of Herschel Island. A polar bear cub was found killed by wolves near Shelter Island.

**256** **Wildlife**

**Stirling, Ian**  
Canadian Wildlife Service  
5320 133 Street  
Edmonton, AB T6H 3S5

**File No:** 3278

**Region:** IN **Location:** Beaufort Sea and Amundsen Gulf

**TRACKING STUDY USING SATELLITES OF MALE POLAR BEARS**

Objectives: To deploy a maximum of three ear tags on male polar bears in the southern Beaufort.

**257** **Wildlife**

**Veitch, Alasdair and Popko, Richard**  
GNWT Department of Environment and Natural Resources  
P.O. Box 130  
Norman Wells, NT X0E 0V0

**File No:** 2867

**Region:** SA **Location:** Willow Lake

**WESTERN CANADA COOPERATIVE DUCK BANDING PROGRAM AT WILLOW LAKE**

Objectives: The United States/Canada Cooperative Banding program sets annual banding objectives. Our objective is to band 2 000 mallards, 1 500 northern pintails, and all incidentally captured waterfowl (preferably 1 000 per species), prior to the opening day of duck hunting season (1 September).

**258** **Wildlife**

**Voelzer, James**  
US Fish and Wildlife Service-DMBN  
Waterfowl Population Surveys  
911 NE 11 Avenue, Room 125  
Portland, OR USA 97232-4181

**File No:** 2864

**Region:** All **Location:** Over the NWT mainland

**COOPERATIVE U.S./CANADA WATERFOWL POPULATION SURVEYS**

Habitat conditions for nesting waterfowl species were rated as good for most of the survey unit with some drier areas in the eastern half of northern Alberta extending into the south-east area of the NWT, rated as fair. Precipitation during the survey period helped modify these conditions, although the western half of northern Alberta dried out considerably during the survey period. Spring was approximately a week early in the western half of northern Alberta and north-eastern British Columbia, and the southern portion of the NWT. It was about 1 week plus late in the northern portion of the Mackenzie River Valley, Yellowknife area, north and east of Yellowknife, and the eastern half of northern Alberta. Observed ratios of breeding pairs to

lone drakes was good for mallards, and most other dabblers. Some flocked groups of scaup, scoters, ring-necked duck, and mergansers were observed occasionally in the northern portion of the survey area and in the eastern half of northern Alberta.

# Department of Fisheries and Oceans

## FISHERIES SCIENTIFIC LICENCES

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**259**
**Fisheries****Bergmann, Martin**

DFO

501 University Crescent,  
Winnipeg, MB R3T 2N6**File No:** SLE-04/05-280**Location:** The Beaufort Sea, latitude 69.1505° to 70.46865° N; longitude 133.09160° W

Objectives: the objectives of the project are to collect scientific samples from fish communities in the Mackenzie Delta and Beaufort Sea using a number of traditional fishing gear types. The purpose of collection is: 1) to “ground truth” data from hydroacoustic surveys of the biota on the sea floor and water column.; 2) for an ongoing study of the trophic structure of the fish communities. This is accomplished by examining the stomach contents and other characteristics (stable isotopes of nitrogen and carbon) of the fish samples; and 3) for ongoing genetic (stock structure and variability) and contaminants studies. All fish samples will be archived for future use. In addition to collecting fish, some attempt will be made to collect organisms from lower trophic levels (benthic and pelagic invertebrates) that support the fish populations.

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**260**
**Fisheries****Bergmann, Martin**

DFO

501 University Crescent,  
Winnipeg, MB R3T 2N6**File No:** SLE-04/05-281**Location:** Beaufort W Sea: Latitude 69.15205N° to 70.46865° N; longitude 133.09160° W to 138.68188°W

Objectives: The benthic program is a component of the larger biological program taking place aboard the CCGS Nahidik in the Beaufort Sea. The purpose of the benthic program is to determine what kinds of communities of animals live on and in the seabed in this shallow, ice-disturbed coastal shelf of the Beaufort Sea, and to sample the catch of the subsistence fishers and to obtain a record of the fishing effort.

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**261**
**Fisheries****Bergmann, Martin**

DFO

501 University Crescent,  
Winnipeg, MB R3T 2N6**File No:** SLE-04/05-282**Location:** The Beaufort Sea between longitude 131° 00' W and 141° 00' W (does not include Alaskan waters)

Objectives: The Joint Western Arctic Climate Study (JWACS) is part of an ongoing co-operative effort between Japan and Canada to study ocean ice processes and climate change in the western Arctic Ocean using moorings and hydrographic surveys. The Beaufort Gyre Exploration Project (BGEP) is a collaboration between the US-NSF (Woods Hole Oceanographic Institution) and Canada to study the storage of freshwater in the central Canada Basin using moorings and hydrographic surveys.

CTD/Rosette measurements and water column samples will be collected at a number of stations (~30) in the Canada Basin (to 3 800 m or deeper); XCTD probes will be deployed between stations. Vertical net tows will be conducted at a selected number of stations, sampling at a range of depths from 0 - 100 m to 0 - 1 000

m. As ice conditions and time allow, the hydrographic survey will be extended to include sampling in the northern Canada Basin and/or the eastern Canada Basin.

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**262** **Fisheries**

**Cobb, Donald**  
DFO  
501 University Crescent  
Winnipeg, MB, R3T 4N2

**File No:** SLE-04/05-251

**Location:** Mackenzie River at Pokiak Channel 68°13'10"N, 135°00'20"W

Objectives: To conduct index gillnetting programs to gather information on the health of the fish stocks.

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**263** **Fisheries**

**Cobb, Donald**  
DFO  
501 University Crescent  
Winnipeg, MB, R3T 4N2

**File No:** SLE-04/05-252

**Location:** Shingle Point 68°59'00"N, 137°22'00"W

Objectives: To conduct index gillnetting programs to gather information on the health of the fish stocks.

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**264** **Fisheries**

**Cobb, Donald**  
DFO  
501 University Crescent  
Winnipeg, MB R3T 4N2

**File No:** SLE-04/05-253

**Location:** Whitefish Station 69°22'45"N, 133°37'00"W

Objectives: To conduct index gillnetting programs to gather information on the health of the fish stocks.

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**265** **Fisheries**

**Cobb, Donald**  
DFO  
501 University Crescent  
Winnipeg, MB R3T 4N2

**File No:** SLE-04/05-254

**Location:** Tuktoyaktuk Harbor 69°26'00"N, 132°58'00"W

Objectives: To conduct index gillnetting programs to gather information on the health of the fish stocks.

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**266** **Fisheries**

**Cott, Pete**  
DFO  
Suite 101 Diamond Plaza  
5204-50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2

**File No:** SLE-04/05-317

**Location:** All water bodies within the Chitty Lake Scientific Reserve bounded by the following coordinates:

62.75000°N; 114.03788°W

62.75000°N, 114.12879°W

62.75295°N; 114.16225°W  
 62.71796°N; 114.25821°W  
 62.67074°N; 114.23201°W  
 62.66231°N; 114.07828°W  
 62.66203°N; 114.04672°W  
 62.66105°N; 114.03788°W

Objectives: To determine fish species present in the water bodies listed in this licence and to collect baseline data to determine the effects of water withdrawal on fish and fish habitat.

**267 Fisheries**

**Harwood, Lois**  
 DFO  
 Suite 101 Diamond Plaza  
 Yellowknife, NT X1A 1E2

**File No:** SLE-04/05-221

**Location:** Near-shore transects on the Beaufort Sea within coordinates 69°04' to 70°30'N and 137°00' to 132°45'W

Objectives: To conduct a systematic aerial survey and observe/count numbers of marine animals.

**268 Fisheries**

**Harwood, Lois**  
 DFO  
 Suite 101 Diamond Plaza  
 Yellowknife, NT X1A 1E2

**File No:** SLE-04/05-222

**Location:** Waters in Amundsen Gulf used by Holman and Sachs Harbour subsistence harvesters.

Objectives: To collect ageing structures, tissues for contaminants/disease testing and measurements from seals harvested by subsistence users.

**269 Fisheries**

**Harwood, Lois**  
 DFO  
 Suite 101 Diamond Plaza  
 Yellowknife, NT X1A 1E2

**File No:** SLE-04/05-244

**Location:** Waters off Kendall Island (69°30'00"N, 135°20'00"W) and Hendrickson Island (69°30'00"N, 133°35'00"W) in the Beaufort Sea.

Objectives: To collect specimens and data, on site, from beluga whales landed by subsistence hunters.

**270 Fisheries**

**Harwood, Lois**  
 DFO  
 Suite 101 Diamond Plaza  
 Yellowknife, NT X1A 1E2

**File No:** SLE-04/05-249

**Location:** Husky Lakes area – study zone enclosed by coordinates 69°15' to 69°40'N and 130°30' to 132°00' W

Objectives: To document the size, sex, and age structure, fish abundance and determine the present exploitation rate of fish.

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**271 Fisheries**

**Harwood, Lois**  
DFO  
Suite 101 Diamond Plaza  
Yellowknife, NT X1A 1E2

**File No:** SLE-04/05-255  
**Location:** Hornaday River 69°20'00"N, 123°30'00"W

Objectives: To sample the catch of the subsistence fishers and to obtain a record of the fishing effort.

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**272 Fisheries**

**Harwood, Lois**  
DFO  
Suite 101 Diamond Plaza  
Yellowknife, NT X1A 1E2

**File No:** SLE-04/05-256  
**Location:** Rat River 30 Km radius of 67°46'00"N, 135 03'00"W

Objectives: To sample the catch of the subsistence fishers and to obtain a record of the fishing effort.

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**273 Fisheries**

**Harwood, Lois**  
DFO  
Suite 101 Diamond Plaza  
Yellowknife, NT X1A 1E2

**File No:** SLE-04/05-257  
**Location:** Fish Lake, 71°10'00"N 116°40'00"W

Objectives: To sample the catch of the subsistence fishers and to obtain a record of the fishing effort.

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**274 Fisheries**

**Harwood, Lois**  
DFO  
Suite 101 Diamond Plaza  
Yellowknife, NT X1A 1E2

**File No:** SLE-04/05-263  
**Location:** Kendall Island 69°29'N, 135°15'W, and Hendrickson Island 69°30'N, 133°35'W

Objectives: Community whale samplers will be taking measurements and samples from beluga whales taken in the regular subsistence harvest at their respective whaling camps. The hunters will permit access to their landed whales for sampling (aging structures, tissues for contaminants testing, tissues for disease testing, reproductive tracts, stomachs, lungs) and measuring (girth, length, fatness). Samples are either frozen or preserved in formalin. This is the fifth year of the project in both Hendrickson Island and Kendall Island locations. At the Kendall Island site a veterinarian from Abbotsford, BC will be present and he will be taking additional biological samples from the landed whales (see attached list of what is planned by Dr. Rafferty for the Kendall Island site).

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**275 Fisheries**

**Harwood, Lois**  
DFO  
Suite 101 Diamond Plaza  
5204-50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2

**File No:** SLE-04/05-305

**Location:** Fish Hole on the Rat River 67°46'49"N, 136°18'46"W

Objectives: to collect data on the size, sex and maturity of char; to apply floy tags to obtain information on the movements and numbers of fish; and to enhance the expertise in the local communities on the scientific collection of biological data.

**276**

**Fisheries**

**Johnson, Jim**

DFO

501 University Crescent,  
Winnipeg, MB R3T 2N6

**File No:** SLE-04/05-296

**Location:** Mackenzie Delta and the Beaufort Sea encompassed by latitudes 68° 45' N to 70° 00' N  
and longitude 131° 00' W to 139° 00' W

Objectives: This application is to cover the field component of an ongoing, multi-year study investigating the trophic structure of the Beaufort Sea / Mackenzie Delta ecosystem. The main objective of this study is to develop a baseline database on the isotopic ratios for nitrogen, carbon and sulfur for tissues collected from organisms representing all trophic levels present in the various Beaufort Sea / Mackenzie Delta environments (e.g., riverine, estuarine, brackish near shore, marine near shore and marine offshore). However, the achieved level of funding necessitated scaling back the project concentrating our efforts on the Mackenzie Delta and near shore coastal areas with an emphasis on anadromous fish species and the prey species that support these populations.

**277**

**Fisheries**

**Low, George**

DFO

42043 Mackenzie Highway  
Hay River, NT X0E 0R9

**File No:** SLE-04/05-209

**Location:** Tsetso Lake 61°51'N, 123°01'W

Objectives: To collect fish to investigate reports of emaciated, watery, low quality fish in the lake. The catch will be sampled for length, weight, sex, maturity, age and condition. Parasite counts and signs of disease will be recorded.

**278**

**Fisheries**

**Low, George**

DFO

42043 Mackenzie Highway  
Hay River, NT X0E 0R9

**File No:** SLE-04/05-218

**Location:** Area 1W of Great Slave Lake 61°07'00"N, 116°00'00"W

Objectives: To determine the size ranges of whitefish caught in different sizes of gillnets and to establish the presence/absence of shortjaw cisco.

**279**

**Fisheries**

**Low, George**

DFO

42043 Mackenzie Highway  
Hay River, NT X0E 0R9

**File No:** SLE-04/05-219

**Location:** Area 1E of Great Slave Lake 61°00'00"N, 115°00'00"W

Objectives: To determine the size ranges of whitefish caught in different sizes of gillnets and to establish the presence/absence of shortjaw cisco.

**280**

**Fisheries**

**Low, George**

DFO

42043 Mackenzie Highway

Hay River, NT X0E 0R9

**File No:** SLE-04/05-295

**Location:** Dogface Lake, 60°17' N 119°06' W

Objectives: To investigate a concern from the lodge owner about the sudden lack of walleye in Dogface Lake. Until last summer the lodge which harvests very few fish in a season had an abundant source of walleye to support their sport fishing business. It appears there has been some kind of kill which has drastically and suddenly reduced the population of fish. There have been other problems with walleye populations in the Deh Cho region recently. A wasting type disease was investigated in Trout Lake last year and there have been stock problems in Kakisa and Tathlina lakes as well. This trip will be preliminary to follow-up study if it is required with a partner from Science.

**281**

**Fisheries**

**Orr, Jack**

DFO

501 University Cr.

Winnipeg, MB R3T 2N6

**File No:** SLE-04/05-220

**Location:** Hendrickson Island/Kugmallit Bay 69°35'00"N, 133°40'00"W

Objectives: To gain a better understanding of the movements of beluga whales and their ecology in the Beaufort Sea with the aid of satellite tags

**282**

**Fisheries**

**Stern, Gary**

DFO

501 University Crescent

Winnipeg, MB R3T 2N6

**File No:** SLE-04/05-320

**Location:** Ramparts Rapids near Fort Good Hope (66°15'00"N, 128°38'00"W)

Objectives: To assess the level of bio-accumulating substances and current-use chemicals in fish to determine temporal trends.

**283**

**Fisheries**

**Tallman, Ross**

DFO

501 University Crescent,

Winnipeg, MB R3L 0N1

**File No:** SLE-04/05-270

**Location:** Great Bear Lake (Keith Arm), 65°10'00"N, 123°00'00"W

Objectives: 1) To gather baseline data for Keith Arm lake trout on size and age structure, fecundity (egg number per female), growth and mortality over a five year period. These data will be used for stock assessment of Keith Arm lake trout. They will also be used to compare the productivity of Keith Arm lake trout to stocks in the other parts of the lake.

2) To gather baseline data on size and age structure, fecundity (egg number per female), growth and mortality of Dease, Smith, McVicar and McTavish arm lake trout. One of each of these arms will be sampled over a 4 year time period.

3) To determine if lake trout are genetically distinct between basins.

4) To determine the extent of movements (if any) by lake trout in Great Bear Lake by using molecular genetics.

**284****Fisheries****Tallman, Ross**

DFO

501 University Crescent

Winnipeg, MB R3T 2N6

**File No:** SLE-04/05-318**Location:** Mackenzie River, upstream from Tsiigehtchic near Pierre Creek (67°19'55"N, 133°20'55"W)

Objectives: To implant radio tags in broad whitefish to identify spawning and over-wintering areas and determine the migration and spawning timing of the species.

**285****Fisheries****Tyson, Dave**

DFO

Suite 101 Diamond Plaza

Yellowknife, NT X1A 1E2

**File No:** SLE-04/05-213**Location:** Mackenzie River, between latitudes 68 and 69° North.

Objectives: To collect data on the effects of exposure to the output of a seismic air-gun on the auditory systems of fish.

**286****Fisheries****Watkinson, Douglas**

DFO

501 University Crescent

Winnipeg, MB R3T 2N6

**File No:** SLE-04/05-311**Location:** South Nahanni Watershed (61°03'00"N, 123°21'00"W) outside the boundaries of Nahanni National Park.

Objectives: To collect information on the distribution, population sizes, biology and genetic connectivity between populations.

# 2005 Licensed Research Projects

# Aurora Research Institute

## Scientific Research Licences

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### BIOLOGY

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**287****Biology****Bekhuys, Tim**

AMEC Americas Ltd.  
 Earth & Environmental Division  
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 Burnaby, BC V5C 5A9  
 tim.bekhuys@amec.com

**File No:** 12 402 747**Licence No:** 13767**Region:** NS, SS**Location:** Gahcho Kué (Kennady Lake)**GAHCHO KUÉ BIOPHYSICAL BASELINE STUDIES**

The baseline studies comprised the following components: wildlife, fisheries, water quality, hydrology, meteorology and air quality, vegetation and soils. The studies were a continuation of work undertaken on the same components in previous years. Wildlife studies included spring, summer and fall surveys of caribou, grizzly bears, wolverines and wolves. Bird studies included upland game birds, raptors, breeding birds (passerines), and waterfowl. Occurrences of denning/nesting, feeding and rearing behaviour and success were studied. Fisheries studies focused on smaller lakes not previously studied and extensions downstream in the Kennady Lake (Gahcho Kué) drainage. Populations were censused and habitats were studied. Water quality and hydrology studies were continued from programs conducted in previous years to add to the database of baseline information. Lakes and streams in the immediate Gahcho Kué area were monitored during the spring, summer and fall. Air quality and meteorology studies were similarly extensions of previous programs. Instruments were set up at the Gahcho Kué camp to record weather and air quality conditions throughout the spring, summer and fall. Limited additional soils and vegetation studies were carried out during the summer of 2005 to add to the existing database. Soils and vegetation community maps will be developed to characterize the terrestrial habitats around Gahcho Kué.

**288****Biology****Brewin, Kerry**

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 kbrewin@dillion.ca

**File No:** 12 402 755**Licence No:** 13855**Region:** NS**Location:** Matthews Lake, near the Tundra/Salmita Mine**PROPOSED MONITORING PLAN - MATHEWS LAKE AND AREA FISH HABITAT RESTORATION PROJECT**

In the summer of 2004 work was undertaken to improve fish habitat in and around Matthews Lake, NWT. This work involved: creating fish habitat in Matthews Lake and Sandy Lake; improving spawning grounds in a local stream (Stream B); and removing in-lake and on-shore waste abandoned at two former mine sites. In the summer of 2005, the first year of a multi-year post-enhancement monitoring program was conducted to assess fish utilization and response of the enhanced habitats. The areas where habitat was created in Matthews Lake were found to be stable and differences were starting to emerge between the constructed habitat and a control area (e.g., presence of more invertebrates which fish feed on). In Sandy Lake, fish were

actively using an embayment that was created from a previously fishless pond that was permanently connected to Sandy Lake. Arctic grayling juveniles were spotted in the vicinity of the enhanced spawning habitat in Stream B and some of the areas which had the waste removed from the lakes were now indistinguishable from the natural surroundings. Monitoring will continue during the summers of 2007 and 2008 to ensure that the created habitat is functioning as designed.

**289****Biology****Buckland, Laurie**

Golder Associates

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laurie\_buckland@golder.com

**File No:** 12 402 688**Licence No:** 13903**Region:** NS**Location:** La Martre River**2005 FISH AND FISH HABITAT SURVEYS FOR THE NAILII HYDRO PROJECT**

This work was conducted as part of a study to determine the feasibility of developing a run-of-river hydro project on the La Martre River (the Nailii Project), about 18 km east of Wha Ti. The proposed project would divert water out of the La Martre River, reducing the flow over a 1.2 km section. A main issue associated with the reduced river flow is the need to ensure that there is sufficient flow to protect fish habitat. A field survey was conducted to determine the presence or absence of fish, to document the fish habitat available, and to investigate the hydrology of the La Martre River. This information would then be used to determine a preliminary estimate of in-stream flow requirements for the La Martre River within the project area. The field survey took place on September 9, 2005. The study area extended from 1 km upstream of the La Martre falls to 3 km downstream. No fish sampling was undertaken. Unsafe wading or boating conditions resulted in limited on-the-ground data collection. A photographic aerial reconnaissance was conducted from a helicopter. The habitat of the La Martre River was mapped over the length of the study area. Two cross-sectional profiles were recorded: one at the intake site, and one about 1 900 m downstream of the falls. Water quality measurements (pH, conductivity, temperature and dissolved oxygen) were recorded at both sites. The La Martre River at the project site was assessed to be a fish-bearing river. This preliminary assessment indicated that the fish habitat within the affected reach was of generally low quality, due primarily to the abundance of rapids with high water velocity throughout the reach. Of the approximately 1.2 km section of the river that would be impacted by reduced flows as a result of the project, about 700 m has low fish habitat suitability.

**290****Biology****Classen, Claire**

University of Alberta

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**File No:** 12 402 748**Licence No:** 13797**Region:** SS**Location:** Wood Buffalo National Park**DEVELOPMENT OF A MONITORING PROGRAM FOR THE WHOOPING CRANE FOOD SOURCES IN WOOD BUFFALO NATIONAL PARK**

The Revised International Recovery Plan for the whooping crane (*Grus americana*) has outlined the need to monitor potential prey (fish and aquatic invertebrates) on the breeding grounds of this critically endangered species. Whooping crane breeding grounds within the Wood Buffalo National Park (WBNP) were studied with the aim of developing a long-term prey monitoring program that could be used by WBNP staff to gather information on wetland habitat characteristics and whooping crane prey, and to relate this information to chick survival and opportunities for population expansion. In 2005, the research team repeatedly sampled sets of isolated nesting area ponds to assess differences in prey among each nesting area in WBNP. A set of

easily accessible ponds located near the nesting area was also sampled to assess the effectiveness of various types of sampling gear as well as temporal changes in prey composition and abundance. Aquatic invertebrates were sampled for laboratory analysis, whereas fish were counted in the field and subsequently released. Results will be analyzed to determine the precision, accuracy, and efficiency of the various techniques to reflect the spatial and temporal variability of whooping crane prey in the breeding-area ponds. Recommendations will be developed for Parks Canada to employ an optimal long-term monitoring protocol.

## 291 Biology

**Cott, Pete**

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**File No:** 12 402 742

**Licence No:** 13749

**Region:** IN

**Location:** North Richards Island, Mackenzie Delta

### **A RESEARCH STUDY TO UNDERSTAND AND MITIGATE THE EFFECTS OF EXPLOSIVE USE BENEATH WATER BODIES**

The study was conducted in the first week of April 2005 with the caged fish component specifically occurring from April 3-5. All work was completed; however, due to the proprietary nature of the tamping component results, only the caged fish component will be given here. Rainbow trout eggs and fry were exposed to different pressure changes in the water column to identify the pressure change that causes injury to fish. Pressure created by the explosives ranged from 7kPa to 280kPa.

There were 14 exposures in total, using different setbacks from the fish cage and different charge sizes to produce the range of pressure changes. Twenty fish of each life stage (eggs and fry) were used per exposure. Three hydrophones were placed in each cage to accurately monitor the pressure change the fish were exposed to. Injury and mortality were assessed in the field but all fish were subsequently sent to the Freshwater Institute, Winnipeg for a complete examination by microscope. This work is ongoing.

## 292 Biology

**Crossman, Bill**

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**File No:** 12 402 760

**Licence No:** 13896

**Region:** IN, GW

**Location:** Disturbed areas in the Inuvialuit Settlement Region and east of the Dempster between Inuvik and Tsiigehtchic

### **NORTHERN NATIVE PLANT DEVELOPMENT FOR RECLAMATION AND REVEGETATION IN THE NWT**

The objective of this program is to develop technologies to propagate and cultivate plant species native to the NWT which will enable these species to become available for revegetation projects in the NWT. The need for native plant seed for revegetation has been identified due to increased industrial development in the territory and the need to improve land reclamation practices and environmental mitigation strategies. Funding was not received in time to fully initiate the project in 2005; therefore only a small amount of seed was collected from plant species in the Inuvik region. Seeds from the following plant species were collected: *Deschampsia caespitosa*, *Beckmannia syzigachne*, *Calamagrostis canadensis*, *Calamagrostis stricta*, *Arctagrostis latifolia*, *Astragalus alpinus*, *Hedysarum alpinum*, *Oxytropis campestris*, *Oxytropis deflexa*, *Elymus macrourus*, *Elymus trachycaulus*, *Artemisia tilesii*, *Arctophila fulva* and *Poa glauca*. The seeds were dried, cleaned and stored for future germination and growth trials.

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**293** **Biology****Dick, Terry**

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**File No:** 12 402 722**Licence No:** 13856**Region:** NS**Location:** Chitty Lake, about 45 km north of Yellowknife**SEASONAL MOVEMENTS OF LAKE TROUT, LAKE WHITEFISH, AND NORTHERN PIKE IN A SMALL NORTHERN SHIELD LAKE**

Fieldwork at Chitty Lake, involving the collection of fish, was undertaken in late June and August 2005. Acoustical transmitters were implanted in five lake whitefish in June and eight northern pike in August. The fish were captured using either a rod and reel or an index gillnet that was set for less than one hour and brought back to camp for the surgical procedure. Fish that were suitable for the tagging study (>1 kg) were anaesthetized. Post-operated fish were observed in an enclosure made of a seine net attached to shore for approximately 15 minutes until they swam upright. The fish were subsequently released. Eleven hydrophones were positioned throughout the lake in June and information was downloaded in August and December 2005. Data recovered from the acoustic receivers indicated that all fish survived.

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**294** **Biology****Eschenroder, Randy**

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**File No:** 12 402 679**Licence No:** 13860**Region:** SS**Location:** East Arm of Great Slave Lake near Lutsel K'e**MORPHOLOGICAL DIVERSITY OF LAKE TROUT: DIFFERENTIATION BETWEEN DEEP AND SHALLOW FORMS**

The objectives of the fieldwork were to determine whether a deep-water type of lake trout resembling the "humper" of Lake Superior exists in Great Slave Lake, and to increase samples of other deep-water morphotypes sampled in 2002. The field team made 17 gillnet lifts, starting on August 6 and ending on August 12, and worked up 150 lake trout. Most of the fishing was carried out in deep water (>50 m), and the bulk of the catch was of a deep water, siscowet-like trout. The team were successful in catching humper-like trout. Almost all of what appeared to be humper morphotypes were juveniles, and the absence of gravid (non-resting) adults in the nets suggests that they were aggregated at unknown locations for spawning. In addition to the lake trout, approximately 25 shortjaw and three least ciscoes were caught.

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**295** **Biology****Ford, Bruce**

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**File No:** 12 402 762**Licence No:** 13906**Region:** NS**Location:** Discovery Mine site, Giauque Lake, Thistlethwaite Lake, Control Lake A**AQUATIC STUDIES IN SUPPORT OF THE DISCOVERY MINE REMEDIATION WORK**

A freshwater fisheries program was conducted from August 21-25, 2005 at Giauque Lake, Thistlethwaite

Lake and Lake A, adjacent to the Discovery mine site. The purpose of the program was to determine the post-reclamation effects of the sub-aqueous mine tailings on the aquatic ecosystem. This was accomplished through fish collection at several sites in the aforementioned lakes along with collection and analysis of benthic invertebrates. Target species for fish sampling included lake trout, lake whitefish and longnose sucker. Fish were measured and weighed, their aging structures (scales and otoliths) and tissues (liver and dorsal muscle) removed and analyzed, the latter for the presence of mercury and other metals. Benthic invertebrates were collected in order to conduct taxonomic analysis. Study results indicate that while still high (most exceed federal human consumption guidelines), mercury content in fish tissues appear to be declining over time.

**296****Biology**

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**File No:** 12 402 718**Licence No:** 13894**Region:** SA**Location:** Mackenzie River, 2 km upstream and downstream of Norman Wells**NORMAN WELLS AQUATIC EFFECTS MONITORING PROGRAM - PLUME DELINEATION STUDY**

Work conducted in 2005 was the second year of a two-year study. In the first year, the mixing characteristics of three separate effluents in the Mackenzie River were examined as part of a field dye tracer study. The data obtained from the dye study was used to describe the dispersion of the effluent plume in the Mackenzie River. Computer modelling of effluent dispersion in the Mackenzie River was undertaken in 2005 based on results of the dye tracer survey conducted in 2004. A second dye tracer survey was conducted in August 2005 at the Central Processing Facility site. The 2005 survey was conducted during higher river flows than in 2004, allowing the effluent dispersion model to be calibrated for different flow regimes.

**297****Biology**

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**File No:** 12 402 519**Licence No:** 13877**Region:** SS, DC**Location:** Along Highway 5 at locations of recent burns, and the Crown Fire Modeling plots north of Fort Providence**POST-FIRE FOREST REGENERATION IN THE WESTERN CANADIAN CONTINENTAL BOREAL FOREST: MEASUREMENT AND LANDSCAPE MODELING**

The objective of this study is to develop a landscape model capable of predicting regeneration after fire in the northern boreal forest. Data was collected in the past from Porter Lake (near Lutsel K'e), Big Fish Lake, Alberta, and Wood Buffalo National Park (between Pine Lake and Peace Point). Data was also collected from the International Crown Fire Modeling Experiment near Fort Providence. This study involved revisiting these sites in order to record visual observations (written and photographic) and GPS coordinates.

**298****Biology**

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**File No:** 12 402 697  
**Region:** NS

**Licence No:** 13803  
**Location:** Fortune Mineral's NICO property & along route of proposed road

### ENVIRONMENTAL SURVEYS FOR THE FORTUNE MINERALS NICO PROJECT

Work at the NICO site included fish and fish habitat, water and sediment quality, benthic invertebrate abundance, and wildlife and vegetation surveys. Aquatic surveys were conducted on each of the water bodies located within a 10 km radius of the mine site (study area) and a reference site. Similarly, all wildlife surveys were conducted within a 5 km buffer of the proposed road route and the 10 km radius of the project site. Fisheries surveys focussed on the collection of population metrics and spring and fall spawning information for northern pike, lake whitefish and walleye in each water body in the study area. Various techniques including electro-fishing, angling, gillnets and trap nets were used to collect specimens. Early to late season (June - August) surveys of water and sediment quality and benthic invertebrate abundance was conducted on each water body in the study area to supplement the existing baseline dataset. A late-season vegetation survey (August) identified and characterized vegetative communities with visual observations. The identification of any rare species, which may be impacted by project activities, was also noted. Aerial surveys for moose and caribou numbers, distribution, behaviour, habitat use and snow track densities were performed. Nests and potential nest sites were identified to document the presence of raptor species (including eagles, falcons, hawks, and owls). Point counts were conducted to determine the presence and relative abundance of upland breeding birds. Surveys for aquatic mammal sign and water birds were conducted on water bodies within the study area. All incidental wildlife observations were recorded.

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**299**

**Biology**

**Gray, Michelle**

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**File No:** 12 402 761  
**Region:** NS

**Licence No:** 13904  
**Location:** East Basin, Lac de Gras

### FISH HEALTH AND POPULATION ASSESSMENT ADJACENT TO DIAVIK MINING ACTIVITIES ON LAC DE GRAS

The fish health and population assessment on Lac de Gras was completed to meet the requirements of a DFO Fisheries Authorization. Diavik Diamond Mines Inc. was required to collect health information (length, weight, liver and gonad weight, fecundity), contaminant burden, and metallothionein analysis of 20 lake trout and 20 round whitefish from three different sites (near diffuser close to the Traditional Knowledge camp, and a reference site in north-east corner). Length, weight and species data was required from an additional 80 fish for each of the two fish species from each site. Fish catching in late August/early September were not successful at collecting the required numbers of fish despite considerable effort. From 37 gillnet sets (average soak time: 1.4-1.6h) and 493 hours of soak time for trap nets, a total of 106 lake trout and 27 round whitefish were captured. These catches were insufficient for estimation of fish populations in the east basin of Lac de Gras, and health analysis of captured fish showed no significant differences among the three sites. Metals and metallothionein analysis also showed no significant differences among sites. There was no observable influence of the mine diffuser on the local fish health.

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**300**

**Biology**

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**File No:** 12 402 677  
**Region:** GW

**Licence No:** 13824  
**Location:** Along seismic lines near Inuvik and Tsiigehtchic

### TREE REGENERATION ON SEISMIC LINES

This study is intended to increase understanding of the process of regeneration on the seismic lines in the Mackenzie River uplands and delta, and to explore possible ways of accelerating regeneration. Specifically, experimental sowing and cutting were performed to find out the effects of factors such as substrate type, forest floor scarification, and light availability on the establishment and growth rates of black and white spruce. Results indicate that scarification had little effect on germination rates because the poorer seedbeds such as feathermosses remained sufficiently wet; therefore, no dramatic differences were observed in seedbed-mediated survivorship at the germination stage that would be expected in non-permafrost terrain further south. The type of natural seedbed did, however, have a strong effect on germination rates. Generally, germination success was as good as on the best seedbeds in the southern boreal forest. Likewise, predation intensity by rodents was similar to that typical of the south. Increasing the light levels on overtopped delta white spruce saplings by removing the covering shrubs had little effect on spruce growth because light levels were already very high and the bulk of the light was coming from the side. Finally, it was found that while there was considerable subsidence on seismic lines, this did not preclude rapid regeneration by either spruce species.

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**301**

### Biology

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**File No:** 12 402 706  
**Region:** IN, GW

**Licence No:** 13827  
**Location:** Mackenzie River, delta, and surrounding areas

### PHYLOGEOGRAPHY AND GENETIC POPULATION STRUCTURE OF BROAD WHITEFISH (COREGONUS NASUS) IN THE MACKENZIE DELTA AND RIVER AND SURROUNDING AREA, NWT

The objective of this study was to collect samples that represent the different putative populations of broad whitefish in and around the Mackenzie River delta for the purpose of classifying the genetic population structure of this species. Broad whitefish samples were collected during the summers and falls of 2003 to 2005, by biologists of the Gwich'in Renewable Resource Board, DFO, the Alaska Department of Natural Resources and local Gwich'in and Inuvialuit harvesters. Thus far, DNA has been extracted from 1 410 broad whitefish collected from 55 locations including Alaskan drainages, east to the Mackenzie River system and its major tributaries. Although there are samples from 55 locations, each locality likely does not represent a distinct population, especially for samples collected throughout the Mackenzie River delta where several populations are known to migrate through. Several primers (short artificial strands of DNA used to amplify, or make many copies of, a specific region of DNA) have been identified, and amplified products have been analyzed for three out of the eight primers to be used in this study. Of those samples, considerable genetic variation between samples has been observed although no conclusions can be drawn until more data is collected. Once all eight primers have been employed, genetic analysis of the data, where genetic differences between populations will be determined, will commence thereafter.

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**302**

### Biology

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**File No:** 12 402 706  
**Region:** GW

**Licence No:** 13828  
**Location:** Throughout the Travaillant Lake system

### **CONTINUED RADIO-TRACKING OF BROAD WHITEFISH (COREGONUS NASUS) IN THE TRAVAILLANT LAKE SYSTEM, NWT**

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

**303**

#### **Biology**

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**File No:** 12 402 759  
**Region:** IN

**Licence No:** 13887  
**Location:** Tuktoyaktuk

### **SEWAGE LAGOON DISCHARGE ASSESSMENT**

The Incorporated Hamlet of Tuktoyaktuk's sewage lagoon facility is a natural lake that has been modified with a perimeter berm structure at the south edge to provide retention. The lagoon is annually discharged into the adjacent ocean. The objective of the study was to evaluate the potential impacts of sewage discharges on fish and benthic invertebrates in the receiving environment by comparing reference and effluent exposed communities. The Sewage Discharge Assessment was carried out to meet the water licensing requirements of the Hamlet of Tuktoyaktuk as issued by the NWT Water Board. The Department of Municipal and Community Affairs (MACA) requested that fish within the study area (reference and exposed) be collected to determine population and possible contamination levels. The study was conducted from September 21-23, 2005. Tissue samples were collected from 25 individual fish specimens; a wildlife monitor from the Hamlet of Tuktoyaktuk was employed to ensure ethical treatment of the animals. There was no indication that the status of the fish community is impaired in the receiving environment. There were no signs of internal or external stress observed in any of the fish captured. All physiological measures suggested that the growth and health of fish collected in the exposure area, when compared to the reference area, are not subject to any impairment. For all analytical parameters, including metals and PCBs there is likely no basis for concern for the health of any consumers of fish. The results were provided to MACA and the Hamlet of Tuktoyaktuk for submission to the NWT Water Board.

**304**

#### **Biology**

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**File No:** 12 402 749  
**Region:** NS

**Licence No:** 13800  
**Location:** 31km radius of Snap Lake Diamond Project

### **DE BEERS SNAP LAKE DIAMOND MINE 2005 MONITORING PROJECT**

The objective of this study was to continue collecting data pertaining to terrestrial and aquatic resources within and around the 31 km radius of the Snap Lake Diamond Mine. Sampling was conducted by Golder Associates Ltd. across the site between January and October, 2005. The aquatics program included monitoring of water quality, sediment quality, benthic invertebrates, plankton, and fish health. The wildlife program included caribou, grizzly bear, wolverine, wolf and falcon surveys. Vegetation and air quality studies also occurred on site. Members of aboriginal groups took part in facets of these studies and provided input on fish habitat, fish palatability, aquatic sampling, and wildlife surveys. Results of the various programs are being finalized and will be submitted to the Mackenzie Valley Land and Water Board as a 2005 Annual Report. Copies of the report will be provided to the various community groups. The report will also become part of the public record.

**305**

### **Biology**

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**File No:** 12 402 757  
**Region:** GW

**Licence No:** 13861  
**Location:** Travaillant Lake system

### **CONTINUED POPULATION ASSESSMENT OF HARVESTED FISH SPECIES IN THE TRAVAILLANT LAKE SYSTEM**

During the 2005 fieldwork, a total of 875 fish were caught at three sampling sites using multi-mesh fill nets: 340 broad whitefish (lake: 107; south river: 30; north river: 203), 293 lake whitefish (lake: 64; south river: 219; north river: 10), 203 cisco species (lake: 202; north river: 1), 17 northern pike (lake: 13; north river: 4), 21 lake trout (lake) and one longnose sucker (north river).

Whitefish and crooked back were found to be larger in the north river than the south river, and generally, both species were larger in both rivers than in the main lake. This is because the rivers were sampled during spawning, when the majority of fish are mature and large as well as heavy with reproductive organs. The longest whitefish was 21.85" and the longest crooked back, 20.12" (both caught in the main lake). Significant numbers of other species were not caught in either river but in the main lake. The largest jackfish was 43.11" in length and 18.96 lb in weight. The largest lake trout was 34.29" in length and 16.76 lb in weight. Cisco was the most common species caught in the main lake, averaging 5.81" in length and 0.07 lb in weight.

**306**

### **Biology**

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**File No:** 12 402 757  
**Region:** SA

**Licence No:** 13870  
**Location:** Keith Arm and Dease Arm of Great Bear Lake

### **ASSESSMENT OF LAKE TROUT STOCKS IN GREAT BEAR LAKE**

A total of 306 fish were captured in gillnets. There were 212 lake trout (12 released), 12 cisco spp. (0 released), 59 round whitefish, 44 lake whitefish (four released), and two longnose suckers (0 released). Two nine-spine sticklebacks and five sculpin spp. were caught in beach seined (0 released).

Lake trout averaged 25.3” and 7.6 lb; figures for the largest and smallest lake trout were 51.2” and 32 lb and 7.1” and 0.2 lb respectively. Lake whitefish averaged 20.9” and 4.9 lb, while round whitefish averaged 13.1” and 0.8 lb. There were relatively few cisco spp. caught; average cisco size recorded at 7.1” and 0.1 lb.

**307****Biology****Hoyt, Andrea**

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**File No:** 12 402 624**Licence No:** 13922**Region:** IN**Location:** Big Fish River, Cache Creek and Fish Hole (sites located approximately 70 km W-NW of Aklavik)**COMMUNITY MONITORING OF THE BIG FISH RIVER**

The field portion of the five-year Big Fish Community Monitoring project took place at Big Fish River from November 1-5, 2005 during the traditional char harvesting season. The field crew included Aklavik Elders and Hunters and Trappers Committee (HTC) members, Moose Kerr School high school students, and Fisheries Joint Management Committee (FJMC) resource biologists. The field crew completed portions of a stream habitat survey and a water quality survey, establishing benchmark sampling locations for use in future years. Students made observations and recorded data; Elders and HTC Committee members shared stories and discussed how the environment has changed over the years, imparting Traditional Knowledge to help the students develop an understanding of how the environmental changes impact the life and culture of the Inuvialuit people. Some observations pointed to water levels being much lower than in the past, channel banks increasingly sloughing/eroding, and portions of the streambed have increased sedimentation.

Plans for taking a limited number of samples from char for analysis of contaminants, particularly mercury, did not occur due to difficulties obtaining a DFO Fisheries Scientific Licence. However, it was observed that there only a few adult fish and a low number of juvenile fish were present in the stream. Water samples were collected for laboratory analysis. Following completion of the fieldwork, the youth participants, with the assistance of the FJMC resource biologists and Joint Secretariat staff, analyzed data collected (water quantity and quality, GPS information), and prepared reports and presentations describing the project. The reports and presentations included reflections of the students’ experiences and recommendations for improving the project in future years.

**308****Biology****Katz, Sharon**

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**File No:** 12 402 758**Licence No:** 13874**Region:** IN, GW**Location:** Inuvik area**NATURAL DYES**

In the summer of 2005, the research team produced several dyes, using methods outlined in Judy Waldner McGrath’s *Dyes from Lichens and Plants* (1977). The first was a dye from a local plant, the identity of which is concealed due to patenting possibility. Samples were sent to Professor Jean Lavelle at Northampton Community College for analysis as ink products. The results of these tests are still pending, and completion of

this project is dependent upon the results. Secondly, a dye was created from the lichen, *Cetraria nivalis*, which yielded a beige colour. Bacteriochlorophyll was also extracted from green algae, collected from ponds and ditches around Inuvik.

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### 309 **Biology**

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**File No:** 12 402 746

**Licence No:** 13762

**Region:** IN, GW

**Location:** Sachs Harbour, Paulatuk, Aklavik, Inuvik, Tsiigehtchic

#### **USING HUNTER OBSERVATIONS AND ECOLOGICAL KNOWLEDGE TOGETHER WITH SCIENCE TO UNDERSTAND PAST AND CURRENT OCCURRENCE OF DISEASES IN NORTHERN WILDLIFE**

From January-March 2005, the researchers held a series of focus group interviews on wildlife disease occurrence in ten communities in the Sahtu, Gwich'in and Inuvialuit settlement regions. The purpose of the project was to record experienced harvesters' observations of wildlife disease in the past and present, and to determine if harvesters had noticed any changes in disease occurrence (i.e., types or frequency of diseases or locations). The work was conducted with the local Renewable Resource Councils and Hunters and Trappers Committees to identify suitable harvesters to interview. A community assistant was hired to contact participants and assist with the interviews. A total of 63 experienced harvesters, both men and women (aged 34-88) participated in the project. Focus group sessions were tape-recorded and notes were also taken. Transcripts of the sessions are currently being analyzed. So far, one notable finding is the common observation of a sub-skin green, slimy fluid in caribou.

This work represents a unique approach to understanding and monitoring changes in disease occurrence in a rapidly changing Arctic environment. It is a component of a larger project to evaluate the effects of climate change on wildlife health in the Canada's Western Arctic and Subarctic.

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### 310 **Biology**

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**File No:** 12 402 712

**Licence No:** 13815

**Region:** IN, GW

**Location:** Sites between Inuvik and Tuktoyaktuk, along Horton River and Anderson River, and sites accessible from the Dempster Hwy between Fort McPherson and Inuvik

#### **AUTECOLOGY AND POPULATION ECOLOGY OF GREEN ALDER**

There is growing evidence, both anecdotal and quantitative, that the abundance of tall shrubs such as alder and willow is increasing in the Western Arctic. The broad goal of this project is to examine the causes and extent of recent changes to shrub cover in the Mackenzie Delta region. Fieldwork to date has focused primarily on comparisons of the effects of temperature and disturbance on alder (*Alnus viridis ssp. crispa*) patch dynamics. To assess the importance of climate on alder populations, alder patch characteristics have been sampled along the temperature gradient from the forest-tundra south of Inuvik to the low arctic tundra at the Beaufort coast. Recent burns and permafrost slumps have also been sampled to examine the effect of disturbance on alder. Preliminary results show increases in seed viability, percent cover, and growth with distance from the coast, suggesting that temperature increases are likely to drive changes in alder abundance. The number of catkins, seed viability, percent cover, and growth are also consistently greater on disturbed

sites compared with control sites, regardless of latitude. This suggests that changes due to increased temperature are likely to be exacerbated by increased rates of natural and anthropogenic disturbance.

**311****Biology****Layberry, Ross**

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**File No:** 12 402 754**Region:** SA, DC, NS, SS**Licence No:** 13853

**Location:** Yellowknife, Nahanni National Park Reserve, Norman Wells, Tulita, Gordon Lake and Daring Lake, as well as along roads in the North Slave and South Slave regions

**BUTTERFLY INVENTORY IN THE NWT**

Butterfly collection occurred in June and July, 2005 with the assistance of GNWT Environment and Natural Resources (ENR), the Sahtu Renewable Resources Board, Parks Canada and the Canadian Wildlife Service and schools in Fort Good Hope. Collection was carried out in the following areas: Yellowknife, Ingraham Trail, Highway 3 (west of Yellowknife), Fire Camp (near Tippett Lake), Reid Lake campsite, Niven Lake Trail, Fort Good Hope, Fossil Lake, Norman Wells, Tulita, Deline, Mount Hamar, Kee Scarp, Canol Heritage Trail, MacTung Mine Road, Virginia Falls campsite, Sunblood Mountain, Deadmen Valley Ranger Cabin, Nahanni Butte, Daring Lake Tundra Ecological Research Station, Enterprise, and Hay River. All butterfly specimens that were collected by the researcher have been mounted and identified, in addition to another 150 specimens collected by others in and around Nahanni National Park Reserve. The additional 150 specimens have been donated to the Canadian National Collection. Information on the entire collection has been sent to ENR biologists. Five species were previously unknown in the NWT, and to the database on the website of the Canadian Biodiversity Information Facility in Ottawa.

**312****Biology****Moore, Steve**

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**File No:** 12 402 638**Region:** SS**Licence No:** 13914**Location:** Pine Point Mine area**ENVIRONMENTAL BASELINE STUDIES, TAMERLANE VENTURES INC., PINE POINT MINING PROJECT**

A program of stream biophysical sampling and water quality sampling was conducted in September 2005 in order to gain an understanding of prevailing aquatic conditions in the area of the Pine Point Mine operated by Tamerlane Ventures Inc. For the water sampling component, sampling sites were located in Buffalo River and Twin Creek, as well as at the locations where the Buffalo River and Twin Creek flow into Great Slave Lake; samples were also collected in Great Slave Lake. Stream biophysical sampling consisted primarily of fish habitat assessment; sampling for fish presence was not conducted. The water quality for all sites sampled along Twin Creek, Buffalo River and in Great Slave, with the exception of two sites, were typical of natural background values for this area of the NWT; where exceedances occurred, for example, in the case of aluminium, it should be noted that this metal is typically associated with the limestone, dolomite, sandstone and shale found in the Pine Point area. No fish sampling occurred but observations of aquatic habitat were made at six stations on the Buffalo River and nine on the 45km-long Twin Creek.

Baseline data collection to complete an ecological land classification for the Pine Point area was also undertaken in September, 2005. A total of 38 field inspections were completed in seven ecosystem types (or

ecosites) across a study area of 36 153 ha. Mapping was then completed of the study area at a 1:50 000 scale. Eleven ecosystem types were classified within the study area, an area encompassing the Slave River and Hay River Lowland Ecoregions. Eight of these ecosystem types are naturally vegetated and one is classified as water. Just over 50 % of the study area is classified as lowland and 47% is classified as upland. Most of the area is forested, and shrub units tend to be present in low-lying areas that have some evidence of fire. These same shrub units made up the majority of the mixed-wood units. Confidence in the mapping and subsequent data analysis is moderate to high for most units. Jack pine and trembling aspen are common, with white and black spruce dominating in later successional timber stands. The most common ecosite in the study area is the upland, Labrador tea – mesic ecosite at 28%, with shrubby fens and treed fens representing 25% and 24%, respectively. A preliminary wildlife baseline survey was conducted concurrently with the ecological land classification study. The objective of the fieldwork was to document biological diversity over the 36 153 ha study area. Whilst examining the habitat types in the study area, information on species presence was recorded by means of actual observations, tracks, burrows and other signs. Within the 11 identified ecosystem types or habitat, 80 bird observations were recorded, including of species with special status designations such as the whooping crane and peregrine falcon. A total of 104 mammal observations were made of 13 different mammal species, including woodland caribou and wood bison, both of which have special status designations. Species that appear to occupy multiple habitat types within the study area include moose, black bear, and species of woodpecker.

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**313****Biology****Morrison, Scott**

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**File No:** 12 402 727**Licence No:** 13907**Region:** NS**Location:** Lac de Gras**SHOAL HABITAT UTILIZATION STUDY**

As stated in the Authorization for Works or Undertakings Affecting Fish and Fish Habitat (DFO File No. SC98001), Diavik Diamond Mines Inc. (DDMI) is responsible for conducting a Fish and Fish Habitat Utilization Study prior to in-lake dike construction. To meet the requirements outlined in the Fisheries Authorization, DDMI has been conducting a yearly Shoal Habitat Utilization Survey (hydroacoustic shoal surveys). In 2005, hydroacoustic shoal surveys were attempted on September 15 and October 2 on eight transects that were part of the 2004 survey. All eight transects are located east of the A154 dike, and each was surveyed twice by boat based on previously mapped shoals.

In addition to the hydroacoustic surveys, angling was utilized in an attempt to ground-truth the hydroacoustic data, and to capture, tag, and obtain life history data from fish utilizing the shoals.

The program was also supposed to include the use of a remotely operated vehicle (ROV) to obtain visual confirmation of fish using the shoals. However, inclement weather conditions and equipment problems caused by cold weather resulted in the suspension of the 2005 survey. No fish were captured.

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**314****Biology****Muggli, Deborah**

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**File No:** 12 402 711  
**Region:** NS

**Licence No:** 13811  
**Location:** Forty-seven lakes and approximately 40 other sites west of the Long Lake Containment Facility Area, Ekati Diamond Mine

### **2005 AQUATIC MONITORING PROGRAM - EKATI DIAMOND MINE**

The objectives of the program are to determine if the Ekati Diamond Mine is affecting its surrounding aquatic environment, and to provide baseline data for the mine area.

Field activities consisted of: water quality, phytoplankton and zooplankton sampling; the establishment of hydrology and meteorology stations; limnology measurements; benthos and sediment quality measurements; fish sampling; and the monitoring of the Panda Diversion Channel.

Findings from this program will be made publicly available through BHP Billiton.

**315**

**Biology**

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**File No:** 12 402 756  
**Region:** NS

**Licence No:** 13857  
**Location:** Hill Creek, east of Rae-Edzo on Highway 3

### **FISHERIES SURVEY OF HILL CREEK (LOCATED ON HIGHWAY 3)**

Fieldwork cancelled.

**316**

**Biology**

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**File No:** 12 402 412  
**Region:** SS

**Licence No:** 13805  
**Location:** Wood Buffalo National Park

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

This research concerns the circulation of organic matter and carbon in jack pine forests as well as between such forests and the atmosphere. The question as to the quantity of carbon that jack pine forests can accumulate during growth will be addressed in the research; this may reveal something about the role of these forests in delaying or accelerating global warming. Measurement of aboveground forest litter and estimation of the amount of soil respiration [particularly those respired by soil organisms (heterotrophic respiration)] were undertaken in 2005. The amount of aboveground litter for approximately a one-year-period in the study sites ranged between 55 and 138 g/m<sup>2</sup> of organic matter. The average amount of heterotrophic respiration was in the range of 0.312 and 0.336 g CO<sub>2</sub> m<sup>2</sup> hr<sup>-1</sup> for measurements taken in August, 2005. The value was smaller (0.138 g CO<sub>2</sub> m<sup>2</sup> hr<sup>-1</sup>) when measured in June, 2005. With these data and other information gathered, it is planned to calculate the total amount of carbon and organic matter moving through and into the jack pine forests of the NWT.

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**317****Biology****Osawa, Akira**Ryukoku University  
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oosawa@world.ryukoku.ac.jp**File No:** 12 402 412**Region:** GW**Licence No:** 13848**Location:** Crown Land within 500m of the Dempster Highway, between the south shore of Campbell Lake and 20 km east of Fort McPherson**STRUCTURE OF BLACK SPRUCE FORESTS ON CONTINUOUS PERMAFROST**

This research attempts to discover a common growth pattern of forests growing on continuous permafrost regions. The researcher's previous work in Siberia described a peculiar pattern of forest growth in which biomass (amount of wood and other living organic matter) reached a relatively small maximum value of 50 to 80 tons ha<sup>-1</sup> in dry weight. This limit was found to be reached at a relatively young age. Typically, larch forests (on permafrost) in Siberia grow rapidly after a stand-replacing forest fire. However, their growth (or biomass accumulation) virtually stops at stand age of 20-30 years. After that the forests may live 200 more years but show no more biomass accumulation during that long period. Thirty stands of black spruce were measured in August 2005 along the Dempster Highway. The number of forest stands that were measured is still not sufficient to arrive at any definite conclusions; however, the pattern of forest development described above seems to be present in the current data set. Data collection will be continued in the near future.

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Earth & Environmental Division  
Suite 1100, 815-8<sup>th</sup> Avenue SW  
Calgary, AB T2P 3P2  
apovey@teraenv.com**File No:** 12 402 670**Region:** DC**Licence No:** 13770**Location:** Selected lakes and streams along the proposed pipeline corridor, Jean Marie River and Trout Lake areas**2005 WINTER AND SPRING AQUATIC SURVEYS IN THE DEH CHO REGION**

Winter fish and fish habitat surveys were conducted at four sites within the Deh Cho Region during April 12-14 by a field crew of three people. The purpose of the winter surveys was to assess watercourse freezing conditions and over-wintering conditions of selected water bodies along the proposed pipeline corridor. Selection of sites was based on observation made during summer surveys conducted in 2004. Information collected during this survey included: an assessment of winter habitat use, using remote videography; in situ water quality measurements (temperature, dissolved oxygen, conductivity & pH); discharge and depth measurements; ice thickness and depth of water below the ice cover and presence or absence of frazzle ice.

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apovey@teraenv.com**File No:** 12 402 670**Region:** IN**Licence No:** 13780**Location:** Selected streams and lakes along the proposed pipeline corridor in the Inuvialuit Settlement Region

### 2005 WINTER AND SPRING AQUATIC STUDIES IN THE INUVIALUIT SETTLEMENT REGION

The 2005 winter and spring aquatic studies in the Inuvialuit Settlement Region included fisheries, hydrology and water quality investigations. All activities complied with licence conditions. The aquatic studies were conducted by a crew of three individuals, including a local assistant. Fish and fish habitat surveys were conducted during April 29-30 by a field crew of three people, including a local assistant. The purpose of the winter surveys was to assess watercourse freezing conditions and over-wintering conditions of selected water bodies along the proposed pipeline corridor and within the production area leases. Selection of sites was based on observations made during summer surveys conducted in 2004. Information collected during this survey included: an assessment of winter habitat use using remote videography; in situ water quality measurements (temperature, dissolved oxygen, conductivity and pH); discharge measurements; ice thickness and depth of water below the ice cover; and presence or absence of frazzle ice.

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**320**

**Biology**

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**File No:** 12 402 670

**Region:** GW

**Licence No:** 13781

**Location:** Selected streams and lakes along the proposed pipeline corridor in the Gwich'in Settlement Area

### 2005 WINTER AND SPRING AQUATIC STUDIES IN THE GWICH'IN SETTLEMENT AREA

The 2005 winter and spring aquatic studies in the Gwich'in Settlement Area included fisheries, hydrology and water quality investigations. All activities complied with licence conditions. Winter fish and fish habitat surveys were conducted at two sites during April 27-28 by a field crew of three people, including a local assistant. The purpose of the winter surveys was to assess watercourse freezing conditions and over-wintering conditions of selected streams along the proposed pipeline corridor. Selection of sites was based on observation made during summer surveys conducted in 2004. Information collected during this survey included: an assessment of winter habitat use, using remote videography; in situ water quality measurements (temperature, dissolved oxygen, conductivity and pH); discharge and depth measurements; ice thickness and depth of water below the ice cover; and presence or absence of frazzle ice.

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**321**

**Biology**

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**File No:** 12 402 670

**Region:** IN

**Licence No:** 13794

**Location:** Ninglntgak Island access channels in the Kendall Island Bird Sanctuary; Middle, Kumak and East channels; Kittigazuit and Kugmallit bays

### 2005 AQUATIC AND MARINE ENVIRONMENTAL STUDIES RELATED TO BARGE-BASED FACILITIES IN THE INUVIALUIT SETTLEMENT REGION

The 2005 aquatic studies related to barge-based facilities focussed on hydrology investigations. All activities complied with licence conditions. The aquatic studies were undertaken by crews of two to four individuals, including a local assistant. A survey of ice and water level conditions during spring break-up in the delta channels near Ninglntgak Island was conducted between May 26 and June 3. Ice conditions were documented with videos and photos. Time lapse cameras were installed to monitor the ice break-up as it progressed.

Access to the sites was by helicopter.

Water level monitoring stations were installed at Shallow Bay (west), Kittigazuit Bay and Kumak Channel during July 11-13. Each station consisted of a pressure probe in the channel connected by a cable to a data logger on the banks. The west bank of Kumak Channel was also surveyed on July 13 to develop baseline information to monitor annual natural shoreline erosion. During the week of July 18, a two-person survey team collected detailed GPS measurements for each of the monitoring sites. An additional water level monitoring station was installed at Shallow Bay (east) during August 1-3. During this period, the crew also inspected the previously installed water level and wind monitoring stations and downloaded data from those sites. The water level monitoring stations recorded water levels in their respective channels until October 3, when they were decommissioned and removed. On October 4, GPS positioning data was collected at the proposed bargeset-down location and resistance measurements were taken in four borehole sites.

**322****Biology****Povey, Andrew**

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**File No:** 12 402 670**Region:** GW**Licence No:** 13846**Location:** Along the proposed pipeline survey corridor within the Gwich'in Settlement Area**2005 SUMMER & FALL AQUATIC SURVEYS IN THE GWICH'IN SETTLEMENT AREA**

Fieldwork cancelled.

**323****Biology****Povey, Andrew**

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**File No:** 12 402 670**Region:** GW**Licence No:** 13847**Location:** Along the proposed pipeline survey corridor within the Gwich'in Settlement Area**2005 TERRESTRIAL STUDIES IN THE GWICH'IN SETTLEMENT AREA**

Fieldwork cancelled.

**324****Biology****Povey, Andrew**

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**File No:** 12 402 670**Region:** IN**Licence No:** 13850**Location:** Along the proposed pipeline survey corridor within the Inuvialuit Settlement Region**2005 SUMMER AND FALL AQUATIC SURVEYS IN THE INUVIALUIT SETTLEMENT REGION**

Fieldwork cancelled.

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**325** **Biology****Povey, Andrew**

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**File No:** 12 402 670**Region:** IN**Licence No:** 13851**Location:** Within the anchor fields and the pipeline gathering system survey corridor in the Inuvialuit Settlement Region**2005 TERRESTRIAL STUDIES IN THE INUVIALUIT SETTLEMENT REGION**

Fieldwork cancelled.

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**326** **Biology****Povey, Andrew**

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**File No:** 12 402 670**Region:** SA**Licence No:** 13883**Location:** Along the pipeline study corridor within the Sahtu Settlement Area**2005 TERRESTRIAL STUDIES IN THE SAHTU SETTLEMENT AREA**

Fieldwork cancelled.

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**327** **Biology****Povey, Andrew**

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**File No:** 12 402 670**Region:** SA**Licence No:** 13885**Location:** At water bodies along and around the proposed and alternate pipeline routes in the Sahtu Settlement Area**2005 SUMMER AND FALL AQUATIC STUDIES IN THE SAHTU SETTLEMENT AREA**

Fieldwork cancelled.

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**328** **Biology****Shapiro, Mike**

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**File No:** 12 402 752**Region:** SS**Licence No:** 13810**Location:** "Fox Holes Lakes" (unnamed water bodies) at 60°03'N, 112°27'W**MOLECULAR ANALYSIS OF EVOLUTIONARY CHANGE IN STICKLEBACK POPULATIONS**

The goal of this study is to determine the genes which control skeletal changes in different populations and

species of animals. Stickleback fish were found to be ideal subjects for study because various populations around the world show significant differences in skeletal structures. Of special interest to the study was a unique population of nine-spine sticklebacks from Fox Holes Lakes that completely lack pelvic fins (the equivalent of our legs). In June 2005, the research team used minnow traps to collect samples of nine-spine sticklebacks from Fox Holes Lakes. The fish were taken to a laboratory at Stanford University for analysis. The correlation between specific DNA sequences and the presence or absence of the pelvic fins was studied. In addition, some of the fish was analyzed to determine if nine-spine sticklebacks from Fox Holes Lakes have modifications in the same gene that causes pelvic reduction in a population of three-spine sticklebacks (a completely different species) from British Columbia. This important result is included in a forthcoming scientific paper to be published in the journal, *Proceedings of the National Academy of Sciences of the USA*.

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**329** **Biology**
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**File No:** 12 402 584

**Licence No:** 13864

**Region:** GW, SA, DC

**Location:** Various sites throughout the Gwich'in Settlement Area, the Sahtu Settlement Area and the Deh Cho Region

**ESTABLISHMENT OF PERMANENT MONITORING PLOTS IN THE NWT**

Permanent Monitoring Plots (PMPs) are permanent sites set up in the forest to obtain tree and vegetation information in the same location every ten years. The plots provide baseline information on the state of the forest resource, and provide a mechanism for long-term monitoring of change to forest and vegetation condition. To date, there are about 180 PMPs in the NWT. In 2005, 6 PMPs were established in the Deh Cho Region, and 32 in the Sahtu Region. The data and long-term trend summaries will be available to resource managers, communities and researchers for a variety of uses such as understanding forest growth and succession, forest management planning, and monitoring effects of climate change.

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**330** **Biology**
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**File No:** 12 402 721

**Licence No:** 13889

**Region:** IN

**Location:** Beaufort Sea

**INUVIALUIT SETTLEMENT REGION MARINE EXPLORATORY FISHERY**

Fieldwork cancelled.

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**331** **Biology**
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**File No:** 12 402 605

**Licence No:** 13915

**Region:** DC

**Location:** Prairie Creek Winter Access Road

### CANADIAN ZINC- PRAIRIE CREEK WINTER ROAD FISH HABITAT ASSESSMENT- UPDATES

Fisheries and fish habitat assessments were completed along the Prairie Creek Winter Access Road, from Liard River to the Prairie Creek Mine site, with support from Dillon Consulting Ltd biologists and technical staff. The study area included the proposed alignment for the winter road, which largely follows the historical alignment of the Liard to Prairie Creek Winter Road constructed for exploration and initial mine development in the early 1980s.

Detailed habitat and fisheries assessments were completed by: helicopter over-flights, ground surveys at crossings accessible from air, and ground surveys of road sections accessible by ATV. Ground-based assessments utilized standard stream habitat survey forms and general procedures (i.e., BC Integrated Land Management Bureau's Reconnaissance (1: 20 000) Fish and Fish Habitat Inventory: Standards and Procedures)

Habitat assessments were completed on 19 watercourses, including Prairie Creek, Funeral Creek, Sundog Creek, two unnamed tributaries of Sundog Creek, Tetcela River, Fishtrap Creek, three unnamed watercourses, Grainger River and eight unnamed tributaries of Grainger River.

Fish sampling was completed on six watercourses. A backpack electrofisher was used and each sample obtained was visually-identified. Arctic grayling and slimy sculpin were found in Grainger River at Grainger Gap (UTM: 479276, 6799589). Arctic grayling was also found in Tetcela River (UTM: 460386, 6813946). No fish were collected in the sampled reaches of: Funeral Creek (UTM: 464450, 6831654), two tributaries of Sundog Creek (UTM: 431604, 6829807; 436365, 6828647), and an unnamed tributary of Grainger River, east of Grainger Gap (UTM: 482648, 6796642).

**332**

#### Biology

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**File No:** 12 402 763

**Licence No:** 13910

**Region:** SA

**Location:** Loon Lake near Fort Good Hope

#### POPULATION ABUNDANCE AND VITAL RATES OF FISH HARVESTED ALONG THE MACKENZIE VALLEY PIPELINE ROUTE – LOON LAKE 2005

The Loon Lake fish study took place from August 24 to September 4, 2005. The goal was to collect baseline life history and relative abundance information about harvested fish populations in Loon Lake. The project was coordinated by the DFO (Winnipeg) and the Fort Good Hope Renewable Resource Council. The field crew consisted of two biological consultants hired by DFO, one adult resident from Fort Good Hope, and one youth resident from Fort Good Hope. Fish were caught with multi-mesh gillnets and were sampled for length, weight, sex, maturity stage, ageing structures, and tissues. A total of 459 fish were caught and sampled, including lake whitefish, northern pike, walleye, lake cisco, broad whitefish, nine-spine sticklebacks and an unidentified minnow species.

**333**

#### Biology

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**File No:** 12 402 720

**Licence No:** 13740

**Region:** NS

**Location:** Within a 20km by 20km square surrounding the Discovery mine

**BASELINE DATA COLLECTION, YELLOWKNIFE GOLD PROJECT, TYHEE NWT CORP.**

The purpose of this fieldwork is to continue the collection of baseline data to support an anticipated application to the Mackenzie Valley Land and Water Board. Five main assessments were conducted as part of the 2005 program: 1) air quality, climate and noise (general air quality monitoring; particulate data collection; noise measurements; climate data collection from a weather station installed in 2004); 2) aquatic and groundwater resources (monitoring of hydrometric and lake elevation stations; secondary bathymetry surveying of Round Lake; second-year snow surveys at five stations investigated in 2004; second-year surface water quality data collection for comparison with the 2004 and regional data); 3) vegetation and plant communities (vegetation sampling and habitat classification, extending from the area studied in 2004 and including the winter road corridor; ground-truthing and refinement of classifications based on the 2004 work and satellite imagery); 4) wildlife and wildlife habitat (expansion of the 2004 fieldwork; wildlife studied included caribou, moose, carnivores, raptors, waterfowl and breeding birds); and 5) fish and fish habitat (length, weight and age data collection; tissue sampling; bathymetry surveying using GPS and a depth-sounder; underwater surveying to record habitat characteristics such as widths, depths, substrates, cover elements, and spawning, foraging and overwintering areas; water temperature, dissolved oxygen, conductivity and pH measurements; species studied included northern pike, lake whitefish, lake chub, slimy sculpin, and Arctic grayling).

Local communities will be updated on the fieldwork and provided with plain language summaries and a copy of the final report.

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**File No:** 12 402 670**Licence No:** 13790**Region:** NS**Location:** Within a 20km x 20km square surrounding the Salmita Mine**BASELINE DATA COLLECTION, COURAGEOUS LAKE GOLD PROJECT, SEABRIDGE GOLD INC**

During summer and autumn of 2005, EBA Engineering Consultants Ltd. conducted a hydrometric survey of Matthews Creek, which flows between Matthews Lake and Courageous Lake. The survey was conducted on behalf of Seabridge Gold Inc. The activities that occurred during the survey are as follows: instrumentation installation and collection of an initial set of stage-discharge information; further stage-discharge data collection from a different creek flow; and final stage-discharge data collection and instrumentation removal for the season. The flow data was used to develop a stage-discharge curve. The maximum discharge recorded in the survey was 1.2m<sup>3</sup>/s on 24 June, in the post-freshet period. Data indicated that creek flows generally declined over the summer and autumn, with a minimum flow of 0.2m<sup>3</sup>/s recorded on 22 September 2005, prior to freeze-up. Creek water temperatures were also recorded for the same period and ranged from a high of 18° in summer to 1.5° in autumn. Using the stage-discharge relationship and the recorded stages, a time history or hydrograph was developed for the survey period. Data also indicated that snowmelt and evaporation had a minimal impact on creek flows during the survey period. As variations between years can be significant, it is recommended that the hydrology program be continued for at least another year.

Aerial surveys were conducted in four periods between autumn 2004 and autumn 2005 in order to document the presence of caribou, grizzly bears and wolves in the survey area; in addition, the aerial caribou surveys also provided data on caribou abundance and distribution across the study area. As could be expected, caribou abundance was lowest in the July and November periods and highest in September, the time when caribou are migrating southward. The surveys were informed by the cumulative data from the satellite-collar program conducted by the GNWT Department of Environment and Natural Resources (ENR). Miscellaneous wildlife

observations were also recorded during the surveys and included foxes, raptors and waterfowl. Surveys were conducted in 2004 to document bears, dens and bear sign, with a total of five dens and seven bears observed. In 2005, aerial surveys and ground checks were conducted incidentally to other field surveys. Nevertheless, five bears and one old den were observed. Similarly, observations of wolves, wolf activity and dens were documented incidentally to other field surveys in both 2004 and 2005. In 2004, one active wolf den and one inactive den were recorded and 24 observations of wolf sign recorded. In 2005, it was observed that the same active wolf den was being used again and two old den sites were located. Two adult wolves were observed.

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**335****Biology****Wytrychowski, Scott**

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**File No:** 12 402 682**Licence No:** 13899**Region:** NS**Location:** Lac de Gras**DIAVIK DIAMOND MINES INC. DUST DISTRIBUTION AND MONITORING USING LICHENS AS BIOINDICATORS**

The Diavik Diamond Mine impacts the immediate tundra community resulting in increased levels of elements and compounds in lichen tissue compared to reference communities 30 and 60 km away. Sampling direction and lichen species affected accumulation of airborne pollutants in tissue; however, there was no consistent pattern. The presence of phthalates cannot be associated with the Diavik Diamond mine as levels were consistent between reference sites and mine. Polycyclic aromatic hydrocarbons (PAHs) were not found in lichen tissue or soil. Element and compound concentrations in lichen tissue are, in general, well below Canadian Council of Ministers of the Environment (CCME) guidelines for soil quality. Guidelines do not exist for plant tissue, and therefore, it is not possible from this study to assess the type of magnitude of impact, if any, elevated levels may have on lichen and plant communities. This research and that carried out in other arctic regions supports the use of lichens as bioindicators of air quality surrounding point sources of pollution. Quantitative data on element concentrations in lichen tissue are required to provide precise data that can be compared to background levels in the region and regulatory criteria. More detailed research would be beneficial to determine the specific effect of direction and species, if any, on the accuracy of air quality data collected using lichens.

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**File No:** 12 402 682**Licence No:** 13900**Region:** NS**Location:** Lac de Gras**DIAVIK DIAMOND MINES INC. 2005 AQUATIC EFFECTS MONITORING PROGRAM**

Diavik Diamond Mines Inc. conducted the Aquatic Effects Monitoring Program in 2005 as a requirement of the Type A Water Licence N7L2-1645. This is the fifth year of post-baseline aquatic effects monitoring and the third full year of monitoring (open-water and ice cover) since the Mackenzie Valley Land and Water Board approved the program in July 2001. Despite the very close (60m) proximity of Surveillance Network Program (SNP) Station 19 to the effluent diffuser, open-water and ice cover results remain below Canadian Council of Ministers of the Environment (CCME) "Guidelines for the Protection of Aquatic Life". Ice cover concentrations at SNP Station 19 tend to be higher and more variable than open-water concentrations. This

is likely a result of increased wind driven lake circulation in the open-water, resulting in better initial dilution or mixing.

Open-water chlorophyll *a* concentrations closest to the effluent discharge were found to be elevated. These results indicate at least a short-term increase in primary productivity and the gradient of increase indicates that the final effluent could be the source. Results from the near-field monitoring location showed an increase in number of taxa and density of benthic organisms. While too early to be conclusive, combined with the chlorophyll *a* results, there appears to be some effects of nutrient enrichment. Sediment quality parameters are similar to previous years and have shown higher concentrations further way from Diavik with a reverse concentration gradient; this concludes that Diavik is not the source but that the observed changes may be naturally occurring within the lake.

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**File No:** 12 402 682**Licence No:** 13901**Region:** NS**Location:** Lac de Gras **DIAVIK DIAMOND MINES INC. 2005 REVEGETATION RESEARCH**

The goal of this research is to identify the most effective and economical methods for establishing self-sustaining native vegetation cover on disturbed sites at the Diavik Diamond Mine. The research seeks to determine: which substrates are most effective for plant establishment and growth; the soil amendments that are most effective at enhancing substrate properties and plant establishment; and the groups and individual native plant species that are able to establish and survive on a variety of substrates.

Preliminary soil analyses show that for all treatments, phosphorus is the most limiting nutrient, cation exchange capacity is relatively low, pH is neutral and total organic carbon is low. Heavy metal concentrations of potential concern include arsenic, chromium, cobalt and nickel. Plant growth was limited at the time of the assessment and seedlings were not more than 5 cm in height. Fall seeded fertilizer plots had the greatest plant establishment although densities were not more than 25 seedlings per plot. Grasses established more readily than forbs, which were uncommon. In the topsoil treatments, *Betula sp.* and *Vaccinium sp.* established from remnant vegetation islands. There was evidence of the importance of microsites (safe sites) in all plots; seed appeared to germinate and establish more readily if there was some protection provided (rocks, soil clumps etc.) by the substrate.

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**338****Biology****Zalatan, Rebecca**

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**File No:** 12 402 703**Licence No:** 13820**Region:** SS**Location:** Four sites approximately 250 km south-east of Lutsel K'e (61°32.5'-61°45.1'N and 105°52.3'-106°49.3'W)**THE RELATION BETWEEN CLIMATE AND ABUNDANCE CYCLES IN BARRENLAND CARIBOU HERDS, NWT**

This year's field season was completed with one day of sampling and was aimed at obtaining cross-sections (disks) from black spruce stands at two sites. The purpose for sampling these sites was to develop tree-ring chronologies south-east of Great Slave Lake to better understand the local climate in this region. Obtaining a local record of climate will enable determination of what influence large-scale climate, specifically the Arctic Oscillation (AO), has on barren-ground caribou population abundance cycles.

Fieldwork took place August 26, 2005. The research team commuted by float plane to Site 19 (McArthur Lake; 61° 33.740N, 106° 49.165W) and Site 16 (Penylan Lake; 61° 640N, 106° 27.679W). 36 cross-sections were collected from Site 19, and 40 cross-sections from Site 16. The cross-sections were taken at breast height (1.3 m above ground) to reduce the influence of biological factors. Due to time constraints, it was not possible to sample cross-sections at Sites 17-18. The results demonstrate that caribou population abundance cycles are closely, but inversely, related to the first two phases of the AO (approximately 1900-1929 and 1930-1969). In contrast, caribou population abundance was not inversely related to the last phase of the summer AO (1970-2000), but demonstrated a rather episodic relationship. This study is the first to demonstrate the long-term relation between the AO and caribou population abundance cycles of barren-ground caribou.

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## CONTAMINANTS

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**File No:** 12 402 503**Licence No:** 13862**Region:** SS, DC, SA**Location:** Colville Lake, Cli Lake, and the east arm and west basin of Great Slave Lake

### **SPATIAL AND LONG-TERM TRENDS IN PERSISTENT ORGANIC CONTAMINANTS AND METALS IN LAKE TROUT AND BURBOT FROM THE NWT**

The study is designed to find out whether contaminant levels are changing in fish in the NWT. Most of the research effort is focusing on lake trout in Great Slave Lake where work has been carried out at Lutsel K'e (East Basin) and west of Hay River (commercial fisheries, West Basin) since 1993. Organic contaminant levels are low in lake trout fillet, with many chemicals such as DDT and PCBs showing evidence of a decline in concentrations. These declines appear due to the fact that the lake trout are younger and less lipid-rich in the early 2000s than those measured in the early to mid 1990s. Fish were a little more lipid-rich in 2004 with organic contaminant levels also higher. Mercury levels are relatively low in lake trout although larger fish have higher values, which approach the 0.5 ppm guideline for the commercial sale of fish. Time trends are less evident. Mercury concentrations in lake trout were measured from Colville Lake and levels are similar to those measured in 1996; Cli Lake fish have not yet been analyzed. Contaminant monitoring in burbot in Great Slave Lake is now occurring only at Fort Resolution, near the Slave River mouth, and shows similar temporal patterns as observed in lake trout. Burbot liver has higher organochlorine contaminant concentrations than lake trout fillet, while mercury concentrations are similar in lake trout and burbot fillet.

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**File No:** 12 402 503**Licence No:** 13869**Region:** SA**Location:** Mackenzie River and tributaries, near Fort Good Hope, Norman Wells and Tulita

### **AQUATIC STUDIES ALONG THE MACKENZIE RIVER AND ITS TRIBUTARIES**

This study was designed to investigate small fish living in the Mackenzie River between Fort Good Hope and Norman Wells to assess their healthiness. The fieldwork involved travelling in two boats with community members from Fort Good Hope. A lot of various small fish were located and sampled at different sites. All appeared healthy, including those fish sampled on the drill islands at Norman Wells. There also was a good amount of fish food (aquatic insects and worms) in the shallow waters of the river. Fish, aquatic insects and worms, and the water chemistry of six creeks in the Norman Wells area and along the pipeline route were also investigated. This was done by helicopter. Some of the rivers were found to be slightly salty, although the bottom animals were found to be healthy. There were different kinds of fish living in the creeks, sculpins being very abundant except at Chick Creek (where grayling were most abundant). Very young Arctic lamprey were captured in Oscar Creek and in the Mackenzie River near the Oscar Creek mouth. There seemed to be

slightly fewer fish and fish food downstream than upstream of the winter roads.

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### 341 Contaminants

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**Region:** NS

**Location:** Vicinity of Giant Mine, Baker Creek, and Old Town in Yellowknife

#### **SPECIATION AND MOBILITY OF ANTIMONY IN SOIL, SEDIMENT, AND WATER IN THE REGION OF THE GIANT MINE ROASTER**

The aim of this research is to understand the interaction of surface waters, pore waters and sediment, and the implications of this interaction on the present and future mobility of antimony. Three sample sites — Baker Creek (the channel portion shoreward of the breakwater immediately before it discharges into Yellowknife Bay), the vegetated section of Baker Creek (also shoreward of the breakwater), and Baker Pond (on the Giant Mine site) — were chosen in order to study antimony in porewater and sediment. Sampling was performed by gathering sediment cores and installing dialysis arrays (peepers). Surface water samples were also collected in order to gauge the effects of the water treatment plant on the discharged waters entering Baker Creek, and subsequently, Yellowknife Bay. Surface water samples were collected in June 2005, prior to the operation of the water treatment plant, and again in September 2005, after eight weeks of operation. Surface waters were collected in the settling pond, the polishing pond, Baker Pond, Baker Creek channel, and the vegetated portion of Baker Creek. Water entering the water treatment plant was also sampled.

Pore and surface water samples have been sent for analysis to the US Geological Survey (USGS) in Boulder, Colorado; the samples will be tested for SbIII and SbV, AsIII and AsV, FeII and FeIII as well as selected cations and anions.

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### 342 Contaminants

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**File No:** 12 402 713

**Licence No:** 13854

**Region:** NS

**Location:** Lakes near the Colomac Gold Mine

#### **ECOLOGICAL CONDITIONS IN THE PROPOSED DISCHARGE ROUTE OF THE COLOMAC MINE**

The aquatic/fisheries investigations were conducted from July 14 to July 21, 2005 by Rescan Environmental Services Ltd. for the Contaminants and Remediation Directorate of the Department of Indian Affairs and Northern Development (DIAND). Four lakes (Spanner Lake, L-Shaped Lake, Paddle Lake and Lake 315) were sampled for water quality, sediment quality, phytoplankton, benthic macroinvertebrates, and fish community (only from Spanner Lake and Lake 315). Aquatic vegetation (*Carex spp.*) was also sampled from three wetlands for analysis of tissue metal concentrations. Metal concentration trends in water, sediment and vegetation reflected natural biogeochemical processes. With the exception of total copper, none of the water quality variables exceeded the Canadian Council of Ministers of the Environment (CCME) guidelines and many were below detection limits. None of the sediment quality variables exceeded CCME guidelines for effects on aquatic life, with the exception of total arsenic and total zinc. Average phytoplankton biomass values were low but not uncommon for arctic lakes. Similarly, benthos density was low in all lakes, the highest values of which were observed in the two shallow lakes, L-Shaped Lake and Paddle Lake. Fish communities were sampled using gillnets and minnow traps. Lake trout were captured in both Spanner Lake and Lake 315, whereas lake whitefish were captured only in Lake 315. Tissue samples were removed from a subset of these fish for metal analysis. None of the mercury concentrations in either lake trout or lake whitefish exceeded the Health Canada guideline of 0.5 mg/kg wet weight.

**343****Contaminants****McLeod, Deborah**

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**File No:** 12 408 134**Licence No:** 13746**Region:** IN, GW**Location:** Inuvik, with participants recruited from communities in the Inuvialuit Settlement Region**MONITORING TEMPORAL TRENDS OF HUMAN ENVIRONMENTAL CONTAMINANTS IN THE NWT AND NUNAVUT**

In 2004, a feasibility study to establish trends for human environmental contaminants in the NWT and Nunavut began with funding from the Northern Contaminants Program. The project acts as a follow-up to the Human Environmental Contaminants Exposure study that was conducted between 1995 and 2001 and will be valuable in Canada's effort to meet its international obligation to the Persistent Organic Pollutants (POP) and Heavy Metals Protocols of the United Nations Economic Commission for Europe (UN/ECE) and Long Range Transboundary Air Pollution (LRTAP) Convention. The program will contribute data to the Global Monitoring Plan created under the Stockholm Convention that includes human blood as a biomarker.

This study involved the baseline collection of maternal blood and hair samples as well as lifestyle/dietary information from pregnant women in the Inuvik. Approximately 50 women who gave birth in Inuvik were recruited to the study; participants were interviewed before they delivered to assess diet and lifestyle during pregnancy and then asked to sign a consent form agreeing to provide blood and hair samples for the study. Communication of results is expected to occur before March 31, 2007. The study will initially provide information to participants, then to community members regarding country food consumption in women of childbearing age and then produce data to international contaminant monitoring initiatives. Consultation was a key component to offering this project and consultation activities continued as a priority to include meetings with and ongoing presentations to: territorial health departments, regional health authorities and staff, territorial environmental contaminants committees, regional and national aboriginal organizations including the local Inuvialuit Regional Corporation and the Gwich'in Tribal Council, with a primary focus on women of childbearing age and community members in the Inuvialuit Settlement Region.

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## ENGINEERING

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**File No:** 12 406 032**Licence No:** 13736**Region:** IN**Location:** Five potential sources of granular materials adjacent to the proposed pipeline right-of-way and at the proposed site of Storm Hills Piggings Facility**2005 WINTER FIELD GEOTECHNICAL INVESTIGATION PROGRAM IN THE INUVIALUIT SETTLEMENT REGION**

The 2005 Winter Field Geotechnical Investigation Program in the Inuvialuit Settlement Region (ISR) was conducted between January 23 and March 13, 2005. The objective of the program was to obtain information with respect to sub-surface conditions in the ISR within potential borrow sources and at a facility site. This information is required in order to assess the feasibility of a Mackenzie Valley pipeline and for the preparation of subsequent regulatory applications. Over the course of the program, information was collected from four proposed borrow sources (1.004P, 2.029PB, 2.029P and 20.038P) and the proposed Storm Hills Piggings Facility.

Execution of the program was approved by various regulatory agencies including the Inuvialuit Land Administration, Indian and Northern Affairs Canada, the NWT Water Board and the Aurora Research Institute. Protocols from the Department of Fisheries and Oceans (DFO) were also complied with during the planning and implementation of the program. Indian and Northern Affairs Canada (INAC) conducted three environmental inspections during the execution of the program. Meetings and telephone communications were held on a consistent basis with the regulatory agencies. Implementation of the program commenced on January 23 with a survey of the Cockney Channel access to the Storm Hills Staging Area. Site investigations commenced on February 9 with a test pit excavation carried out at Site 1.004P near Swimming Point Camp. Clean up of the program area was completed on March 13 at Site 20.038P. The program was executed over 50 days during this time period. A total of six boreholes were drilled and 14 test pits were excavated at the four proposed borrow sources. A total of four boreholes were drilled at the proposed Storm Hills Piggings Facility. None of the field activities resulted in any major environmental incidents. There were five minor hydrocarbon spills, all of which were less than two litres in volume. All of these spills were immediately reported, responded to and cleaned up without any residual effects. Contaminated snow and contaminated absorbent pads and rags were stored separately, and ultimately disposed of at the appropriate landfill site. There was no known disturbance to wildlife during the program. As well, there was no known negative environmental impact to the ground surface or to the water resources and fisheries in the one water source (Peter Lake) used during the program.

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**File No:** 12 406 032**Licence No:** 13737**Region:** IN**Location:** Proposed site of the Taglu Field Development**2005 WINTER GEOTECHNICAL FIELD PROGRAM: TAGLU FIELD**

The Taglu Winter 2005 Geotechnical Program in the Inuvialuit Settlement Region (ISR) was a field-based

multi-component sampling and survey exercise located on the Taglu Development Pad within the Kendall Island Bird Sanctuary in the Mackenzie Delta. The objective of the program was to obtain information regarding subsurface conditions at the Taglu site. The fieldwork ran between February 17 and March 24, 2005, taking a total of 36 days to complete. Thirteen boreholes were augured to a maximum depth of 25 m to: characterize subsurface soil and ice conditions; delineate the thickness of the active layer and any interfaces between frozen and unfrozen ground; collect undisturbed samples of both frozen and unfrozen soil; obtain ground temperature data and install ground temperature monitoring equipment; and obtain data on auger penetration rates.

The lithology in the undisturbed tundra generally consists of 0.6–0.9 m of peat cover overlying non-plastic silt grading into very fine sand. Permafrost was encountered in all overland boreholes. Excess ice contents in the surficial 4 m ranged from 20% to 100%. Below this depth, visible excess ice in the drilled boreholes was generally less than 5%. An ice vein was encountered in one borehole, PL3, between 7.15 m and 7.65 m depths.

Porewater salinity measurements from 44 soil samples taken from depths up to 25 m ranged from 0 ppt to 6 ppt, averaging at 2 ppt. The existing gravel pad, which was constructed in the area of the former D43 wellsite, consists of approximately 1–2 m of granular fill overlying the tundra. Subsurface conditions at two potential dock site locations were investigated. The depth from ice cover to river bottom at the two borehole locations ranged from 3.0–4.2 m. The river bottom at these locations consists of unfrozen, soft to firm non-plastic silt grading into loose to very dense, very fine-grained silty sand at 5–6m depths below the river bottom.

Ground temperatures at a 10m depth were approximately  $-5.0^{\circ} + 0.5^{\circ}$  C in undisturbed tundra, except in the vicinity of water bodies or disturbed areas. Permafrost was encountered in the vicinity of the former sump, former exploration well (D43) and the river bank, albeit at warmer ground temperatures. Because the boreholes were drilled during the winter it was not possible to determine the depth of the active layer.

The information collected during the field program is being used as primary input into the development of: 1) future project permit applications (i.e., land use permits, water licences); 2) engineering design criteria for foundations of future structures; 3) preliminary construction and design planning; operational criteria; and cost estimating.

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**346**
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**Region:** GW

**Location:** Within the pipeline study corridor of the Gwich'in Settlement Area

**2005 WINTER FIELD GEOTECHNICAL INVESTIGATION PROGRAM IN THE GWICH'IN SETTLEMENT AREA**

The 2005 Winter Field Geotechnical Investigation Program in the Gwich'in Settlement Area (GSA) was conducted between February 11 and April 4, 2005. The objective of the Program was to obtain information with respect to sub-surface conditions in the GSA within potential borrow sources, at a facility site and at a potential location for a pipeline anchor test. This information is required in order to assess the feasibility of a Mackenzie Valley Pipeline and for the preparation of subsequent regulatory applications. Over the course of the program, information was collected from two proposed borrow sources (2.051PA and 20.073P), from the proposed Inuvik Area Facility (IAF) site and from along the proposed access road between the IAF and the Dempster Highway. Information was also collected from four areas along the Dempster Highway, which exhibited a variety of subsurface soil conditions, to test the suitability of using slurry and screw anchors as anti-buoyancy measures for pipeline construction.

Execution of the program was approved by various regulatory agencies including the Gwich'in Tribal Council, the Gwich'in Land and Water Board and the Aurora Research Institute. Protocols from the Department of Fisheries and Oceans (DFO) and Acceptance Conditions from the GNWT Department of Transportation were also complied with during the planning and implementation of the Program. Indian and Northern Affairs Canada (INAC) conducted four environmental inspections and one Industrial Water Licence inspection during the execution of the program. Meetings and telephone communications were held on a consistent basis with the regulatory agencies. Implementation of the program commenced on February 11 with a survey of the IAF access. Site investigations commenced on February 25 with drilling conducted at Anchor Test Area 1 (Staging Area). Clean up of the program area was completed on April 4 at Anchor Test Area 4. The Program was executed over 52 days during this time period. A total of ten boreholes were drilled at the two proposed borrow sources. A total of 13 boreholes, 43 slurry anchor holes and 20 screw anchor pilot holes were drilled at the four Anchor Test Areas. A total of 18 boreholes were drilled at the proposed Inuvik Area Facility. A total of 6 test pits were excavated and 11 boreholes were drilled along the proposed access to the IAF.

None of the field activities resulted in any major environmental incidents. There were five minor hydrocarbon spills, all of which were less than ten litres in volume. All of these spills were immediately reported, responded to and cleaned up without any residual effects. Contaminated snow, and contaminated absorbent pads and rags were stored separately and ultimately disposed of at the appropriate landfill site. There was no known disturbance to wildlife during the program. As well, there was no known negative environmental impact to the ground surface or to the water resources and fisheries in the two water sources (GSA-1 and Dolomite Lake) used during the program.

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**347****Engineering****Graburn, Larry**

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**File No:** 12 406 032**Licence No:** 13742**Region:** SA**Location:** Within the pipeline study corridor of the Tulita District of the Sahtu Settlement Area**2005 WINTER FIELD GEOTECHNICAL INVESTIGATION PROGRAM IN THE SAHTU SETTLEMENT AREA - TULITA DISTRICT**

Fieldwork cancelled.

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**348****Engineering****Graburn, Larry**

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**File No:** 12 406 032**Licence No:** 13766**Region:** SA**Location:** All major watercourse crossings located on the proposed pipeline right-of-way in the K'ahsho Got'ine District of the Sahtu Settlement Area**2005 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM IN THE SAHTU SETTLEMENT AREA**

The 2005 Spring Break-up Watercourse Investigation Program in the Sahtu Settlement Area (SSA) was a helicopter-based program that was conducted in two phases to observe the break-up conditions at the major watercourse crossing locations along a proposed pipeline corridor. The overall purpose of the program was to acquire information necessary for the engineering design and operation of the proposed Mackenzie Valley

Pipeline at each of the crossing points and as input to the project cost estimate. The objectives of the program were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed watercourse crossing points. The program consisted of a pre-break-up phase and a break-up phase, and took three days to complete, between April 17 and April 20, 2005.

The first phase of the Program was conducted in the Gwich'in Settlement Area (GSA), SSA and the Deh Cho Region (DCR) between April 14 and April 22, 2005. In this phase, all the required break-up conditions were observed. The second phase was conducted only in the Inuvialuit Settlement Region to meet the late break-up conditions in the Mackenzie Delta. The required observations were made at all proposed crossing locations in this area as the break-up was underway.

There was no known interaction with any wildlife, during the ground portion of the program. Helicopters were contracted with companies designated by Imperial Oil Resources Ventures Limited, based on Access and Benefits considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The program operating plan was developed to assign a helicopter company and community monitors to each program and to each community area of the respective regions.

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**349**

**Engineering**

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**File No:** 12 406 032

**Licence No:** 13768

**Region:** DC

**Location:** All major watercourse crossings located on the proposed pipeline right-of-way in the Deh Cho region

**2005 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM - DEH CHO REGION**

The 2005 Spring Break-up Watercourse Investigation Program in the Deh Cho Region (DCR) was a helicopter-based program that was conducted in two phases to observe the break-up conditions at the major watercourse crossing locations along a proposed pipeline corridor. The overall purpose of the program was to acquire information necessary for the engineering design and operation of the proposed Mackenzie Valley Pipeline at each of the crossing points and as input to the project cost estimate. The objectives of the program were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed watercourse crossing points. The program consisted of a pre-break-up phase and a break-up phase, and took three days to complete between April 14 and April 16, 2005.

The first phase of the Program was conducted in the Gwich'in Settlement Area (GSA), Sahtu Settlement Area (SSA) and the DCR between April 14 and April 22, 2005. In this phase all the required break-up conditions were observed. The second phase was conducted only in the Inuvialuit Settlement Region to meet the late break-up conditions in the Mackenzie Delta. The required observations were made at all proposed crossing locations in this area as the break-up was underway.

There was no known interaction with any wildlife, during the ground portion of the program. Helicopters were contracted with companies designated by Imperial Oil Resources Ventures Limited, based on Access and Benefits considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The program operating plan was developed to assign a helicopter company and community monitors to each program and to each community area of the respective regions.

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**350** **Engineering****Graburn, Larry**

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**File No:** 12 406 032**Licence No:** 13769**Region:** GW**Location:** All major watercourse crossings located on the proposed pipeline right-of-way in the Gwich'in Settlement Area**2005 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM IN THE GWICH'IN SETTLEMENT AREA**

The 2005 Spring Break-up Watercourse Investigation Program in the Gwich'in Settlement Area (GSA) was a helicopter-based program that was conducted in two phases to observe the break-up conditions at the major watercourse crossing locations along a proposed pipeline corridor. The overall purpose of the program was to acquire information necessary for the engineering design and operation of the proposed Mackenzie Valley Pipeline at each of the crossing points and as input to the project cost estimate. The objectives of the program were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed watercourse crossing points. The program consisted of a pre-break-up phase and a break-up phase, and took one day to complete between April 21 and April 22, 2005.

The first phase of the program was conducted in the GSA, Sahtu Settlement Area (SSA) and the Deh Cho Region (DCR) between April 14 and April 22, 2005. In this phase all the required break-up conditions were observed. The second phase was conducted only in the Inuvialuit Settlement Region to meet the late break-up conditions in the Mackenzie Delta. The required observations were made at all proposed crossing locations in this area as the break-up was underway.

There was no known interaction with any wildlife, during the ground portion of the Program. Helicopters were contracted with companies designated by Imperial Oil Resources Ventures Limited, based on access and benefits considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The program operating plan was developed to assign a helicopter company and community monitors to each program and to each community area of the respective regions.

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**351** **Engineering****Graburn, Larry**

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**File No:** 12 406 032**Licence No:** 13785**Region:** SA**Location:** Commissioner's Land at Norman Wells**NORMAN WELLS STRAW BALES AND REFLECTIVE SURFACE TEST**

Fieldwork cancelled.

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**352** **Engineering****Graburn, Larry**

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**File No:** 12 406 032**Licence No:** 13793**Region:** IN**Location:** All major watercourse crossings located on the proposed pipeline right-of-way, and at Pete's Creek, in the Inuvialuit Settlement Region

## **2005 SPRING BREAK-UP WATERCOURSE INVESTIGATION PROGRAM IN THE INUVIALUIT SETTLEMENT REGION**

The 2005 Spring Break-up Watercourse Investigation Program in the Gwich'in Settlement Area (GSA) was a helicopter-based program that was conducted in two phases to observe the break-up conditions at the major watercourse crossing locations along a proposed pipeline corridor. The overall purpose of the program was to acquire information necessary for the engineering design and operation of the proposed Mackenzie Valley Pipeline at each of the crossing points and as input to the project cost estimate. The objectives of the program were to determine the qualitative and quantitative features of ice conditions and hydraulic characteristics at each of the proposed watercourse crossing points. The program consisted of a pre-break-up phase and a break-up phase, and took four days to complete between May 23 and May 27, 2005.

The first phase of the program was conducted in the GSA, Sahtu Settlement Area (SSA) and the Deh Cho Region (DCR) between April 14 and April 22, 2005. In this phase all the required break-up conditions were observed. The second phase was conducted only in the Inuvialuit Settlement Region to meet the late break-up conditions in the Mackenzie Delta. The required observations were made at all proposed crossing locations in this area as the break-up was underway.

There was no known interaction with any wildlife, during the ground portion of the Program. Helicopters were contracted with companies designated by Imperial Oil Resources Ventures Limited, based on Access and Benefits considerations. The helicopter companies and the community monitors are linked together through joint venture arrangements. The program operating plan was developed to assign a helicopter company and community monitors to each program and to each community area of the respective regions.

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### **353**

### **Engineering**

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**File No:** 12 406 038

**Licence No:** 13890

**Region:** IN

**Location:** Sump sites Ikhil A-01, Ikhil I-37, Kilagmiotak M-16, Kilagmiotak F-48, Ogeoqeoq J-06, Onigat C-38, Onigat D-52, Reindeer F-36, Reindeer A-41, Sholokpaoqak P-60, Shakgatlatachig D-50

## **INVENTORY AND ASSESSMENT OF DRILLING WASTE SUMPS IN THE MACKENZIE DELTA OF THE INUVIALUIT SETTLEMENT REGION**

In 2004, several oil and gas industry member companies collaborated on an initiative to catalogue and conduct preliminary assessments of heritage drilling sumps in the Inuvialuit Settlement Region (ISR). Prior to the 2004 field season, industry representatives formed a technical committee to develop a standardized sump assessment protocol to be applied to all sites included in the industry- and research-sponsored programs. Representatives from Indian and Northern Affairs Canada (INAC) and the Inuvialuit were also part of the technical committee.

This study was conducted over two years and involved field visits during the summers of 2004 and 2005. As one of the industry sponsors for this program, ConocoPhillips Canada contributed 11 heritage drilling sump sites (seven situated on Crown Land and four, on Inuvik 1(a) lands) to be catalogued and assessed during the 2005 field season. Komex International Ltd. (now WorleyParsons Komex) and IEG Environmental (now Klohn Crippen Berger) conducted the assessments at these sites.

The primary objective of this study was to develop and field-verify appropriate methods to inventory and assess environmental conditions at a selection of heritage drilling sump sites in the ISR. The scope of the work involved identifying, testing, assessing and reporting on the environmental conditions of drilling waste

sumps in accordance with the “Protocol for the Assessment of Drilling Mud Sumps”. The protocol requires data collection/compilation from existing sources as well as site-specific field survey information. The existing source information includes: site identification and location; site history; supplementary physiography/geology/climate/ecology data; and previous site assessment reports.

The site-specific field survey information collected in 2005 comprised: site description (infrastructure, slumping, ponding, soil staining, etc.); a photographic record of site conditions (ground and aerial); an active layer thickness survey; soil and surface water sampling and chemical analysis; a site survey with GPS coordinates for sump perimeter, sample points, well centre, etc.; terrain conductivity (EM38) surveys; and a vegetation assessment (qualitative). Based on the 2004 findings, the 2005 program methodology reduced the number of active layer measurements taken on the lease and adjacent undisturbed terrain to ten for each category, and only the EM38 was utilized for the 2005 geophysical surveys.

The following are some general observations based on the 2005 survey results. Four sites had salt staining/crusting present on or immediately adjacent to the survey area described in the field as having an areal extent of <20% of the site area. Six sites had surface water bodies within approximately 500 m. Four sites had portions of the sump collapsed with surface water ponding, with an additional four sites showing minor subsidence. Soil and/or water samples from three sites were analyzed for hydrocarbons; soil analytical results from these sites reported detectable levels of F2, F3 and F4 hydrocarbons. The surface water sample from Ikhil 1-37 reported detectable ethylbenzene, xylenes and F2 hydrocarbon concentrations. Additionally, debris was reported at five sites, and pilings, at four sites.

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**354****Engineering****Johnson, Pascale**

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**File No:** 12 402 751**Licence No:** 13809**Region:** DC**Location:** Pointed Mountain Plant Site, WNW of Fort Liard (60° 23'N, 123° 49'W)**PHASE II ENVIRONMENTAL SITE ASSESSMENT AT POINTED MOUNTAIN GAS PLANT AND ASSOCIATED FACILITIES**

This program is part of ongoing surface water, groundwater and soils investigations associated with the decommissioning of the Pointed Mountain Gas Field. Alpine Environemntal Ltd., through Nahendeh Land and Environmental Servies, conducted fieldwork in August and December of 2005 on various locations within the gas field.

Surface water and groundwater sampling and monitoring were conducted on Sites A1, A2, A3, A4, the Pointed Mountain Plant Site and airstrip. Surface water samples were collected from Fisherman Lake, unnamed creeks located near the A2 wellsite and airstrip and the A2 spring.

The surface water and groundwater results are generally consistent with results from previous years.

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**355****Engineering****Kustan, Ed**

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**File No:** 12 402 709  
**Region:** DC

**Licence No:** 13760  
**Location:** N-01 wellsite south-east of Fort Liard

### **SUPPLEMENTAL PHASE II ENVIRONMENTAL SITE ASSESSMENT, N-01 WELLSITE**

The purpose of this work was to add to the previous environmental assessments done in 2002-2004 at the N-01 wellsite and associated facilities. Additional vertical and horizontal delineation of environmental impacts; installing two additional groundwater monitoring wells; field screening the soil; obtaining samples of the soil and/or groundwater for laboratory analysis; and reporting findings along with recommendations were projected for this phase of the assessment. Groundwater monitoring will be part of the overall assessment project later this year.

**356**

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**File No:** 12 402 709  
**Region:** DC

**Licence No:** 13840  
**Location:** F-36 wellsite 30 km south of Fort Liard, along the Shiha Pipeline

### **F-36 ENVIRONMENTAL SITE ASSESSMENT 2005**

The objective of the fieldwork was to assess conditions at the F-36 wellsite. Soil or surface water identified as a concern was sampled, using a shallow hand auger, for laboratory analyses. The final report will provide a comparative analysis of the findings from the 2004 and 2005 assessments.

**357**

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**File No:** 12 402 709  
**Region:** DC

**Licence No:** 13841  
**Location:** O-35 wellsite 30 km south of Fort Liard, along the Shiha Pipeline

### **O-35 ENVIRONMENTAL SITE ASSESSMENT 2005**

The objective of the fieldwork was to assess conditions at the O-35 wellsite. Soil or surface water identified as a concern was sampled, using a shallow hand auger, for laboratory analyses. The final report will provide a comparative analysis of the findings from the 2004 and 2005 assessments.

**358**

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**File No:** 12 402 709  
**Region:** DC

**Licence No:** 13842  
**Location:** M-25 wellsite 15 km north of Fort Liard, along the Chevron Pipeline

### **M-25 ENVIRONMENTAL SITE ASSESSMENT 2005**

The objective of the fieldwork was to assess conditions at the M-25 wellsite and associated remote sumps. Soil or surface water identified as a concern was sampled, using a shallow hand auger, for laboratory analyses.

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**359** **Engineering****Kustan, Ed**

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**File No:** 12 402 709**Licence No:** 13843**Region:** DC**Location:** K-29 wellsite 15 km north of Fort Liard, along the Chevron Pipeline**K-29 ENVIRONMENTAL SITE ASSESSMENT 2005**

The objective of the fieldwork was to assess conditions at the K-29 wellsite and associated remote sumps. Soil or surface water identified as a concern was sampled, using a shallow hand auger, for laboratory analyses.

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**360** **Engineering****Kustan, Ed**

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**File No:** 12 402 709**Licence No:** 13844**Region:** DC**Location:** O-80 wellsite 15 km north of Fort Liard, along the Chevron Pipeline**O-80 ENVIRONMENTAL SITE ASSESSMENT 2005**

The objective of the fieldwork was to assess conditions at the M-25 wellsite and associated remote sump. Soil or surface water identified as a concern was sampled, using a shallow hand auger, for laboratory analyses.

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**361** **Engineering****Povey, Andrew**

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**File No:** 12 402 670**Licence No:** 13845**Region:** GW**Location:** Along the proposed pipeline survey corridor within the Gwich'in Settlement Area**2005 ROUTE AND SITE RECONNAISSANCE IN THE GWICH'IN SETTLEMENT AREA**

Fieldwork cancelled.

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**362** **Engineering****Povey, Andrew**

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**File No:** 12 402 670**Licence No:** 13849**Region:** IN**Location:** Along the proposed pipeline survey corridor within the Inuvialuit Settlement Region

**2005 ROUTE AND SITE RECONNAISSANCE IN THE INUVIALUIT SETTLEMENT REGION**

Fieldwork cancelled.

**363****Engineering****Povey, Andrew**

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**File No:** 12 402 670**Licence No:** 13882**Region:** SA**Location:** Along the proposed pipeline study corridor within the Sahtu Settlement Area**2005 ROUTE AND SITE RECONNAISSANCE IN THE SAHTU SETTLEMENT AREA**

Fieldwork cancelled.

**364****Engineering****Quaife, Ron**

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**File No:** 12 406 039**Licence No:** 13892**Region:** IN**Location:** Sump sites Ellice O-14, Hanson G-07, Itrilek B-52, Kurk M-39, Langley E-29, Louth K-45, Mallik L-38, Mallik J-37, Maillik P-59, Napartok M-01, Tununuk K-10**INVENTORY AND ASSESSMENT OF DRILLING WASTE SUMPS IN THE MACKENZIE DELTA OF THE INUVIALUIT SETTLEMENT REGION**

In 2004, several oil and gas industry member companies collaborated on an initiative to catalogue and conduct preliminary assessments of heritage drilling sumps in the Inuvialuit Settlement Region (ISR). Prior to the 2004 field season, industry representatives formed a technical committee to develop a standardized sump assessment protocol to be applied to all sites included in the industry- and research-sponsored programs.

This study was conducted over two years and involved field visits during the summers of 2004 and 2005. As one of the industry sponsors for this program, Imperial Oil Resources contributed 11 heritage drilling sump sites (nine situated on Crown Land and two, on Inuvik 1(b) or Tuktoyaktuk 1 (a) lands) to be catalogued and assessed during the 2005 field season. Komex International Ltd. (now WorleyParsons Komex) and IEG Environmental (now Klohn Crippen Berger) conducted the assessments at these sites.

The primary objective of this study was to develop and field-verify appropriate methods to inventory and assess environmental conditions at a selection of heritage drilling sump sites in the ISR. The scope of the work involved identifying, testing, assessing and reporting on the environmental conditions of drilling waste sumps in accordance with the "Protocol for the Assessment of Drilling Mud Sumps". The protocol requires data collection/compilation from existing sources as well as site-specific field survey information. The existing source information includes: site identification and location; site history; supplementary physiography/geology/climate/ecology data; and previous site assessment reports.

The site-specific field survey information collected in 2005 comprised: site description (infrastructure, slumping, ponding, soil staining, etc.); a photographic record of site conditions (ground and aerial); an active layer thickness survey; soil and surface water sampling and chemical analysis; a site survey with GPS coordinates for sump perimeter, sample points, well centre, etc.; terrain conductivity (EM38) surveys; and a vegetation assessment (qualitative). Compared to 2004, the 2005 program methodology reduced the number

of active layer measurements taken on the lease and adjacent undisturbed terrain to ten for each category, and only the EM38 was utilized for the 2005 geophysical surveys.

The following are some general observations based on the 2005 survey results. All sites had surface water receptors estimated to be within 500 m of the drilling sump or lease site. Two sites had salt staining described in the field as having an areal extent exceeding 20% of the site. Two sites had salt or iron staining described in the field as present but having an areal extent of < 20% of the site. Six sites had ponded water on the sump or lease area with chloride concentrations exceeding 250 mg/L; of these sites, two had chloride concentrations approximately twice (or greater) that of background concentrations. Five sites had at least portions of the sump collapsed with surface water ponding; an additional four sites reported minor subsidence. Approximately seven sites had terrain conductivity (EM 38) readings on or adjacent to the drilling sump measuring more than twice the background. No sites were reported to have surface soil hydrocarbon staining. Debris was present at five sites, and pilings, at one site.

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**365** **Engineering**

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**File No:** 12 406 041

**Licence No:** 13921

**Region:** NS

**Location:** Dettah sewage lagoon

**ENHANCED SEWAGE TREATMENT USING AERATION TECHNOLOGY**

Fieldwork cancelled.

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**366** **Engineering**

**Wiatzka, Gerd**

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**File No:** 12 406 037

**Licence No:** 13871

**Region:** SA

**Location:** Port Radium Mine site

**ASSESSMENT, REMEDIATION AND ASSOCIATED SERVICES FOR FORMER URANIUM MINES**

In July 2005, SENES Consultants Ltd. conducted an environmental assessment/monitoring at and in the vicinity of the former Port Radium Mine on Great Bear Lake. The work was conducted at the request of the Contaminants and Remediation Directorate of Indian and Northern Affairs Canada (INAC).

The objective of the program was to supplement the information collected during previous assessments, for the purposes of characterizing the existing environment and refining remediation plans for the site. Particular emphasis was placed on the assessment of impacted areas adjacent to the Port Radium site that had not been evaluated in previous programs (e.g., Echo Bay Mines, Cross Fault Lake and the “tower area”). The major components of the 2005 program included: 1) water quality sampling in Great Bear Lake, McDonough Tailings Containment Area, Cross Fault Lake and Glacier Lake; 2) sampling of surface soils for the presence of designated substances (e.g., asbestos) and hydrocarbon products; 3) vegetation surveys; 4) characterization of mine openings, structures and debris; 5) identification and characterization of potential borrow sources; and 6) roving gamma surveys of previously unsurveyed areas.

Findings from the 2005 assessment/monitoring activities will be issued in an assessment report scheduled for

completion in June, 2006. The report will be provided to the Department of Indian Affairs and Northern Development (DIAND).

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**367** **Engineering**

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**File No:** 12 406 036

**Licence No:** 13739

**Region:** IN

**Location:** Niglintgak Field Development Facilities site in the Mackenzie Delta

**2005 WINTER FIELD GEOTECHNICAL INVESTIGATION PROGRAM, NIGLINTGAK FIELD DEVELOPMENT FACILITIES**

Information with respect to subsurface conditions at the Niglintgak flow line, well pads and proposed land and barge landing sites was collected as part of the 2005 Niglintgak Winter Field Geotechnical Investigation Program. The program begun on February 13 and was completed on April 1. Camp Farewell was closed on April 3.

Twenty-six boreholes were drilled to depths ranging from 16, 20 and 25 m for the land-based sites and up to 50 m in the Kumak Channel. The purpose of drilling was to characterize subsurface soil and ice conditions; delineate the thickness of the permafrost active layer and any interfaces between frozen and unfrozen ground; collect undisturbed samples of both frozen and unfrozen soil; obtain ground temperature data and install ground temperature monitoring equipment and obtain data on drill penetration rates under various subsurface conditions. In addition to the geotechnical investigations, ground-penetrating geophysical surveys were also conducted as part of the program. A total of 57.8 ha of new overland access to boreholes and 1.80 ha of new access for geophysical testing lines were used during the program. Program activities also included: the construction of an access ramp from Kumak Channel onto the Niglintgak site using snow and river channel water; surveying and staking of proposed access lines (width of 6m) to borehole locations and geophysical lines; packing of snow on access lines with the use of snowmobiles and tracked equipment (while ensuring that adequate snow cover was present); and mobilization and siting of a survival shack on the channel ice to support the drilling operations. Existing permitted camp facilities at Camp Farewell provided accommodation and fuel storage for subcontractors and Shell personnel during the program.

Specific site visits were conducted by Canadian Wildlife Service representatives on February 22 and Indian and Northern Affairs Canada representatives on February 22 and March 18. Wildlife sightings that were observed during the program included two foxes, one wolverine, five reindeer and a number of ptarmigans. Due to the timing of the program, migratory birds were not observed.

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## FOSSILS

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**368****Fossils****Johnson, Art**

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**File No:** 12 402 753**Licence No:** 13831**Region:** GW**Location:** Sites in the Gwich'in Settlement Area, located at approximately 67° 45.570N, 133° 53.151W and 68° 06.565N, 133° 28.538W**FOREST RESEARCH IN THE MACKENZIE RIVER DELTA**

In the summer of 2005, forest scientists from the University of Pennsylvania began a project aimed at determining the annual productivity of a forest located on the banks of the Rengleng River, within the Gwich'in Settlement Area (GSA). The annual productivity of a forest is the amount of wood and foliage (leaves and needles) produced by trees each year, and is reported in units of mass per area (in this case Mg/ha-yr). As a general guide to forest productivity worldwide, cold region forests, like the majority of the spruce forests around Inuvik, have annual productivities in the range of 1-3 Mg/ha-yr, while mid-latitude forests fall in the range of 5-12 Mg/h-yr. The primary goal of this study was to find a forest as similar as possible to the two million-year old spruce-dominated fossil forests that grew along what is now Ballast Brook on Banks Island to determine its productivity. The research team joined the Franklin and Marshall College group on Banks Island, where they excavated and measured buried logs of ancient spruce along the banks of Ballast Brook. From the diameters and tapers of these fossil logs, it was possible to calculate that those trees were 24-30m in height, and were adding wood at a rate of about 3 Mg/ha-yr. Along the Rengleng River, the parts of white spruce trees of about the same size were dissected and weighed to determine the weight of needles and wood produced annually. The modern riparian forest produced about 3-5 Mg of needles per hectare per year, and 2.5-3.5 Mg of wood. This is expected to be a reasonable estimate of the productivity of the ancient spruce forests of Banks Island. It is also of note that riparian forests in the area around Inuvik are as productive as many mid-latitude forests. The riparian forests grow quite fast due to the lack of permafrost, access to stream or ground water throughout the growing season, and the long period of sunlight.

**369****Fossils****Williams, Christopher**

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**File No:** 12 402 750**Licence No:** 13807**Region:** IN**Location:** Ballast Brook, Banks Island (74°20' N, 123°10' W)**PAST CLIMATES OF ANCIENT FORESTS ON BANKS ISLAND**

Abundant fossil plant remains are preserved in the mid-Miocene-aged deposits of the Ballast Brook Formation on Banks Island. Intact cones, logs, and stumps preserved in situ as mummified remains presented an opportunity to reconstruct the composition, structure, and productivity of a forest that once grew north of the Arctic Circle. The research team mapped and measured 76 tree stumps exposed in three dimensions on a 0.12 ha coal deposit. Pines and spruce dominated the forest. Stump diameters ranged from 6 cm to 56 cm (average = 30 cm). Estimates suggest that average tree height of the Miocene forest was 14 m and the largest diameter trees were approximately 22 m in height. Stem volume equalled 430 m<sup>3</sup> ha<sup>-1</sup> and stem biomass (assuming a wood density similar to modern spruce of 450 kg m<sup>-3</sup>) equalled 193 Mg ha<sup>-1</sup>. On a stand-average

COMPENDIUM OF RESEARCH IN THE NORTHWEST TERRITORIES — 2004-2005

basis, the annual ring width of the stem wood sampled in the field equalled 1.5 mm. Based on this ring width, a preliminary estimate for carbon sequestered aboveground as wood in these forests is 3.1 Mg ha<sup>-1</sup> yr<sup>-1</sup>. Thus, these were moderate biomass forests with moderate productivity typical of forests growing in cool temperate climates

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# GEOLOGY

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**370****Geology****Duk-Rodkin, Alejandra**

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**File No:** 12 404 606**Licence No:** 13835**Region:** DC**Location:** The area from Dahadinni River to the confluence of the Trail and Mackenzie Rivers, and in the mountains west of Wrigley Lake**SURFICIAL GEOLOGY OF THE MACKENZIE CORRIDOR**

The Southern Mackenzie region has a complex glacial history. The region was glaciated by two ice masses from two different sources the mountains to the west and the plains to the east. Stratigraphic and geomorphologic evidence indicate that the two glaciers occupied this region at a slightly different time during the Late Pleistocene. The eastern continental ice sheet (Laurentide) advanced over the foothills and up major valleys before montane valley glaciers reached their maximum or during their initial stages of development ca. 30 ka. This pattern of glaciation is the same one that affected central and Northern Mackenzie Mountains in the Late Pleistocene. However, while areas north of the 64th parallel have an excellent geomorphic and pre-Late Pleistocene stratigraphic glacial record, the southern areas have an excellent geomorphic and stratigraphic Late Pleistocene record. No old glaciation record has been found except in old glacial cirques developed in the outer ranges filled with Late Pleistocene Laurentide sediments. Ice provenance in the mountains were from various sources, valley glaciers from the continental divide, local ice caps developed in montane tops risen above the snow line during glaciation and from the Cordilleran ice sheets of Cassiar and Selwyn mountains. Ice provenance from the east (Laurentide) moved into the region in lobes and sub-lobes that moulded over the very irregular foothills to mountains topography.

The two ice masses caused major changes to the landscape of Southern Mackenzie region. The Laurentide Ice Sheet blocked the drainage of South Nahanni River causing the formation of a glacial lake that inundating approximate maximum area of 6 000 km<sup>2</sup> with an outlet to the south-west into Yukon Territory and the Pacific Ocean. Preliminary recordings of the thickness of lacustrine sediments at various sites east of Virginia Falls were observed to be between 110 to 120 m. The ice sheet reached Virginia Falls and lower Flat River. Shield granite erratics were found over 100 km behind the mountain front. During retreat of the continental ice sheet and advance of montane ice glacial, Lake Nahanni cut an outlet to the East at the locality of First Canyon. This outlet joined the north flowing drainage that eventually reached the Arctic Ocean. Another example of a major change was the damming of Redstone River. This occurred close to 22 ka BP which caused the eastern flowing river to change its course to the north. The channel incised through a highly folded and faulted terrain triggering landsliding that continues until today. The stratigraphic record of the region shows glacial lacustrine and deltaic sediments formed by the pre-advancing Laurentide Ice Sheet deposited over pre-Late Pleistocene east-flowing fluvial deposits containing organic rich over-bank deposits. A re-advance subsequently occurred in which westward and northward Laurentide tillites were overlapped by lacustrine sediments and another Laurentide till. In turn, a local montane till, devoid of shield erratics that extended as piedmont glaciers over Laurentide sediments, developed. Lacustrine and deltaic sedimentation of glacial Lake Mackenzie then occurred. Other montane glacier data suggest several inter-bedded local tills in middle North Nahanni Valley overlapped by a major outwash unit. No paleosols are present at their upper contacts; only a change in colour and flow direction has been observed to count for a different provenance.

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**File No:** 12 404 141**Licence No:** 13865**Region:** IN**Location:** Melville Island, Eglinton Island, Walker Inlet, Prince Patrick Island, and Banks Island**ENVIRONMENTAL CHANGE IN THE WESTERN ARCTIC**

During the 2005 field season, four camps were established on the Western Arctic islands to gather geological data that would help clarify the histories of sea level, glaciation and deglaciation both during, and after, the last glacial maximum (LGM) around 18 000 years ago. From July 1 – 30, 2005, two camps were established on north-east Banks Island. A group of researchers surveyed landscape features relating to former ice margins, such as moraines and melt-water channels, and former positions of sea level, such as raised beaches and deltas. Fossil shell material for radiocarbon dating was collected from these landforms and deposits that enabled the construction of a detailed chronology of events spanning the last 30 000 years. Though preliminary, results suggest that Banks Island was subjected to far more extensive glaciation during the past 30 000 years than had previously been envisaged. The distribution of abandoned ice-marginal meltwater channels, both mapped from air-photos and on the ground, suggests an integrated pattern of ice retreat across the whole landscape of northeastern Banks Island as opposed to only limited glaciation along the coastal margins. During deglaciation sea levels were as much as 80m higher than present along the north-western coast of Prince of Wales Strait due to the land having been depressed by the load of glacial ice.

From July 9 – August 2, 2005, another group of researchers conducted fieldwork out of two camps in the western Queen Elizabeth Islands: one located on northern Eglinton Island and the other in Marie Bay, Melville Island. Meltwater channels and other glacial landforms (e.g. moraines) were mapped on air photos and in the field and the provenance of glacial sediments (till) and erratics were assessed. Raised marine shorelines and sediments were also mapped and dated if they contained fossil marine shells or driftwood, especially those observed to be in contact with glacial landforms. Preliminary results suggest that Eglinton Island was indeed glaciated during the LGM, but additional field surveys are required on southern Eglinton Island to confirm this hypothesis. The composition of glacial sediments suggest that the source of LGM ice on Eglinton Island was not the western Melville Island Ice Cap, but rather a combination of the north-west sector of the Laurentide Ice Sheet to the south and local, island-based glaciers. Deglaciation began by ~12 000 years before present, and from ~12 000 – ~5 000 years before present, relative sea level fell, reflecting crustal rebound following deglaciation. From ~5 000 years ago to the present, relative sea level has been rising and continues to do so today. Seven fossil bivalve samples related to raised marine shorelines (11-30m above modern sea level) were collected and radiocarbon dated from Marie Bay. Together with the other ten radiocarbon dates collected from western Melville Island in 2003 and 2004, a detailed story documenting the timing and pattern of deglaciation and sea level change from LGM to present can be developed (to be discussed in C. Nixon's Ph.D. dissertation). Based on the radiocarbon dates from Marie Bay alone, sea level change from LGM to present was similar to that which occurred on northern Eglinton Island. Shorelines of the same age are higher on western Melville Island than they are on northern Eglinton Island however, suggesting some additional crustal rebound, most likely from the Melville Island Ice Cap. Additional surveying of raised marine shorelines on southern Eglinton Island is required to further develop this interpretation. Driftwood collected from Marie Bay ranged widely in age range and was more abundant than anywhere else on western Melville Island. This shows that Marie Bay is experiencing a rising sea level similar to the rest of the study region, and may also suggest that it became ice-free earlier than other locations, allowing mobile pack-ice to enter the bay and deliver driftwood from the Arctic Ocean.

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**File No:** 12 404 593**Licence No:** 13839**Region:** SA, DC**Location:** Greater Nahanni ecosystem, in the south-western part of the Sahtu Settlement Area and the north-western part of the Deh Cho Region**NAHANNI MINERAL AND ENERGY RESOURCE ASSESSMENT (MERA) 2**

The second and final field season of research into the Mineral and Energy Resources of the proposed expansion of the existing Nahanni National Park Reserve has been completed. Federal Government policy requires that a Mineral and Energy Resource Assessment (MERA) study be carried out for every new national park proposal. Four components to the project were completed.

A team of field workers used a helicopter to collect samples of stream and river sands and mud. Over 1 400 samples were collected from the Nahanni area and analyzed for 52 different elements. The chemistry of the sample when analyzed can give a summary of the rocks in the valley. For the second part of the study, a geologist collected water spring samples from 78 sites. The water composition carries clues as to what minerals the water dissolved along its path. The third part of the study was an airborne geophysical survey over three small portions of the Greater Nahanni Ecosystem: Prairie Creek area, Caribou River Area and the Cantung deposit area. The surveys help in mapping the geology of the area because the rocks host metal deposits that often have minerals that can be recognized due to their magnetic, conductive and radioactive qualities.

A total of 40 mineral showings were also examined by a geologist to identify and classify the different types of metal deposits in the region. The results of these studies will be published by the Geological Survey of Canada as an Open File scheduled for completion by October 2006.

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**File No:** 12 404 634**Licence No:** 13798**Region:** DC**Location:** North-western shore of Great Slave Lake near Windy Point**SEARCH FOR SPRINGS REPORTED BY MCCONNELL IN 1890**

Fieldwork cancelled.

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**374** **Geology****Jackson, Valerie**

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**File No:** 12 404 554**Licence No:** 13821**Region:** NS**Location:** 240 km NNW of Yellowknife

### **SOUTHERN BEAR PROVINCE GEOLOGICAL MAPPING PROJECT**

The Southern Bear Geological (bedrock) Mapping Project is focussed on an area ~240 km north of Yellowknife. It is planned that in three to four years, most of the ground within NTS map sheets 085B/4 and 5 and 086C/1-8 will be mapped under the project. The 2005 field season, the second for the project, started on June 12 and ended on August 25. Field mapping was focussed in the middle of the project area, and was completed out of three main base camps— on a lake due east of De Vries Lake (June), Mattberry Lake (July), and on a bay of Ingray Lake (August). In the approximately 10.5 weeks, ~30 % of the project area was mapped.

Rocks within the project area can be subdivided according to age: Archean rocks, older than 2.5 billion years and found mainly in the east, and younger Proterozoic rocks, between 2.5 and 0.6 billion years old, found in the west. Samples weighing about 20-25kg were collected to get precise ages on these rocks. Some of the Proterozoic rocks in eastern parts of the area, for example at Norris and Ingray Lakes, possess rusty zones (called gossans) that contain sulfide minerals. Other Proterozoic rocks near DeVries Lake contain alteration zones that elsewhere in the NWT are associated with copper, silver, and gold. Samples (about 1-2 kg) of the gossans and alteration zones were collected to see if they contain appreciable amounts of precious metals. To date, some of the samples have been found to contain elevated concentrations of Cu, W, Co, Ag, and Mn. These concentrations are reported in NWT Open Report 2006-002 available through the NWT Geoscience Office website. Technical results from the bedrock mapping project are presented at the Geoscience Forum held every November in Yellowknife, and are posted on the NWT Geoscience Office website.

In 2005, the project supported three B.Sc. thesis studies (University of Alberta, Carleton University and University of Ottawa) and a post-doctoral study (Memorial University).

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### **Geology**

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**Licence No:** 13878

**Region:** GW

**Location:** Peel Plateau and Plain

### **REGIONAL GEOSCIENCE STUDIES AND PETROLEUM POTENTIAL OF THE PEEL PLATEAU AND PLAIN**

The Peel Plateau and Plain has widespread hydrocarbon potential, and yet, it is under-explored and its geological history, poorly understood. The primary objective of this four-year project is to improve knowledge of the regional geology, including stratigraphic relationships, depositional and tectonic histories, basin evolution, and petroleum potential. This project is significant because much of the geological mapping in the area dates back to the 1960s and new geological knowledge in the North is necessary to stimulate petroleum exploration, industry investment, and economic development for the benefit of Northerners.

Ten days of geological reconnaissance work was conducted from July 27 to August 5, 2005 by geologists from the NWT Geoscience Office, Geological Survey of Canada and the Yukon Geological Survey. The first phase of research focussed on the examination of the geology exposed along the Dempster Highway, from Inuvik, NWT to Eagle Plains, YT. The survey gave an overview of rocks that range in age from Proterozoic Eon (1 billion years ago) to Cretaceous Period (142 to 65 million years ago), as well as landscape features created by Quaternary age (2 million years to 10 000 years ago) glaciations. Along the highway, the geology of 25 stops was documented in order to update data for a now out-of-print geological guide for the Dempster Highway. In addition, Paleozoic carbonates exposed in the Campbell Uplift around Inuvik were examined at quarries and on the north-west and south-east sides of Campbell Lake. Representative lithological samples of formations were collected and Paleozoic carbonates were sampled for microfossils.

Helicopter reconnaissance work covered four main map-areas: Trail River (NTS 106L), Snake River (NTS 106F), Ramparts River (NTS 106G) and Sans Sault Rapids (NTS 106H) along the western and southern edge of Peel Plateau (Richardson and Mackenzie Mountains, respectively). In total, 17 stratigraphic sections were examined spanning 16 different formations, ranging in age from Mesoproterozoic (900 million years ago) to Cretaceous (100 million years ago). Six of the sites represented type localities where formations were originally defined. During flight time, coordinates of several other sections were determined for future work. Preliminary collections from the key sections included: 1) representative lithological samples; 2) carbonate rock for microfossil analysis; and 3) black shale for organic geochemistry analysis. Collection of marine limestone for conodont microfossils provides data necessary to accurately date the different formations examined and improve correlation of rocks within the sedimentary basin. Analysis of the total organic carbon content of shale will provide a preliminary assessment of the hydrocarbon potential of different formations.

The entire rock succession represents different paleoenvironments that changed through time and space. In general, the older part of the succession up to about 380 million years ago represents deposition along a continental margin edge, where the ancient Pacific Ocean deepened westward toward the Richardson Mountains. After this, two mountain-building events created a foreland basin setting across the Peel Plateau and Plain region. Preliminary results from the microfossil and geochemical analyses are expected in late 2005 and these data and interpretations will be presented at future conferences including the Yellowknife Geoscience Forum.

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**376**
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**Licence No:** 13838

**Region:** SA

**Location:** Along the Canol Trail between Macmillan Pass at the Yukon border and the north-eastern edge of the Mackenzie Mountain barrens

**LONG-TERM ECOLOGICAL AND GEOMORPHOLOGICAL INVESTIGATIONS IN THE ALPINE TUNDRA OF THE MACKENZIE MOUNTAINS, NWT**

Approximately six days were spent in the field area in 2005. The main activities in the vicinity of Macmillan Pass and Camp 222 on the Tsichu River were to retrieve stored information from the five automated microclimate stations established in 1990, and check the depth of thaw on five permafrost landforms. One permafrost landform has dramatically deeper thaw depth and this feature is rapidly melting. Others have stable thaw depth on top but are melting from their edges. Based on these studies it is evident that the permafrost is warming ( $\sim 0.8$  to  $1^\circ\text{C}$ ), and melting continues at a rate of  $\sim 1\%$  of the area of permafrost landforms each year.

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## HEALTH

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**377****Health****Becker, Gisela**

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**File No:** 12 408 135**Licence No:** 13804**Region:** SS**Location:** Fort Smith

### **WOMEN'S EXPERIENCES OF CULTURALLY-SAFE BIRTHING WITH A MIDWIFE IN A REMOTE NORTHERN COMMUNITY**

This research investigated women's experiences of culturally-safe birthing with a midwife in a remote northern community. The study took place during a time of change in the community, namely during a renewal of community birthing and re-emergence of midwifery practice. An ethnographic approach was used to examine the research topic; unstructured and semi-structured interviews were conducted with women, specific to their personal experiences and understanding of childbirth. The study found that women's experiences were considerably influenced by the realities of remote living. For women who left their home community to deliver in the regional centre, birth developed into a stressful event. The reported stresses were related to a number of reasons: uncertainties with regard to care received at the regional centre, separation from support systems and the home community, and an increased financial load. Other findings from the interviews included an awareness of risks and risk assessment, interviewees' acknowledgement of their remote location, and the importance of having a local birthing program and midwifery care in the community. The study identifies the need to support and sustain community birthing programs and maternity care providers in remote settings. Multidisciplinary collaborative care models and a developing midwifery profession are key strategies to improve the sustainability of remote maternity care programs.

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**File No:** 12 408 136**Licence No:** 13830**Region:** NS**Location:** Rae-Edzo

### **HEALTH RESEARCH: ACCESSIBLE, APPLICABLE AND USEABLE FOR RURAL COMMUNITIES & PRACTITIONERS**

During the fall of 2005, eight interviews were conducted in Rae-Edzo among volunteer community members and health professionals. The interviews were conducted by Theresa Belcourt (under the direction of Pertice Moffitt, RN, MN, Aurora College Health Program Instructor).

The interviews from Rae-Edzo were part of a larger study being carried out across the following two territories and five provinces: NWT, Nunavut, British Columbia, Alberta, Manitoba, Nova Scotia, and Newfoundland and Labrador. Interview participants were asked about: internet availability in their communities; how they access health information; how they define research; and whether the available health research is relevant and accessible to them.

The interviews are currently being transcribed from audiotapes to paper and will be analyzed for common themes by the research team. Once the interviews have been fully examined, a final report will be produced

and disseminated to participants, health agencies and the public. The larger study will be completed in 2008, with a final report released by 2009.

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**379** **Health**

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**File No:** 12 408 128

**Licence No:** 13837

**Region:** SA

**Location:** Deline

**CULTURAL MODELS, CONCEPTS, AND PRACTICES IN DENE HEALTH AND HEALING**

This community-university research partnership was initiated by the Deline Uranium Team. The Deline Land and Financial Corporation, Deline First Nation and ʔehtséo Ayha school are partners and supporters. The project involves working to understand Sahtúot'ine concepts of health, healing traditions, and how they can be better integrated into community planning, education and policy. University researchers and students worked in close collaboration with Déline researchers, Elders and youth to document local plant medicine knowledge and practice. A four-day "Plants for Life!" camp was held at Russel Bay, where the research team recorded information shared by elders about several plants (including their traditional medicinal uses) found along the shores of Great Bear Lake. Approximately 35 people, both young and old, attended all or part of the "Plants for Life!" camp. More than 15 hours of video footage was taken during the summer, including recordings of stories related to plants and the use of plant medicines both on the land and in the community of Déline. It is hoped that these stories will aid in better understanding the knowledge connected with plant medicines as well as how they are prepared and used.

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**380** **Health**

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**Licence No:** 13917

**Region:** IN

**Location:** Inuvik

**SURVEILLANCE AND MANAGEMENT OF CLIMATE CHANGE IMPACTS IN THE NORTH: IMPLICATIONS FOR NORTHERN PUBLIC HEALTH POLICY AND INFRASTRUCTURE**

Funded primarily by ArcticNet, this action research project focuses on the four Canadian Inuit regions (Nunatsiavut, Nunavik, Nunavut and the Inuvialuit Settlement Region). The theme of the project is the protection of human health from the impacts of climate change (e.g., influence of climate change on key animal populations which people harvest for food; "transport" of certain diseases into the region by insects and animals; instable shorelines on which people build their houses; and the more direct effects of extreme, unpredictable and highly changing weather conditions). More specifically, the project seeks to work with Northern managers, organisations and individuals to assess the current state of, and then build the capacity of, the public health surveillance system in response to climate change-induced health effects.

The project has experienced some significant delays and is currently on hold.

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**File No:** 12 408 133**Licence No:** 13743**Region:** NS**Location:** Rae-Edzo**GENETIC STUDY OF BARDET-BIEDL SYNDROME AND RELATED DISORDERS**

Fieldwork cancelled.

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**382 Health****Jardine, Cynthia**

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**File No:** 12 408 131**Licence No:** 13783**Region:** NS**Location:** Ndilo and Dettah**COMMUNICATION AND UNDERSTANDING OF HEALTH RISKS IN NORTHERN ABORIGINAL COMMUNITIES**

The study was undertaken to develop better insights into the communication and understanding of various types of health risks in the Yellowknives Dene First Nation communities of Ndilo and Dettah. A participatory approach was used that included community members as partners. Information was collected using both questionnaires administered by trained community fieldworkers and photovoice.

Results show that people are concerned about a number of things that may be affecting their health or the health of the people in the community. The risks regarded as most dangerous are those involving alcohol, drugs and tobacco. People are also concerned about contamination of their land and water, particularly from mining activities, and do not always trust the sources where they obtain most of their health information. It would seem that other than requiring better information about risks, people also need to find ways to deal with risky behaviours (such excessive drinking, drug abuse and smoking) and risks stemming from changes to their environment. The results of the study were provided to the study participants, the Yellowknives Dene First Nation Band Council and the communities of Ndilo and Dettah in April 2006.

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**383 Health****Kuhnlein, Harriet**

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**File No:** 12 408 067**Licence No:** 13825**Region:** GW**Location:** Fort McPherson**GWICH'IN TRADITIONAL FOOD FOR HEALTH**

This is Year 1 of a three-year research project, focusing on young women and children. The main intent of the study is to create a sustainable, community-driven base of activities that will support improving the diet of the entire Tetlit Gwich'in community. The questions this study addresses are: Can the diet be improved over a two to a two and a half-year program of food-based interventions? What impact does this have on the

health of the community? 3) What activities can be implemented that will enhance use of traditional food? What activities can be implemented that will improve accessibility and use of good quality market food, particularly perishables such as fruits, vegetables and dairy products? What activities will sustainably reduce demand for low nutrient-dense foods, especially sugary beverages, particularly by young and school-aged children?

Data collected during the research will be returned to the community for their assistance in interpretation. A one-page plain language summary will be prepared in both English and Gwich'in for community residents. The researchers will follow usual community protocols for sharing project results.

**384****Health****Williams, Boyce**

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**File No:** 12 408 122**Licence No:** 13881**Region:** DC**Location:** Hay River**HEALTH BEHAVIOUR IN SCHOOL-AGED CHILDREN SURVEY**

The survey consists of a national unweighted sample of students in Grades 6-10, and requires one class in each of the grades from the NWT, and the initial sample included two schools, Princess Alexandra School and Diamond Jenness Secondary School, to make up the five classes.

As anticipated, the communication at the school level was quite drawn out, subsequent to receiving the licence to perform the research work in the NWT. Initially, Princess Alexandra School declined to participate in the survey; however, the school finally returned six completed photocopied questionnaires to the research team. Communication with Diamond Jenness Secondary School was conducted under an extension to the original licence. Questionnaires were sent out to the school, but near the end of the school year, the research team was informed that they were not completed. This was evidently due to there being some confusion with other research in which the school was involved. Failure to complete the survey was by no means unique to this territory; a number of schools in other jurisdictions also did not complete the surveys after agreeing to do so.

In total, six NWT students are part of the approximately 10 000-participant national sample. Data entry and analysis will be carried out in the summer and fall of 2006.

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## PHYSICAL SCIENCES

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**File No:** 12 404 654**Licence No:** 13905**Region:** NS**Location:** Baker Creek, Giant Mine, Yellowknife**SEDIMENT INVESTIGATION OF BAKER CREEK, GIANT MINE**

The aims of the study are to: determine the spatial extent of sediments enriched by tailings solids; characterize the physical and geochemical characteristics of contaminated sediments in Baker Creek; and determine the extent to which arsenic and other elements of concern in these materials can be remobilized into the water column. The Giant Mine project website and the Giant Mine Community Alliance will assist in communicating the results of this investigation. Other communications efforts include ongoing public information sessions, technical workshops, a display in a Yellowknife shopping mall, educational materials and an extensive public reference library. Information generated from the investigation will be available to the public through the Giant Mine Remediation Project.

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### 386 Physical Sciences

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**File No:** 12 402 745**Licence No:** 13758**Region:** IN**Location:** Kendall Island Bird Sanctuary, Mackenzie Delta region**ENVIRONMENTAL SOIL CHEMISTRY AT ABANDONED DRILLING MUD-SUMPS IN THE KENDALL ISLAND BIRD SANCTUARY, MACKENZIE DELTA REGION**

Fieldwork cancelled.

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### 387 Physical Sciences

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**File No:** 12 404 576**Licence No:** 13866**Region:** IN**Location:** Beaufort Shelf (survey area bounded by: 131°W to 141° W and 69°30'N to 71°N)**BEAUFORT SHELF SEABED MAPPING PROJECT**

In August-September 2005, the Geological Survey of Canada in collaboration with the Canadian Hydrographic Service conducted a seabed mapping program from the Canadian Coast Guard vessel NAHIDIK. Research was focused on investigating geoenvironmental and engineering issues related to offshore hydrocarbon exploration and transportation. Of the 212 new ice scours mapped on the seabed in 2005, nine were extreme events with scour depths ranging from 2 to 3.4 m and 15 were generated by large

pressure ridges with keel depths of 25.1 to 27.1 m. Gas vents first mapped in 2001 were observed to be infilled in 2004. The resurvey in 2005 revealed the vents to be active again as the infill had been blown out. Comparison of mud volcanoes mapped in 2004 and remapped in 2005 indicated that at least one of the 97 features grew by 30 cm over the last year. Whale maw marks in the seabed indicate possible bottom feeding by bowhead whales in the same area as the mud volcanoes. The abandoned artificial island, Nipterk L-19, was first surveyed in 2001 then again this year. Resurvey results indicate the island is still actively eroding after 20 years and has migrated 32m southeastward in the last four years. A new digital multichannel receiving array successfully imaged both shallow gas and permafrost in the sediments below seabed. The marine mammal monitoring program resulted in only a few sightings.

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**388** **Physical Sciences**

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**Region:** NS              **Location:** Lac de Gras/Diavik

**WASTE ROCK STUDIES AT A DIAMOND MINE SITE**

The discovery of diamonds in Canada's North has led to renewed interest in the development of mining properties in the Arctic. At the Diavik Diamond Mine, open pit mining will lead to the development of two 200 Mt permanent stockpiles of waste rock. The study involves the construction of two large-scale experimental waste rock piles (15 m in height × 60 m × 50 m) to measure water flow, water chemistry, rock temperature, and how the waste rock changes over time. In 2005, the initial stages of constructing these test piles were completed. Construction of the test piles will be completed in 2006. Both test piles will contain rock with very low concentrations of sulfide minerals, typical of the rock present at the Diavik site. One test pile will contain rock with a sulfide content of < 0.04 wt% S and the other test pile contains rock with > 0.8 wt% S. Laboratory studies involving small test samples have also been initiated. The results from this five-year study will assist mining companies and regulators in evaluating current waste rock pile designs.

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**File No:** 12 404 618      **Licence No:** 13822  
**Region:** SA              **Location:** Flybye Springs

**MINERAL PRECIPITATES AT FLYBYE SPRINGS, NWT**

Fieldwork at the Flybye Springs (64° 17.8', 130° 33.2') was conducted on August 23, 2005. Spring water temperature, pH, dissolved oxygen content and conductivity were measured in situ. Water, mineral and microbial samples were collected in sufficient number to represent the variability, observed at the spring site and to allow comparison with samples collected in 2004. On August 24, the field team, accompanied by GNWT Department of Environment and Natural Resources wildlife technician, Richard Popko, toured other springs in the Sahtu region to investigate locations for future research. One water sample and 1–5 mineral samples were collected from Bifort Springs (64° 38.9', 129° 12.4'), Moonscape Springs (64° 31', 129° 15'), Landing Strip Springs (64° 17.1', 129° 42.8'), Tuitye Springs (63° 08', 129° 51'), Sculpin Springs (63° 56', 129° 18') and Lymnae Springs (64° 08', 128° 25').

Water and gas samples were analyzed by mass spectrometry; mineral and microbial samples are undergoing

light and scanning electron microscopy, electron microprobe and neutron activation analysis. Preliminary results of this research were presented at the 1st International Travertine Symposium in Denizli, Turkey. A research poster summarizing these findings has been prepared for the Sahtu Renewable Resources Board. Geochemical and mineralogical data have been forwarded to the Sahtu Environment and Natural Resources Department in Norman Wells.

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### 390 Physical Sciences

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**File No:** 12 404 325

**Region:** IN, GW

**Licence No:** 13784

**Location:** Garry Island, Illisarvik, and air-temperature stations at Red Lake, Seal Lake, Bar C, and Dennis Lagoon

#### PERMAFROST INVESTIGATIONS IN WESTERN ARCTIC CANADA

In 2005, work in the Western Arctic was concentrated at four locations— Garry Island, Herschel Island, Illisarvik, on Richards Island and near Paulatuk. At both Garry and Herschel islands, ground temperature was collected from a series of sites along hill slopes to measure the annual temperature in permafrost at places where the snow depth is different. The snow depths are usually low at the top of these slopes and much deeper at the foot of the slopes. Results from Garry Island show that the permafrost has warmed by about 1°C since the 1970s, the increase being greatest where there is less snow. These measurements will be continued next year. Due to climate change, it is expected that the snow depth will increase in the Western Arctic, so by collecting data this way, it might be possible to predict how much warmer the ground will become. Results from Herschel Island show that deep ground temperatures, well below the depth where temperature varies each year, have warmed up by about 2°C since 1970.

The research team continued to work at a site on the Dempster Highway near the Inuvik Airport, where the movement of the ground as it warms and cools over the year is being studied. In June 2004, a ground monitoring temperature cable was installed at the site, which will also assist in monitoring changes in ground temperature as the climate changes. It seems that the ground temperature near Inuvik is close to, but above, -2°C, about 5 °C warmer than at the coast. In the delta near Inuvik, the ground is cooler at sites where the trees close the canopy and the snow is not deep in the winter.

At Paulatuk, the researchers finalized some studies of the wind-blown rocks. A paper discussing these observations, which Dr. Ross Mackay started 52 years ago, will be ready for publication next year.

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### 391 Physical Sciences

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**File No:** 12 404 631

**Region:** NS

**Licence No:** 13873

**Location:** Ingraham Trail

#### MAPPING AND MODELING CARBON FLUX IN NORTHERN CANADA RELATED TO LAND USE CHANGE

During the summer of 2005, scientists from the Earth Sciences Sector, Natural Resources Canada carried out field measurements of land use change and carbon stock around the Yellowknife and Lupin Gold Mine areas. These field data, with those obtained along the Dempster Highway in the summer of 2004, were used to calibrate and validate the estimation of land use change and associated greenhouse gas removal/emission over

Canada's North. The northern areas cover about half of Canada's landmass and store a huge amount of carbon, the release of which could significantly accelerate climate change. The Intergovernmental Panel on Climate Change (IPCC) "Good Practice Guidance for Land Use, Land Use Change and Forestry" recommends nations to report greenhouse gas inventories for all lands. Due to lack of data, Canada's previous United Nations Framework Convention on Climate Change (UNFCCC) reports did not include a greenhouse gas inventory for areas north of the forest line. This research filled the information gap, and was included in Canada's 2006 report to the UNFCCC. Details of this study were described in the two final reports to the Greenhouse Gases Division (Chen et al., 2006; Fraser et al., 2006).

### 392 **Physical Sciences**

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**Licence No:** 13826

**Region:** SS

**Location:** Deep basins of Great Slave Lake

#### **GLACIAL HISTORY OF GREAT SLAVE LAKE, NWT, CANADA**

The aim of this research project is to reconstruct the glacial history of Christie Bay, which is the deepest sector of the Great Slave Lake. This is of particular interest to the researcher due to the possibility that the deepest part of the lake once contained a large subglacial lake, formed during the last glacial period when a thick ice dome covered the Slave region. Subglacial lakes are mainly known from the Antarctic continent, which has remained glaciated for millions of years. Glaciologists are interested in subglacial lakes because they may be an important part of the growth and collapse of ice sheets. They may also contain unique and unknown ecosystems.

In the summer of 2005, the research team conducted a seismic survey in Christie Bay. Acoustic sounding was used to obtain information about the vertical and horizontal distribution of glacial sediments in the deep trough. Several hundred metres of fine-grained lake sediment was discovered; the origin of the sediment is thought to be related to a subglacial lake.

Next year, the research team plans to conduct further geophysical surveys, which are needed in order to understand the physical diversity of the fine-grained lake sediment. With these new data, and detailed topographic mapping of the lake floor, it will be possible to confirm the presence of a subglacial lake 20 000 years ago. The research team also intends to use posters to communicate the results of this scientific study with the Lutsel K'e community.

### 393 **Physical Sciences**

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**Licence No:** 13852

**Region:** GW, SA

**Location:** along the proposed gas pipeline route between Norman Wells and Inuvik

#### **REGIONAL TERRAIN HAZARDS MAPPING**

This project, which focuses on regional landslide hazards mapping, is intended to: 1) provide baseline knowledge on types, regional distribution, and control of landslides through a compilation of existing and new information; 2) assess the potential impacts of hydrocarbon development on slope stability conditions and occurrence of landslides and the influence of landslides on infrastructure and critical facilities; 3) monitor

zones of potentially unstable slopes along the pipeline route using remote sensing technologies; and 4) assess the potential influence of environmental factors (e.g., climatic parameters, forest fires) and recent climate variability on the frequency and magnitude of landslides. The study area encompasses a corridor extending 20 km to either side of the proposed pipeline route between Inuvik and Norman Wells for a length of 540 km and an area of 24 000 km<sup>2</sup>. The study area also includes the Rampart Zone (south-west of Fort Good Hope) and the Thunder River region, both known for widespread landsliding. The study area is characterized by cold winters with low precipitation and relatively warm summers with moderate precipitation.

Using classical photo-interpretation techniques, a preliminary inventory of over 1 800 landslides and other natural terrain hazard features (e.g. karstic sink holes, rock glaciers) has been created for the study area. At present, about 40% of the study area has been mapped using 665 colour air photos (scale of 1:30 000) acquired in 2004. For all of the 1 800 landslide entries in the landslide database, the following attributes were recorded: landslide type and size; location; morphological parameters; surface tone and texture; vegetation re-growth in landslide scar; relative age; activity; material type; flight line; air photo number; and topographic map sheet number. A collection of several hundreds of photographs of landslides, taken while carrying out field campaigns, completes the database. From the database attributes, desktop landslide mapping and statistical analyses as well as detailed investigations at eight landslide sites throughout the valley were performed to characterize the landslide distribution. Preliminary results indicate an average density of one landslide per 5 km<sup>2</sup> and show that the dominant landslide types are retrogressive thaw flows (28%) and active layer detachments (26%). Rock falls (11%), debris flows (10%), earth slides (9%), and retrogressive thaw slides (5%) are second in order of importance. About 47% of all landslides took place in morainic deposits. The relative age of landslides was estimated based on tone, texture, and vegetation re-growth parameters, where 38% were classified as old (>50 years old), 40% intermediate (10-50 years old), and 22% recent (<10 years old).

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**394****Physical Sciences****De Pascale, Gregory**

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**File No:** 12 404 321**Licence No:** 13920**Region:** NS**Location:** Carat Lake Esker and delta, Izok Lake Esker, BHP Koala Airstrip Esker, Misery Lake Esker, Diavik (East Island)**MASSIVE ICE IN GRANULAR DEPOSITS- SHIELD SITES**

Fieldwork cancelled.

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**395****Physical Sciences****Derksen, Chris**

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**File No:** 12 404 641**Licence No:** 13772**Region:** NS**Location:** Snare and Yellowknife basins**AIRBORNE PASSIVE MICROWAVE SURVEYS OF THE SNARE AND YELLOWKNIFE BASINS TO ESTIMATE SNOW WATER EQUIVALENT**

Surface snow measurements and airborne passive microwave data were acquired during April 2005 in order to develop methods to convert satellite passive microwave measurements into snow water equivalent (SWE)

estimates. SWE represents the amount of water stored by the snowpack that is eventually released during spring melt. Very few SWE measurement sites exist across high latitude regions of Canada, so satellite data represent the only means to acquire this information. Airborne data from a Twin Otter aircraft were acquired over the Snare and Yellowknife river basins. At the same time, detailed ground measurements of snow depth, density, water equivalent, and grain size were made at points along the flight lines. Personnel from Environment Canada, NWT Power Corporation and Indian and Northern Affairs Canada participated in making the ground measurements. Relationships between the snow cover properties and airborne data are presently being explored, and these results will subsequently be applied to satellite measurements. The satellite data extend back to 1978, so progress in developing these datasets will produce a historical record of SWE that will show variability and change in snow cover over time.

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**396** **Physical Sciences**

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**Licence No:** 13806

**Region:** IN

**Location:** South-west coast of Banks Island

**EFFECTS OF CLIMATE CHANGE ON COASTAL GEOMORPHOLOGY AND BENTHIC BIOTIC COMMUNITIES, SOUTHWESTERN BANKS ISLAND**

This project assessed effects of climate change on coastal erosion and nearshore marine biology on southwestern Banks Island. Coastal surveys in 2005 included 31 coastal and bathymetric profiles, from Cape Kellett to Sachs Harbour. Coastal bluffs are undergoing retreat, particularly west of Sachs Harbour, where the bluffs are exposed to higher energy conditions and sediments are finer grained. Thermal erosion plays a major role in coastal retreat, as melting ground ice causes slumping and creep of material to the base of slopes. A small rain/wind/wave event caused a minor increase in overland flow-induced sedimentation, but a much larger event would be necessary to removed slumped material from the base of cliffs. Bluffs in the eastern section of the Sachs Harbour hamlet area are also eroding.

Marine biological surveys from 70 stations were used to construct a shallow marine habitat map. Shallow (<10 m) nearshore highly mobile rippled sand sheets with low benthic abundance and biodiversity were the dominant habitat in Thesiger Bay. Deeper (10-30 m) offshore or gravel environments hosted a more diverse fauna of clams, worms, and sand dollars. The most diverse environments in the study area were deep (>20 m) lake basins in Sachs Harbour itself, which hosted tube-dwelling anemones in addition to tunicates, bivalves, polychaetes, and echinoderms. Deep (>20 m) poorly circulated basins in the Sachs Harbour estuary were anoxic, and were devoid of benthic life.

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**397** **Physical Sciences**

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**Region:** NS

**Location:** Exeter-Daring-Yamba Lake catchment, Coppermine River Basin

**ASSESSING SNOWPACK WATER EQUIVALENT DISTRIBUTION IN THE EXETER-YAMBA-DARING LAKE CATCHMENT, COPPERMINE RIVER BASIN, NWT, USING IN-SITU SNOW SURVEYS AND VARIOUS SCALES OF PASSIVE MICROWAVE REMOTE SENSING DATA**

During the April 2005 field campaign, surface, airborne and satellite passive microwave datasets were

acquired with spatially and temporally correspondent snow cover data. This unique, multi-scale data set represents a key contribution to the development of a tundra snowpack water equivalent (SWE) retrieval algorithm. Data were acquired along a gridded pattern of flight lines over an area that corresponded to a single spaceborne passive microwave grid cell. By flying the same lines at three heights, a dataset with three spatial resolutions was collected (~50 m; ~250 m; ~500 m), ideal for examining scaling relationships between surface terrain types and satellite brightness temperatures. Airborne data were also acquired along regional flight lines surrounding the grid experiment site. These lines were selected because they characterized regional terrain and land cover surface conditions. Ground radiometers identical to those on board the Twin Otter aircraft were deployed in the vicinity of Daring Lake. Low-level flights were conducted over selected radiometer locations for both radiometer calibration purposes, and to further address scaling issues. Ground measurements of snow cover properties were acquired in conjunction with each of the four airborne datasets outlined previously. At fixed intervals along flight lines, and at specifically defined points of interest, SWE and bulk snowpack density measurements were taken using ESC-30 snow cores. Snow depth was characterized with randomly located (within-site) probe measurements, and a snow pit was excavated to determine vertical density profiles, snow crystal types and size, and snowpack stratigraphy.

Surface water sampling to understand and quantify the spatial and temporal contribution of snowmelt water to surface water bodies was also initiated in April 2005. Samples were taken from each of the primary contributing sub-basins and major lakes in the 2 500 km<sup>2</sup> in the Exeter-Yamba-Daring Lake study basin. These samples are currently being analyzed for stable isotopes of hydrogen ( $^2\text{H}$ ) and  $^{18}\text{O}$ . Snowpack samples from several sites within the large basin were also extracted and are being analyzed for  $^2\text{H}$  and  $^{18}\text{O}$ . At the latitude of the study basin there is recognized significant difference between the stable isotope ratio of the snowpack and the pre-melt event surface water. The Water Survey of Canada continuously monitors the discharging river draining this basin. As such, it is possible to mathematically separate the snowmelt water component from the total basin discharge. In-situ snow surveys conducted in April 2005 will enable a reasonable estimation of the total SWE in the basin before the melt period. This, combined with stable isotope data, makes it possible to quantify the annual fraction of snowpack water retained on the terrestrial portion of the system.

**398****Physical Sciences****Etty, Craig**

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**File No:** 12 404 648**Licence No:** 13858**Region:** IN**Location:** Muskox D-37 and Parker River J-72 sump sites on Banks Island**HISTORIC SUMP SITE ASSESSMENT**

The objective of this program was to assess the environmental conditions of two drilling waste sumps located in the north-eastern area of Banks Island. The locations are known as Parker River J-72 and Muskox D-87, originally drilled in 1979 and 1981, respectively.

On August 8, 2005, the Parker River J-27 site was assessed using the Environmental Studies Research Funds (ESRF) "Protocol for the Assessment of Drilling Waste Sumps." Activities included: surface water and soil sampling; site photography; active layer measurements; and physical assessment of the site conditions. The overall condition of the site and associated drilling sump was positive. There was no evidence to suggest or confirm that the sump had failed or that there was any loss of containment.

The original plan was to assess the Muskox D-87 site the following day. Unfortunately, due to poor weather, the site could not be accessed and the assessment could not be completed. The project team was, however, able to visually inspect the site from air and obtain site photographs. Overall, the site looked positive. There

was no evidence to suggest sump failure or loss of containment from the sump, the overall visual appearance of the site seeming favourable.

No further work in this area is planned for 2006. A summary report on the overall condition of these two locations, once finalized, will be sent to the Aurora Research Institute.

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### 399 Physical Sciences

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**File No:** 12 404 399

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**Region:** IN

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

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

Coastal surveys were undertaken at Sachs Harbour, Tuktoyaktuk, Shingle Point and at several locations along the Mackenzie Delta front in the vicinity of proposed industrial development. Coastal change was measured at these sites for comparison with data from previous years in order to monitor the impacts of changing environmental conditions. High-resolution digital topographic data were validated and used for flood risk assessment at Aklavik, Tuktoyaktuk, Shingle Point, and the outer delta. These data provide a baseline for measuring impacts of development and provide information for emergency planning. Data have been provided to the RCMP at Tuktoyaktuk and will be transferred to communities when validation has been completed. Sidescan sonar and swath bathymetry data were acquired in very shallow water along the delta front and are being used to assess the risks to nearshore pipelines in anticipation of offshore development. Synthetic aperture radar was used to map nearshore water depths to map channels and over-wintering fish habitat. GPR was acquired in the shallow delta-front area to better understand how shoals form and erode in the delta region. Ground temperatures are being recorded in zones of bottom-fast ice to assess the extent of seabed permafrost growth and degradation.

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### 400 Physical Sciences

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**Region:** IN

**Location:** Mackenzie Shelf–Amundsen Gulf area

#### ARCTICNET THEME 1: INTEGRATED REGIONAL IMPACT STUDY OF THE COASTAL WESTERN CANADIAN ARCTIC

The main objective of ArcticNet's 2005 research expedition in the Western Canadian Arctic was to service and redeploy oceanographic moorings in the Amundsen Gulf/Mackenzie Shelf region. Some of these moorings have been deployed since 2002 as part of the Canadian Arctic Shelf Exchange Study (CASES). Each of the four mooring lines successfully deployed in September 2005 was fitted with instruments designed to gather continuous records of currents, temperature, conductivity, turbidity, dissolved oxygen and the vertical flux of carbon and contaminants. Two moorings were also equipped with autonomous hydrophones to record the acoustic background and the vocalizations of marine mammals. As part of ArcticNet, these moorings are intended to be deployed until 2018. The data from these long-term marine observatories will provide in-depth information on the annual cycle of biological productivity, on the processes (e.g. timing of ice break-up, Mackenzie River runoff, winds) that regulate the offshore fluxes of carbon and contaminants

from the atmosphere to the deep ocean and on the diversity and distribution of marine mammals within the study area. A myriad of physical, biological and geological measurements was also taken at sampling stations distributed throughout the coastal Western Arctic. Between stations, the ship's continuous sampling equipment assured the monitoring of surface water properties, sea surface microwave and optical properties, zooplankton and fish abundance, water depth and atmospheric contaminants and herbicide levels. From viruses to whales and from the upper atmosphere to beneath the ocean floor, the diversity of data amassed in 2005, in years past and in years to come is sure to provide added insight into how the Arctic Ocean is responding to climate change.

**401****Physical Sciences****Grasby, Stephen**

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**File No:** 12 404 634**Licence No:** 13799**Region:** IN**Location:** Prince Patrick Island, at two sites located at about 76°08'00"N, 120°03'10"W, and 76°12'22"N, 120°07'30"W**EXAMINATION OF CARBONATE MOUNDS ON PRINCE PATRICK ISLAND, NWT**

Fieldwork was successfully conducted in July 2005 on Prince Patrick Island. A small two-man camp was established from which the fieldwork sites were visited by foot. The goal of this work was to examine carbonate mounds previously reported in the Walker River area. A traverse was made to the reported location of the northern mound, but as extensive snow banks covered it, work on that mound had to be abandoned. The southern mound was well-exposed and the excellent weather conditions allowed a thorough study of it. The area was measured and described in detail. Initial results suggest that these mounds represent an ancient deep-water methane seep similar to those found on the Gulf of California in present times. Numerous samples representing key aspects of the carbonate mound were also collected. The samples are being processed for analyses, and will be stored as part of the Geological Survey of Canada's collection. Results of the analyses may take another year to finalize.

**402****Physical Sciences****Guo, Laodong**

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**File No:** 12 404 629**Licence No:** 13791**Region:** IN, GW**Location:** East Channel of Mackenzie River near Inuvik**CLIMATE GEOCHEMISTRY**

The purpose of the 2005 field season was to collect two riverine organic carbon samples (in three different phases: dissolved, colloidal, and particulate) from the Mackenzie River. One sample was obtained from beneath the river ice and the other, in June/July when the river was ice-free. Determination of the concentrations of these organic carbon species in the Mackenzie River waters have been made, along with other water chemistry parameters; characterization of stable isotope composition has been completed, including stable carbon and nitrogen isotopes as well as radiocarbon abundance to determine their radiocarbon ages. In addition, examination of the source and transport mechanism of these organic carbon species in the Mackenzie River during frozen and open seasons will be examined. The results from the Mackenzie River samples will be compared to results from the Yukon River and other northern Alaska arctic river water samples, with the aim of studying the organic carbon dynamics in the Arctic river basins and

fluxes across the arctic land/ocean interface in a changing climate. The research team plans to continue sampling in the Mackenzie River Basin if funds are available in the coming years. Preliminary results have been presented at the 2006 American Geophysical Union's Western Pacific Geophysical Meeting and the Earth System Science Partnership Global Environmental Change Open Science Conference in Beijing.

**403 Physical Sciences**

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**Region:** DC      **Location:** Hay River, approximately from Enterprise to the Town of Hay River

**HAY RIVER ICE JAM STUDY**

The research program in 2005 involved field observations along the Hay River, and in and around the town of Hay River during the period of river ice breakup (April 20 to 26). Water levels were measured along the river bank at key sites, and the instrument set-up at the Town's fire hall last year measured the intensity of sunshine occurring in Hay River (important to the nature of river ice breakup). Video and photographs were taken to document the breakup progression both from the ground and from a small plane (chartered locally). River breakup in 2005 involved a number of ice runs and the formation of ice jams in both the East and West Channels. In August 2005 river channel surveys were conducted with help from the Department of Fisheries and Oceans (DFO), and with advice and cooperation from the Hay River Dene Band. Excellent data was obtained from the fieldwork as well as from the Flood Watch Committee for the computer model the research team is developing. Data from the river channel surveys was particularly valuable in considering the historical and current water and ice flow patterns in the various sub-channels of the East Channel, and to begin exploring the issue of sedimentation in the West Channel. This survey is estimated to be completed in the summer of 2006.

**404 Physical Sciences**

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**File No:** 12 404 603      **Licence No:** 13886  
**Region:** NS      **Location:** Ryan Lake, Pontoon Lake, Cameron River, and Tibbet Lake

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

The objective of this Ph.D. project is to determine the effect of Great Slave Lake on air and surface temperatures, and permafrost conditions. In 2005, the study sites along the Ingram Trail that were instrumented with air and surface temperature sensors during the summer of 2003 were revisited. At each site, data loggers were downloaded, re-launched and the batteries, replaced. Active-layer depths were measured and the thermal properties of the ground monitored. Snow surveys were conducted in six-week periods during the winter of 2005/2006 to determine the depth and density of the snow pack.

**405 Physical Sciences**

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**File No:** 12 404 515  
**Region:** IN

**Licence No:** 13763  
**Location:** Melville Island Ice Cap

#### **MASS BALANCE OF ARCTIC GLACIERS**

A part of an ongoing program that began in the early 1960s, this study is concerned with glacier health and climate change monitoring in the High Arctic. Fieldwork was conducted on the Melville Island Ice Cap for a duration of three days. Poles drilled into the ice were measured to detect the changing level of ice and snow, and a year-round record of temperature and snowfall was obtained from an automatic weather station on the ice cap. Additionally, small samples of snow (~ 100 g) were collected from different locations on the ice cap to check for acid/pollutants in the snow.

**406**

#### **Physical Sciences**

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**File No:** 12 404 545  
**Region:** IN

**Licence No:** 13748  
**Location:** Kendall Island Bird Sanctuary, Mackenzie Delta region

#### **ENVIRONMENTAL CONDITIONS AT ABANDONED DRILLING MUD-SUMPS IN THE KENDALL ISLAND BIRD SANCTUARY, MACKENZIE DELTA REGION**

In March and August 2005, environmental information was collected from seven abandoned drilling-mud sumps in and adjacent to the Kendall Island Bird Sanctuary, Mackenzie Delta region. Snow cover, vegetation cover, ground ice, and ground thermal data were collected to investigate potential relationships amongst these variables and to determine the effect of vegetation on winter snow accumulation and ground thermal conditions.

Preliminary results of the field investigations show that: 1) sump caps are positive relief features that promote the accumulation of snow at the perimeter; 2) the growth of tall standing vegetation (shrubs) on the sump cap will promote snow accumulation; 3) there is a relationship between snow depth and temperature at the bottom of the snowpack at the study sites— in March 2005, snow depths greater than about 100 cm were associated with subnivean temperatures warmer than -5.0°C; and 4) thick snow accumulation can retard ground-heat loss in winter— perennial snow accumulation around the perimeters and on the tops of sump caps with tall shrubs can warm the permafrost and increase thaw depth.

Data collection will continue in 2006, with field programs scheduled for March and August. The collection and subsequent analysis of this data will provide additional insight into the long-term terrain and ecological responses to disturbance which may occur as a result of development in the Mackenzie Delta region.

**407**

#### **Physical Sciences**

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**File No:** 12 404 545  
**Region:** IN

**Licence No:** 13897  
**Location:** Mackenzie Delta

#### **ENVIRONMENTAL STUDIES ACROSS THE TREELINE, MACKENZIE DELTA REGION**

Data regarding snow properties and vegetation characteristics was collected at eight sites, along a 130 km transect from Inuvik to the Beaufort Sea coast in March and August of 2005. Six of the eight sites are

instrumented to record near-surface ground temperatures at 5, 10, 50, and 100 cm below the ground surface. Preliminary results are interesting in two regards: 1) snow and vegetation properties are closely related, both snow depth and the height of vegetation decreases along the transect, the largest changes in snow depth and vegetation characteristics occurs between Inuvik and the north end of Noell Lake. A steep decrease in snow depth and vegetation height occurs between these two areas; and 2) Ground temperatures decrease along the transect, the largest differences in ground temperature occur between sites with the largest differences in snow depth. These results are significant as the proposed Mackenzie Gas Pipeline will cross the identified ground temperature gradient close to the study area.

Water samples were obtained from a total of 60 lakes between Inuvik and the Beaufort Sea Coast. Chemical analysis of water samples obtained from the lakes indicates that thermokarst slumping has a significant impact on the water quality of tundra lakes in Mackenzie Delta region. Mapping of disturbances also shows that the aerial extent of thermokarst has increase over the last 5 decades. These data sets provide insight into the natural spatial variability in water quality characteristics of undisturbed lakes, and contribute baseline information that will assist in developing an aquatic effects monitoring program required to assess impacts of the proposed Mackenzie Gas Project.

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**408****Physical Sciences****Lafleur, Peter**

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**File No:** 12 404 621**Licence No:** 13789**Region:** NS**Location:** Within 4 km of the Tundra Ecosystem Research Station at Daring Lake**CANADIAN TUNDRA CLIMATE EXCHANGE PROJECT**

During the period May 10 to August 31, 2005, the research team ran a field campaign of environmental measurements at the Daring Lake research site. The main measurements, related to carbon dioxide exchange (CO<sub>2</sub>) between the tundra and atmosphere, were performed using two methods. One was through a central instrument tower where the CO<sub>2</sub> exchange was measured over a large patch of mixed tundra. The second was by a chamber system that measured the exchange of CO<sub>2</sub> from small plots (0.75 m x 0.75 m) established in different tundra types. Both of these methods are supported by other environmental measurements such as air and soil temperatures, soil moisture and sunshine amount. Data from the 2005 summer field season will be compared with that taken in 2004. Preliminary results suggest that the earlier snowmelt in 2005 had a profound effect on CO<sub>2</sub> uptake by the tundra.

Some long-term manipulation experiments have also been established at the site to test the effects of global warming (simulated by small greenhouses) and increased precipitation (simulated by snow fences trapping greater snow depth). Measurements of plant species, biomass and abundance were taken in each of the manipulations. These will be monitored over several years to determine the tundra vegetation response to global climate change.

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**409****Physical Sciences****Lesack, Lance**

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**Region:** IN, GW

**Licence No:** 13812  
**Location:** Mackenzie Delta in the vicinity of Inuvik

#### **BIOGEOCHEMISTRY OF LAKES IN THE MACKENZIE DELTA**

This project is ongoing, with a long-term goal of developing a biogeochemical model for lakes in the Mackenzie Delta, and ultimately, a more general ecosystem model for lakes in the floodplains and deltas of major world rivers that could help assess the effects of multiple stresses on rivers as a result of global change. Specific goals for the 2005 season included: 1) investigating the sources and fates of dissolved organic carbon (DOC) in aquatic food webs of the Mackenzie Delta; 2) assessing photobleaching rates in lakes with differing compositions of coloured and non-coloured DOC; and 3) assessing the removal of nutrients and DOC from Mackenzie River water during its flow through the Mackenzie Delta.

In June through August, water samples were collected weekly in a set of six lakes to assess sources of DOC within the delta, and samples of algae, aquatic plants, zooplankton and bacteria were taken from this same set of lakes three times over the summer to determine the contribution of DOC to delta food webs. Early results from this work show different sources of DOC (from aquatic plants, river water and permafrost slumping) across delta lakes. Lake water samples collected for experimental measurements (at the Inuvik Research Centre) showed that delta lakes can photobleach rapidly, but that their potential to do so varies depending on the source of DOC (coloured or non-coloured) to these lakes.

The research project on the removal of nutrients and DOC from Mackenzie River water was completed this year, with the submission of C. Emmerton's M.Sc. thesis. Results from earlier work on the delta (zooplankton: Riedel, Lesack and McQueen; hydrogen peroxide: Febria, Garies, Lesack and Bothwell) were submitted for publication to major scientific journals. An internet web page summarizing the biogeochemistry of lakes work in the Mackenzie Delta, including a list of research team's most recent publications can be found on the Simon Fraser University limnology website.

**410**

#### **Physical Sciences**

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**Region:** NS

**Licence No:** 13788  
**Location:** Two small lakes located 5–7 km south-west of Back Lake (approximately 63.42 N 109. 20 W)

#### **2 000 YEARS OF CLIMATE CHANGE AT TREELINE NORTH OF YELLOWKNIFE**

In order to reconstruct changes in summer temperature and changes in vegetation at the northern treeline zone, sediment cores were obtained from two small lakes located north-west of Yellowknife. The two small lakes are unnamed on maps and are located about 5 km south-west of Back Lake at 63° 43' 07 N (Lake S41) and 109° 19' 07 W (Lake S42). The lakes are in the tundra zone, but not far from the scattered spruce trees (*Picea*). The lakes were reached using a Jet Ranger helicopter from Yellowknife. The cores were taken on April 27, 2005 by Glen MacDonald (UCLA) and Dave Porinchu (Ohio State University). The lakes had about 2 m of ice and were 2.4 and 2.6 m deep. A hand-powered Livingstone corer was used to collect 45 cm and 52 cm of sediment from Lake S41 and Lake S42 respectively. The sediment was organic-rich lake silts with some fragments of wood and other plant remains. The wood fragments are near the bottom of the cores, suggesting that the area around the lakes once had forests. Radiocarbon dating indicates that lake-bottom sediments in Lake S41 are 2 340 years old while those in Lake S42 are 4 830 years old. Further analysis, using fossil insects and geochemistry, is being done to reconstruct the climate and vegetation changes at the lakes.

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**File No:** 12 404 378**Licence No:** 13764**Region:** IN, GW**Location:** Trail Valley Creek and Havikpak Creek, in the vicinity of the AES Upper Air Station near the Inuvik Airport; northern Richards Island, Zed Creek, Hans Creek**SNOW ACCUMULATION/RUNOFF IN HIGH LATITUDE PERMAFROST BASINS**

Field studies were conducted in the Inuvik area during 2005, looking at the factors controlling the movement of energy and water between the land surface and the atmosphere during the spring snowmelt period. These factors control both the supply of energy and water to the atmosphere, as well as snowmelt, and therefore, spring runoff in the streams and rivers. The long term objective of these studies is to improve the ability to predict weather, climate, and water resources. With future uncertainties in climate, and with potential development projects, such improved predictive ability is essential in order to properly manage future environmental change and to adapt to such changes. The 2005 fieldwork concentrated primarily on measuring total basin snowfall (by the middle of April), as well as performing the usual automated measurements of solar radiation, air and ground temperatures and summer rainfall.

Ongoing work will compare results from a number of different years so that the variation from year to year can be understood. Results from areas on either side of the tree-line will also be compared. This work provides important data needed to test computer models, which are used to predict the impact of climate warming on these environments. In addition to this ongoing study, the research team began new work on lakes of the outer Mackenzie Delta which involved the measurement of energy fluxes, standard meteorological components, as well inflow/outflow to the lake, and water depth and temperature.

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**412 Physical Sciences****McCarthy, Daniel**

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**File No:** 12 404 650**Licence No:** 13876**Region:** DC**Location:** North Moraine Hill Glacier, headwaters of the Brintnell Creek and/or other glacier forefields in the Ragged Range**GLACIOLOGICAL INVESTIGATIONS IN THE RAGGED RANGE**

The objectives of this study are to: 1) inventory the size and morphometry of glaciers in the Ragged Range; 2) survey North Moraine Hill and/or other large glaciers so as to provide a benchmark against which future change can be detected; 3) find and document geological and botanical evidence of former glacier activity; 4) develop a chronology for Holocene glacier activity in the Ragged Range; and 5) develop one or more growth curves for lichens growing on carbonate and/or silicate rocks.

In July 2005, a reconnaissance trip was made to the headwaters of the Brintnell and Bologna creeks in the Ragged Range, an area being considered for inclusion in an expanded Nahanni National Park Reserve. The fieldwork was done to collect geopotential data for two icefronts, to examine evidence for the Little Ice Age and more recent glacial activity in the area, and to evaluate the feasibility of establishing a glacier monitoring system in the region.

General observations point to the retreat of the Brintnell Glacier front several hundred metres upslope from the location seen in the 1949 aerial photography. This rapid retreat has exposed large areas of lichen free

bedrock, and no obvious lichen trimlines were seen at the glacier. The modern icefront is atop a series of steep bedrock cliffs. The cliffs, a fast flowing stream and waterfalls would make it difficult to study both sides of the forefield. However, several stands of trees in the Upper Brintnell Valley seem to have been untouched by the forest fires that travelled through the Rabbitkettle area in the 1940s. Lichen covered moraines, and trimlines were seen at high elevation cirque glaciers elsewhere in this valley, which suggests that lichens are also established on older surfaces in the Brintnell Glacier forefield. The glacier is close to the park boundary and its meltwaters flow into Glacier Lake. Thus, it might be possible to relate the retreat/advance of this ice to the sediment record preserved in Glacier Lake. Potential for dendroclimatological work in the Brintnell Valley exists as some of the mature tree cover in this valley might be accessible via canoe from Glacier Lake. Such a record could be used to reconstruct climate for the last few centuries.

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**413** **Physical Sciences**

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**Region:** IN

**Location:** North shore of Liverpool Bay (approximately 2 km south-west of Johnson Bay) and the Mason Bay area, on north-east Richards Island

**SAND-WEDGE DEVELOPMENT, TUKTOYAKTUK COASTLANDS**

During cold spells in winter, the permafrost of the Tuktoyaktuk region may crack. Today, the cracks usually fill in spring with water from melting snow that refreezes to form a vein of ice within the permafrost; after many years, the addition of numerous ice veins produces an ice wedge. During the last ice age, however, such cracks in-filled with windblown sand, due to the Tuktoyaktuk region being, at that time, a sandy polar desert with little or no vegetation and little snow cover in winter. The sand-filled cracks formed geological structures known as "Sand wedge". Fieldwork in July and August 2005 near Johnson Bay on north-east Tuktoyaktuk Peninsula and near Mason Bay on northern Richards Island identified a variety of sand wedges. These structures are very useful to geologists because the age of the sand can be determined by measuring the amount of light that it emits when it is exposed to heat or light. If the age of the sand is known, it would be possible to reconstruct the ice age history of the permafrost and of the Tuktoyaktuk polar desert. Sand samples collected from the field sites are currently being dated.

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**Region:** IN

**Location:** Mackenzie Delta, Caribou Hills

**SPATIAL VARIABILITY OF ACTIVE LAYER THICKNESS AND SURFACE CHARACTERISTICS**

Permafrost terrain consists of a seasonally thawed active layer, underlain by perennially frozen ground. The thickness of the active layer depends on ground surface temperature and soil thermal properties. Since these vary in space, due to climatic and microclimatic factors and soil materials, the active layer thickness (ALT) is also variable. In order to characterize the spatial variability of the ALT across the treeline, data were collected during mid to late August 2005 at four sites in the uplands east of the Mackenzie Delta. These hummocky sites consist of 100 x 100 m grids within which the ALT was measured every 10 m at 121 points. Statistical analyses reveal no significant trend in the mean ALT across treeline. However, statistical differences in thaw depth were found between the tops and troughs of hummocks at each site.

Spatial analyses of the data collected revealed that sampling grids larger than 100 x 100 m will be required to characterize the variability of ALT for three sites. In addition, the statistical differences in ALT between the tops and troughs of hummocks mean that future sampling for the determination of spatial variability of ALT will have to be restricted to either the tops or troughs of hummocks for comparison purposes.

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#### 415 Physical Sciences

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**Region:** IN, GW, SA

**Licence No:** 13813

**Location:** About 10 km NW of Noell Lake (Inuvialuit Settlement Region), 20 km east of Travaillant Lake (Gwich'in Settlement Area), 125 km NW of Fort Good Hope (Sahtu Settlement Area), near proposed pipeline corridor

#### MACKENZIE VALLEY LANDSLIDE GEOTECHNICAL INVESTIGATION

In 2005, a corridor approximately 20km wide by about 750km long, from near the Beaufort Sea to south of Tulita, was visually inspected from the air via helicopter. After this inspection, it was determined that work in 2005 would be focussed on landslides in the Inuvialuit Settlement Region (ISR) and the Gwich'in Settlement Area (GSA). Numerous landslide sites were visited for visual inspections at a closer range. The geometry of the landslides was recorded, as well as thaw depth, vegetation thickness, soil types, and water/ice content of the soil.

Test pits were excavated at a number of sites. Soil samples were obtained using hand tools for laboratory testing. In some of the test pits, testing was carried out using a hand-held shear vane to measure the strength of the soil. All test pits were backfilled upon completion. Two sites were identified as suitable locations for test plots: on Crown Land on the west side of East Round Lake (N68°41.3' W133°54.1') in the ISR, and the other, on private land south-east of Travaillant Lake (N67°40.0' W131°31.8') in the GSA. Preliminary soil sampling was done in test pits at these two sites. Future work at these sites will involve installing instruments to monitor ground condition changes.

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#### 416 Physical Sciences

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**Region:** DC, GW, IN, SA

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**Location:** Approximately 60 sites between Fort Simpson and the Beaufort Sea Coast

#### ACTIVE LAYER MONITORING NETWORK IN THE MACKENZIE VALLEY

During August and September 2005, the fifteenth annual survey of the active layer monitoring system in the Mackenzie Valley was completed from Fort Simpson to the Arctic coast. Sites now number 51, about half in the Mackenzie Delta. Ten sites have been selected for the Circumpolar Active Layer Monitoring program of the international Permafrost Association.

Along this 1 400 km transect, active layer thickness varies more as a result of local factors, related to situation, than to regional climate associated with latitude. Though both air and ground thawing degree days increase from arctic through subarctic to boreal environments, active layer development is surprisingly similar, except where local factors override regional patterns. The thaw of 1991, the greatest yet recorded, in keeping with record warm temperatures while thaw in 1996 north of Norman Wells and in the current century at many

sites was notably less than during the late 1990s, also associated with temperature and season length significantly less than normal. The widespread response to these events builds confidence in the utility of the instrumentation for measuring response in the ground to atmospheric change. Data from this monitoring has been used for the Mackenzie Gas Pipeline designs and will assist in environmental assessment of proposals. In the longer term, measurements from this transect will be used to help model climate change impact on near-surface permafrost in this fragile environment.

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**417** **Physical Sciences**

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**Region:** IN

**Location:** Mackenzie Delta

**HOLOCENE ENVIRONMENT CHANGE ACROSS TREELINE, MACKENZIE DELTA REGION**

Between March 21 and 27, 2005 lake sediment cores were collected from seven lakes located north of Inuvik in the vicinity of Noell Lake and Swimming Point. Lake sediment cores were recovered from the lake bottoms in one-metre sections using a modified Livingston piston coring system. All coring took place from the ice cover on the lakes at the time. The lakes varied in depth from 3.31 m to 10.4 m. The sediment cores varied in length from 103 cm to 346.5 cm. Coring was hampered by the cold air temperatures and in the deepest lakes, by the water depth. The use of plastic casing would have aided in the coring process but the need for it was not anticipated. To date, few analyses have been carried out on the lake sediment cores. Radiocarbon dates have been obtained for two of the lakes. All radiocarbon dating was carried out at IsoTrace Laboratories at the University of Toronto. Preliminary sedimentological analyses will be commenced in the spring of 2006. Each core will be analysed for Loss-on-ignition (550°C and 950°C) and magnetic susceptibility. Macroscopic charcoal will also be analysed for each of the sediment cores.

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**418** **Physical Sciences**

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**Region:** IN

**Location:** Richards Island, Lousy Pt, Swimming Pt, Tuktoyaktuk granular sources, Peninsula Pt, Parsons Lake

**MASSIVE ICE STUDY IN GRANULAR DEPOSITS**

The study of massive ice in granular deposits is the basis of G. Pascale's M.Sc. thesis at McGill University. The research focuses on the nature and occurrence of massive ice in sands and gravels. Many theories on massive ice formation suggest that the ice should not be present in these materials. However, there are several places in the NWT where there is massive ice in sand and gravels. This research will attempt to explain the origins of the massive ice in sands and gravels in order to be able to predict ice in the future. In March 2005, winter roads and skidoo trails were used to access some of the sites, including sites on Richards Island (Ya-Ya esker) and the granular borrow sites east of Tuktoyaktuk Harbour. Geophysical surveys using a capacitive coupled resistivity system (CCR) were used to help in assessing the ice conditions in the granular borrow sites. The geophysical data is also being used to map and explain the origins of the ice and the reasons for the presence of ice in certain locations and not in others. Preliminary results suggest that both buried glacier ice (Ya-Ya esker) as well as intrasedimental massive ice are found in some of the granular deposits of the

Mackenzie Delta region. The researchers have made a conscious effort to interact with the local communities through presentations given at the Aurora Research Institute and Aurora College during 2005.

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**419** **Physical Sciences**

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**Region:** IN

**Location:** A series of lakes north of Inuvik, east of Mackenzie River, on Crown Land

**SENSITIVITY OF HIGH-LATITUDE LAKES TO CLIMATIC & DEVELOPMENT DISTURBANCES**

The first full-scale sampling for this project was completed in 2005, following preliminary work in 2004. The goal of this work is to understand the effects of permafrost degradation on the supply of nutrients to tundra lakes, and on the biological communities within the lakes. Bathymetric measurements, catchment snow surveys, and meteorological instrument installations were completed to study the lakes' hydrological regimes. Samples of water column algae and zooplankton were collected between March and September. Lake water samples were analysed for major nutrient content, and other aspects of water quality.

Analyses of lake water indicate that permafrost degradation is introducing a significant and distinct supply of carbon to these lakes. Biological production estimates and plankton abundances indicate that the effects of permafrost disturbance on the lakes alter primary (plant) production in a manner capable of altering energy flow and interactions within the food web. Analyses are ongoing, and should provide both important baseline information on the microclimate, bathymetry, and biological production in the lakes, and novel information regarding the impacts of permafrost degradation on the nature of relationships between nutrients and biological production.

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**420** **Physical Sciences**

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**Region:** IN, GW

**Location:** East Channel of the Mackenzie River at the boundary of the Inuvialuit Settlement Region and Gwich'in Settlement Area

**EVALUATION OF EXTREME EVENTS (ICE JAMS) AND DEEP SCOUR HOLES ON MACKENZIE DELTA CHANNELS**

The objective of the 2005 field campaign was to continue investigations of channel morphology downstream of Mackenzie River at Arctic Red, which was initiated the previous year. Several cross-sections upstream and downstream of the Water Survey of Canada hydrometric stations located near the town of Inuvik and Tsüighehtchic were surveyed during the summer. This field information will be used in the development/calibration of a hydraulic model of ice jamming in the Mackenzie Delta. In addition, Scour Hole #10 (situated on the East Channel south of the town of Inuvik) was revisited to complete the detailed bathymetric surveys using traditional survey methods and GPR. The bathymetric information of this anomalously deep scour hole, which is ~30 m deep or five to six times the average channel depth, will be compared to previous surveys by Lapointe (1986) and Fassnacht and Conly (1992) to determine rates of movement, which is of practical concern in designing pipeline crossings and may have significant impacts on fisheries (e.g., over-wintering areas).

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**421 Physical Sciences**

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**Licence No:** 13786  
**Location:** The drainage area of Scotty Creek (61 ° 18' N, 121 ° 18' W)

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

Canada's boreal forests contain ca. 15% of the world's freshwater supply. However, the boreal forest in north-western Canada has experienced some of the greatest warming in the world over the last few decades, and the effect of this warming on the water resources of this region, is of major concern. The central Mackenzie Basin is an extensive flat headwater region, with a high density of open water and wetlands that occupies the zone of discontinuous permafrost. Discontinuous permafrost terrain is particularly sensitive to the effects of climatic warming, because pronounced changes in water storage and runoff pathways could occur with small additional ground heating. The major peatland types of this region include channel fens, flat bogs and peat plateaus. Peat plateaus play a key role in the generation of runoff because of their relatively deep snowpack, limited water-storage capacity and relatively high slope gradient.

The objective of this research is to develop computer models to estimate the volume and timing of runoff from wetland-dominated basins near Fort Simpson from; 1) the properties of peat plateau soils; and 2) physical attributes of the basin peat plateau cover. This model will help to reduce the uncertainties regarding the influence of climate warming on the future availability of Canada's northern water resources. It will also be a valuable tool in predicting hydrological consequences of human activities (e.g. resource development), which can alter the quantity and quality of runoff (including sediments, pollutants, nutrients, and biota) at hill-slope to basin scales, and can therefore influence the health of downstream aquatic and terrestrial ecosystems, and municipal water supplies.

Recent advances in the research include: 1) field studies at Scotty Creek have enabled the development of a computer model that predicts runoff from the peat plateaus. The performance of the model is currently being evaluated; 2) new techniques have been developed to evaluate key soil properties including the evaluation of the size and connectivity of soil pores using image analysis; 3) an improved understanding of the major factors controlling the volume and timing of stream flow in the Fort Simpson region - this understanding has formed the basis of a new computer model (under development) that will predict stream flow from the wetland-dominated basins (e.g. Scotty Creek, Jean-Marie, Birch, Willow and Blackstone rivers); 4) conducting a highly-detailed landscape classification (because of the importance of the relative proportions of channel fen, peat plateau and flat bog to the volume and timing of stream flow) from high-resolution satellite imagery for a 22 km<sup>2</sup> area of Scotty Creek. Areal photographs for the same region taken in 1948 have also been acquired and are presently being analysed to evaluate the change in land cover over the ca. 50 year period. Preliminary results indicate a 20-50% reduction in the cover of permafrost (peat plateaus).

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**Location:** Chick Creek, Oscar Creek, Canyon Creek, Helava Creek near Norman Wells

**SEDIMENT TRANSPORT PROCESS IN A SUB-ARTIC STREAM**

Fieldwork in 2005 was carried out from August 23 to August 30 by a three-person crew. This work was Phase 1 of a three-phase field project to characterize sediment transport and channel dynamics in a subarctic stream. Phases 2 and 3 are scheduled for 2006.

All fieldwork was carried out at Canyon Creek, 12 km north-east of Norman Wells. Site access was by ATV, and a temporary camp was set up for the duration of the fieldwork. The following field activities were completed: long profile survey along 1.4 km of the river channel; 13 cross-section surveys spanning the channel, spaced 100 m apart; installation of fixed benchmarks to allow repeat surveys in 2006; mapping of habitat units along 1.4 km of the river channel and measurement of water depth; installation of 20 scour chains at random locations within the surveyed area to measure depth of bed scour due to flooding (follow-up sampling in 2006); insertion of 700 tracer stones in the bed to measure gravel transport distance due to flooding (follow-up sampling in 2006).

All fieldwork was successfully completed and the camp site was returned to its original condition. Data is being stored electronically, with data analyses and the writing of the final report to take place upon completion of the fieldwork in 2006.

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**File No:** 12 404 563**Licence No:** 13774**Region:** SA**Location:** Lionel Island in the Keith Arm of Great Bear Lake**MODELLING THE EVAPORATION AND HEAT BALANCE OF GREAT BEAR LAKE**

The goals of this project are to define the temperature structure of central Great Bear Lake, in order to understand the lake's interactions with the atmosphere above, in terms of its energy and water balance. A comparison of these data for Great Bear Lake will be made with those of its high latitude twin, Great Slave Lake.

Lake temperatures in the central Keith Arm of Great Bear Lake were substantially cooler in 2004 and 2005. In 2004, lake temperatures did not exceed 4° C at any depth until August 11, and generally, during the course of summer, temperatures did not exceed 6° C. In 2005, Great Bear Lake started warming two weeks earlier and by August 11 had achieved temperatures of 6 to 7° C in the upper 15 m layer, warming to 8+° C in late August. In both years these temperatures were high enough to promote deep vertical overturning in the central Keith Arm. The temperatures in 2004 were substantially cooler than for Great Slave Lake (three year average) but in 2005, they were only a little cooler. The impact of very warm summer conditions in 2005 is evident in Great Bear Lake.

Analysis to date indicates some important features of the vertical moisture (evaporation) and heat (sensible heat) exchange between surface and atmosphere. Firstly, both exchanges follow the daily solar cycle, increasing and decreasing with the sun's intensity. Secondly, the amount of energy used in evaporation and sensible heat exchange are of the same magnitude. This is in distinct contrast to Great Slave Lake, where the evaporation and sensible heat cycles last about three days and where the heat used in evaporation greatly exceeds that used in sensible heat transfer. Great Slave Lake appears to evaporate much more water than Great Bear Lake. The reasons for this tentative observation are currently being investigated; generally, it has many implications with respect to climate warming.

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B.Seligman@shell.com**File No:** 12 404 643**Licence No:** 13818**Region:** IN**Location:** Mackenzie Delta: Reindeer Channel Route, Camp Farewell docking site, Niglintgak barge site, Kumak Channel, and Kittigazuit "S-bends"**NIGLINTGAK FIELD DEVELOPMENT 2005 BATHYMETRY RESEARCH STUDY**

The 2005 Shell Canada bathymetry program consisted of surveys in four key areas: Kittigazuit Bay, Kumak Channel, Middle Channel near Camp Farewell and Shallow Bay. Bathymetric surveying in Kittigazuit Bay was conducted to investigate the changes in the bottom morphology over one year (i.e., through comparison of the 2004 survey results with those of the present year). The surveying in Kumak Channel was conducted to obtain a detailed assessment of the water depths around the potential set-down location for Shell's gas conditioning facility. Middle Channel near Camp Farewell was surveyed to investigate the approach to Camp Farewell from the Mackenzie River. Reconnaissance surveying in Shallow Bay was conducted to investigate the potential for a large-scale barge to enter the Mackenzie Delta through Shallow Bay without the need for dredging. The crew conducted the surveys on board specialized bathymetric survey vessels especially equipped for the unique conditions associated with the Mackenzie Delta. Accommodation was provided through tent camp or facilities at Camp Farewell.

The 2005 bathymetric program was very successful at achieving all the planned objectives. However, the reconnaissance in Shallow Bay was not completed and has been proposed as part of a 2006 bathymetry survey program.

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rsoare@colba.net**File No:** 12 404 623**Licence No:** 13817**Region:** IN,GW**Location:** In the immediate vicinity of Inuvik and Tuktoyaktuk where patterned ground and thermokarst are present**LANDSCAPE OF THE MACKENZIE RIVER DELTA AND THE TUKTOYAKTUK PENINSULA AS POSSIBLE ANALOGUES FOR THE STUDY OF MARTIAN LANDFORM DEVELOPMENT**

Polygonal patterned-ground and polygon juncture-ponds dot the landscape surrounding Inuvik and Tuktoyaktuk. Both landforms are underlain by ice wedges and surrounded by ice-rich permafrost. Using high resolution images of the Martian surface, the research team has identified polygonal patterned-ground and polygon juncture-pits that are roughly similar in size, shape and possible origin to the arctic landforms noted above. During the month of June 2005, basic field data (trough depth [to ground ice], width and length; pond diameter and depth [to ground ice]) were collected at the site of drained thermokarst lakes (alases). Polygonal-patterned ground and polygon juncture-ponds are commonplace in these former lakes. Comparing the Arctic and Martian data, it could be argued that the similarities between the two data sets are consistent with a similar origin. Next year, GPR will be used to map the pattern of ice wedges and ice-rich permafrost in the alases.

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tait@geomatics.ucalgary.ca**File No:** 12 404 601**Licence No:** 13859**Region:** IN**Location:** Reindeer Station**MONITORING PERMAFROST DEFORMATION IN THE MACKENZIE DELTA**

The objective of this research is to establish the abilities of the radar method to detect vertical land deformation compared to traditional methods. Fieldwork in 2005 concentrated on measuring the topography of a target area (1km<sup>2</sup>). This was done by placing four to five survey targets in the area and establishing the topography of the surrounding area from these points. During those months, radar images of the same area were also captured. Four aluminum reflectors were placed around the area to return an intense signal to the radar satellite to help in the analysis of the resulting images. The topographical measurements will be compared to the radar images to determine the effectiveness of the radar method.

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**427 Physical Sciences****Tomkins, Jessica**Queen's University  
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jess@lake.geog.queensu.ca**File No:** 12 404 639**Licence No:** 13750**Region:** IN**Location:** Melville Island**CLIMATE FORCING FACTORS AND THE RECORD OF CLIMATIC VARIABILITY IN THE WESTERN CANADIAN ARCTIC DURING THE PAST 2 000 YEARS**

Fieldwork cancelled.

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**428 Physical Sciences****Van Stempvoort, Dale**National Water Research Institute  
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Dale.VanStempvoort@ec.gc.ca**File No:** 12 404 646**Licence No:** 13836**Region:** DC**Location:** Wrigley Airport**INVESTIGATION OF GROUNDWATER CONDITIONS AND THE FATE OF FUEL SPILLS IN THE SUBSURFACE, WRIGLEY, NWT**

There is an information gap regarding groundwater quantity and quality along the Mackenzie pipeline corridor in the NWT, and how the groundwater is influenced by permafrost. A groundwater research site was established by Environment Canada at the Wrigley Airport in October 2005. Eight boreholes were drilled to depths of 18 to 31 m. Monitoring wells were installed in five boreholes, and a string of eight thermistor sensors was installed in another. Samples obtained during drilling indicated a discontinuous upper unit of fine sand, underlain by sand, gravel, pebbles and cobbles, with a silty clay unit at the base of drilling. No evidence of permafrost was observed during the drilling. This was confirmed by thermistor data, which indicated seasonally fluctuating temperatures in the uppermost several metres, below which temperatures declined with depth to a minimum of approximately 2°C at 30 m. The water table was encountered in four wells, at depths of approximately 25 to 26 m below ground. Unconfined groundwater flow was in a north-westerly direction. Benzene was not detected (> 0.1 µg/L) in groundwater sampled from the wells.

Maximum concentrations of the following hydrocarbons in groundwater were: toluene, 0.3 µg/L; ethylbenzene, 3.3 µg/L; m,p-xylene, 6 µg/L; o-xylene, 0.1 µg/L.

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#### 429 **Physical Sciences**

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**File No:** 12 404 622

**Licence No:** 13814

**Region:** IN

**Location:** Mould Bay on Prince Patrick Island and Green Cabin on Banks Island

##### **BIOCOMPLEXITY OF FROST-BOIL ECOSYSTEMS**

Small-patterned ground features such as frost boils, earth hummocks, and small polygons are common landforms in most arctic landscapes. They are a product of frost heaving, cracking, and other processes related to frozen ground. This project examined the complex links between climate, vegetation, soils, and geomorphic processes related to patterned ground formation along the complete Arctic bioclimate gradient, from treeline to the coldest parts of the Arctic. The work conducted at Isachsen in 2005 is part of a larger research effort along a south-north transect of sites from the Alaska North Slope to Prince Patrick and Ellef Ringnes islands.

Information was gathered on the following: vegetation (species, cover, leaf area, reflectance, biomass); climate (air temperature, soil temperature, soil moisture); active layer depth; ground heave; vegetation insulation effect; soil (soil type, physical and chemical characteristics); nitrogen mineralization; soil respiration; and soil invertebrates.

Preliminary results quantify the differences between bare and vegetated-patterned ground. These data are also being used to calibrate models of frost heave and vegetation distribution. In 2005, of the 25 people conducting studies as part of this project, four were students participating in an Arctic Field Ecology course, five were graduate students and one was a post-doctoral student.

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#### 430 **Physical Sciences**

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**File No:** 12 404 613

**Licence No:** 13796

**Region:** IN

**Location:** Within 10 km of Tuktoyaktuk in the inner Kugmallit Bay area

##### **PARTICLE DYNAMICS ON THE MACKENZIE SHELF (CASES SUBPROJECT)**

Sampling was conducted in Kugmallit Bay in the eastern channel of the Mackenzie River, 20 km south-west of Tuktoyaktuk during May 2005. An ice hole large enough for deployment of instruments was made by drilling several holes together using an ice drill. Depth to the bottom was 3.5 m and ice thickness was 1.3 m, giving a water column depth of just 2.2 m. The tidal range of Kugmallit Bay is small, with a mean of 0.3 m and a maximum of 0.5 m at Tuktoyaktuk. Sampling was conducted using snowmobiles chartered locally in Tuktoyaktuk. Under the shallow land-fast ice of Kugmallit Bay, the field team observed and measured the timing of increased chlorophyll a concentrations, suspended particulate matter fluxes, sedimentation rates and sediment characteristics during early spring, prior to the onset of break up of land-fast ice in Kugmallit Bay. These results were compared with data collected from the same site during the previous summer. The changing biological and oceanographic variables beneath land fast-ice, suggest the onset of a spring melt occurring hundreds of kilometres further south in the Mackenzie Valley.

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**431 Physical Sciences****Wolfe, Brent**

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**File No:** 12 404 599**Licence No:** 13801**Region:** SS**Location:** Slave River Delta, in the vicinity of Fort Resolution**PRESENT AND PAST HYDROLOGY, ECOLOGY AND CLIMATE OF THE MACKENZIE BASIN DELTAS**

The research program focuses on high-resolution reconstruction of past changes in hydrology, ecology and climate of the Peace-Athabasca (PAD) and Slave River (SRD) deltas in northern Canada. Data from natural archives, including lake sediments and tree rings, supported by comprehensive field-based studies of modern hydrology, limnology and aquatic ecology are employed in the reconstruction. The PAD and SRD have broad ecological and cultural significance and are ecosystems highly sensitive to prevailing climatic and hydrological conditions. Changing delta lake levels impact aquatic and terrestrial ecosystems, wildlife habitat, and traditional First Nations communities who have an historical connection with the PAD and SRD and its resources. Results are addressing concerns related to the potential environmental impact of river regulation, resource development and climatic variability on the PAD and SRD. Knowledge of present and past hydroecological and climatic variability is vital for effective multi-stakeholder environmental stewardship of the PAD and SRD in light of multiple stressors that may affect these internationally recognized northern ecosystems.

Field activities during 2005 focused on continuing multi-year studies of the modern hydroecology of the SRD. The aim of this research is to improve knowledge of changes in lake water balance and chemistry and the subsequent responses of aquatic communities and habitat over seasonal and inter-annual time-scales under varying climatic and hydrological conditions. Graduate student-led field research in the SRD focused on continued hydrological and limnological process studies and monitoring of several lakes from May-September 2005. As in previous years, lake water samples were collected for analysis of oxygen and hydrogen isotope composition, major ions, dissolved organic carbon, nutrients and total suspended solids. Measured limnological variables included lake depth, water transparency, pH, conductivity, and water temperature. Data loggers were installed to obtain continuous records of lake-level fluctuations. Stable isotope and water level data are being used to quantify seasonal variations in lake water balance using isotope-mass balance models which will then be related to seasonal variations in limnological parameters using statistical techniques. Aquatic macrophytes were collected along transects to assess species biomass and associated epiphytic diatoms, and to establish relationships between hydrolimnological conditions and aquatic habitat. Detailed sampling and monitoring efforts were placed into a regional hydrological context generated from three helicopter-based water sampling campaigns for stable isotope composition and total suspended solids. Community outreach efforts included graduate student-led presentations to the Fort Resolution Environmental Working Committee (FREWC) and classes at Fort Resolution Deninu School. In addition, a field trip was conducted for high school students and a member of the FREWC was trained to operate a meteorological station established by the research team at the local airport from May to September.

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## SOCIAL SCIENCES

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**432****Social Sciences****Bender, Emilee**

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**File No:** 12 410 656**Licence No:** 13891**Region:** NS**Location:** Yellowknife and Rae-Edzo**NORTH OF 60: ARCHITECTURE, PLACE AND IDENTITY**

This research effort explores the role of architecture in the adult learning experience in northern Canada. Unlike many previous design proposals for the North that have been imposed from the outside, this project greatly relies on the experiences of northern students, teachers and leaders at the Yellowknife Campus of Aurora College as well as in the broader Yellowknife community.

Through a series of on-site interviews, meetings and talking circles, participants in the study shared their perceived needs, concerns and visions for future adult learning developments in their community. These visions for the adult learning experience, along with an exploration of past educational approaches and a study of traditional northern architectures, culminated in a series of design propositions for the Yellowknife adult learning community. These design proposals were not viewed as conclusive; rather they served as a point of departure as architectural opportunities for this adult learning environment to continue exploring.

It is hoped that the thesis findings and design propositions will inspire conversation and spark debate within the Aurora College campus and among northern leaders (as well as local designers) as they continue to explore the various future development opportunities for this northern college community.

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**File No:** 12 410 645**Licence No:** 13787**Region:** NS**Location:** Aurora College (Yellowknife Campus)**IMPLEMENTATION OF CONCEPT MAPPING AS A TEACHING STRATEGY TO PROMOTE MEANINGFUL LEARNING IN CLINICAL PRACTICE WITH BACCALAUREATE NURSING STUDENTS**

One weekly concept map per second year nursing student was selected during the six-week practice course in May and June 2005 to measure progress over time. The sample consisted of 14 students. The difference between the first and last concept map scores achieved by the same group of students was analyzed. The results showed that the concept map scores increased significantly from the first to the final concept maps. Twelve of the 14 students who signed the consent forms completed the student evaluation scale. The overall response for scale items indicated satisfaction with concept mapping.

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**Region:** NS, SS, DC

**Licence No:** 13833  
**Location:** Dettah, Fort Providence, Rae-Edzo, Fort Resolution, and Hay River

### **LOCALIZATION OF SOCIAL WORK IN NORTHERN CANADA**

This research examined how social work practitioners have to adapt their social work knowledge in order to practise effectively in northern contexts. The participants were identified by key informants as experienced social service practitioners from communities in north-western Ontario and the NWT. In-depth interviews were conducted with 37 practitioners (11 from the NWT and 26 from north-western Ontario), most of whom had 15 years or more experience providing service in northern settings. The findings revealed that there are many issues and dilemmas that social work practitioners face in northern contexts. Foremost amongst these issues are visibility, multiple and multi-dimensional relationships, community acceptance and the need for flexibility as well as community involvement and cultural understanding. Greater linking of services and community partnering were also discovered to be essential in a northern context.

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**435**

### **Social Sciences**

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**Location:** Gahcho Kué (Kennady Lake)

### **2005 SOCIO-ECONOMIC BASELINE STUDIES FOR THE GAHCHO KUÉ (KENNADY LAKE) AREA**

Between August and mid-December 2005, AMEC staff visited communities that would be potentially directly affected by the proposed Gahcho Kué Diamond Project to conduct interviews as part of the project's Socio-Economic Baseline Study. These communities were Lutsel K'e, Gameti, Whati, Wekweeti, Behchoko, Dettah, N'dilo and Yellowknife. Face-to-face interviews were conducted with service providers and other knowledgeable individuals in order to confirm the accuracy of data gathered from secondary sources (mainly government statistics) and their interpretation by AMEC personnel. In Lutsel K'e, the proximal community to the proposed Gahcho Kué site, AMEC personnel undertook a research program in cooperation with the Lutsel K'e Dene First Nation. In November and early December, AMEC personnel worked with an aboriginal assistant on interviews with service providers and residents who were former or current diamond mine workers. The questions posed during interviews in all of the communities related to the following valued components (which feature in the subsequent analysis and assessment of project effects): population, employment, economic activity, health and well-being, family and social issues, education, language and culture, and community infrastructure. Information was also sought on what interviewees believed were the key socio-economic effects of diamond mining in their community.

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**436**

### **Social Sciences**

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**Licence No:** 13792  
**Location:** Ulukhaktok (Holman), Deline, Wha Ti, Hay River Reserve

### **SPORTS VOLUNTEERISM IN SMALL COMMUNITIES IN THE NWT**

The purpose of the study was to examine sport volunteerism in small communities in the NWT. Specific objectives were to examine the barriers that prevent participation in sport volunteering, including personal, social, economic and cultural barriers, and to develop a set of recommendations that might assist in increasing volunteerism in sport in small communities.

Data collection occurred in the communities of Deline, the Hay River Reserve, Ulukhaktok and Wha Ti. A questionnaire survey and focus group were conducted with a total of 52 research participants. Afterwards, several drafts of the report were written and jointly edited by the team, with input from the Knowledge Development Centre in Toronto. Findings indicate that the respondents volunteered in sport to help other people because they believed in the cause, wanted to have fun, promote sport and recreation, and find application for their skills and knowledge. Many respondents regarded sport as part of a larger social and cultural context, linked to the development of youth and the community, and felt that without the contributions of the dedicated volunteers, community sporting opportunities would be greatly diminished. The final report is due to be published in the spring of 2006, and will include a discussion of the barriers to volunteering and 14 recommendations.

**437****Social Sciences****Davison, Colleen**

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**File No:** 12 410 643**Licence No:** 13744**Region:** NS**Location:** Rae-Edzo**THE ROLE OF SCHOOL IN THE LIVES OF NORTHERN ABORIGINAL YOUTH**

It is estimated that less than 30 % of aboriginal students finish high school in Canada and in light of the strong link between education and health, this is a significant public health concern. Although educational disengagement research has been undertaken for more than 30 years, relatively little about how community or environmental factors impact educational pathways. These research gaps are significant, particularly in relation to aboriginal youth in northern communities where rapid transition is occurring due to cultural and environmental change, resource development and the establishment of self-governance structures. This study used ethnographic methods to explore environmental influences on the relationship between youth and school in a northern aboriginal community.

The fieldwork for this study was undertaken in 2005 at Chief Jimmy Bruneau School in Behchoko. Results from participant-observation, field notes and in-depth interviews indicate that factors such as the physical location of the school, specific events in the school's history, cultural symbols and certain administrative practices are key influences on the educational engagement of local students. Preliminary reports were brought back to the community for feedback in October 2005. The final report of this research will be ready by early 2007.

**438****Social Sciences****Fairbairn, Brett**

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**File No:** 12 410 655**Licence No:** 13884**Region:** SA**Location:** Deline**CO-OPERATIVE MEMBERSHIP AND GLOBALIZATION: CREATING SOCIAL COHESION THROUGH MARKET RELATIONS**

This research project is nearing completion. In addition to preparing a research guide for the community at Great Bear Co-operative in Deline, and describing the research team, sponsors and partners, purpose, scope,

and methods, the researchers have produced two research newsletters and presented on preliminary research findings at the annual general meeting of Arctic Co-operatives Ltd. (ACL) in May 2003, 2004, and 2005.

Since finishing a project report in June 2005, the research team has worked on interview transcriptions, finalizing the community review and verification of transcribed interviews, and conducted a second round of interviews. The results from this phase of the project will be presented at the ACL AGM in May 2006. By September 2006, the researchers aim to have completed the review and verification of the second set of transcribed interviews and the writing and distribution of final reports with the co-operative board and members.

Copies of the final reports and publications will be shared as they become available. So far, W. Wuttunee has written "Lessons in Northern Co-operation", a chapter to appear in the forthcoming (2006) University of Toronto Press publication, *Hidden in Plain Sight* (vol. II). In addition to conference presentations, other publications are planned.

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**"THICK DESCRIPTION" OF THE CHANGE OF CANADA'S FIRST NATIONS TRADITION IN HISTORY: A DISCUSSION OF CLIFFORD GEERTZ'S ANTHROPOLOGICAL APPROACH BASED ON FIELD STUDIES IN NORTHERN CANADA**

This Ph.D. project reflects upon Clifford Geertz's method, "thick description", which unlike data based on interviews, polls or surveys, generates data that can give an in-depth understanding of the complexity of culture. This method was chosen in order to develop a holistic, non-judgemental and empathetic manner of getting to know other cultures, in this case, the Inuvialuit and Gwich'in communities of Inuvik. The researcher spent six weeks in the summer of 2005 volunteering at events such as the First Inuvik Summer Games and Great Northern Arts Festival to acquaint herself with members of these communities. Discussions held with people centred on how the Inuvialuit and Gwich'in understand their present-day lives, particularly in the midst of change. Themes arising from the discussions include: feelings of "in-betweenness" as people try to come to terms with what it means to be aboriginal in today's world; the importance of traditional symbols and rituals; pride of belonging to a unique culture; and the impacts of change over the last 50-70 years on the lives of people (e.g., loss of cultural and personal identity, the introduction of the wage economy and quantified/Western time, etc.).

**440****Social Sciences****Hodgkins, Andrew**

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**IMPLICATIONS OF INDUSTRIAL DEVELOPMENT FOR COURSE OFFERINGS AT AURORA COLLEGE, NWT**

The purpose of the study is to understand, from the perspective of those given authority and responsibility for developing policy on behalf of northerners as well as those affected by such policies, the local realities of labour market-influenced educational policy and its implications on policy process and practice.

Primary data was collected using semi-structured interviews and informal discussions. A total of eight interviews were conducted in July, 2005 with Aurora College personnel and several people involved with northern development. College personnel were interviewed at the three regional campuses located in Inuvik, Yellowknife and Fort Smith, with non-college interviews occurring in Yellowknife. A visit to Fort Smith is planned for March 2006, during which time informal discussions will be held with college personnel.

Interview findings provide insight into the key issues and priorities shared by respondents. These findings can be broadly clustered into the following categories: 1) college mandate and community relations: meeting high community expectations to provide a wide variety of programming in response to perceived needs; and 2) priorities, partnerships and funding: responding to the challenges of providing programming in an increasingly market-driven, globalized world while operating within fiscally-tight parameters.

These findings will be used to support theory covered in a literature review. The thesis will be completed by the fall of 2006.

#### **441 Social Sciences**

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**Region:** NS

**Location:** Yellowknife

#### **YOUNG CANADIANS IN A WIRED WORLD (YCWW) - PHASE II - FIELD SURVEY**

“Young Canadians in a Wired World” (YCWW) is the most comprehensive and wide-ranging study of its kind in Canada. Building on baseline research conducted in 2001, the study looks at the online behaviours, attitudes, and opinions of more than 5 200 students in Grades 4 to 11. The participants represent each province and territory, English and French-language schools, and urban and rural environments. The majority of schools from the 2001 survey participated in the 2005 study. Conducted by ERIN Research for Media Awareness Network and funded by the Government of Canada, the study offers insights into current trends, highlights key changes since 2001 and provides recommendations for parents, educators, and others working with young people.

Among YCWW key findings are: 1) young Canadians are more connected than ever; 2) children are active users of the technology; 3) parental involvement has increased over the past four years; 4) internet rules make a difference; 5) young people say their online experiences are generally positive and socially rewarding; 6) children use the internet to extend existing social networks and develop new ones; 7) mainstream websites expose young people to inappropriate content, risky situations and privacy invasions; 8) the internet is their main choice for completing schoolwork but students want better research skills; 9) for some young people, the internet is a vehicle for bullying and sexual harassment; and 10) young people are aware of privacy issues but often give out personal information online.

#### **442 Social Sciences**

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**Location:** Yellowknife

**DOGRIB VERBAL PARADIGMS**

This project was an investigation of verb forms in the Weledeh dialect of Dogrib language, spoken in Dettah and N'dilo. The research was conducted in collaboration with the Goyatiko Language Center in Dettah. The researcher worked with native speakers individually to collect examples of both noun and verb forms in Dogrib, for example, bøkàeht'è, bøkà\_t'è, bøkàet'è, "I cook, you cook, he/she cooks." These data were analyzed in two ways. The first line of research sought to explain the phenomenon of "split subject agreement," where the morphemes within the verb meaning "I," "you," "they," etc. occur in two different positions. In Split Subject Agreement in Northern Athabaskan and Split Subject Agreement and Morphological Typology, it can be argued that the position of these affixes within the verb results from conflicting pressures to express information (Contrast), be brief (Alignment), and have only a single affix for each meaning (No-Allomorphy). A second line of research concerned the lengthening of stem-initial consonants. Phonetic measurements were conducted which showed that some consonants, especially l, n, and m, are 1.7-1.8 times as long before the stem than elsewhere in the word. This pattern is described in the paper, "Syllable Weight in Dogrib".

**443****Social Sciences****Johnson, Don**

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**File No:** 12 410 599**Licence No:** 13819**Region:** IN**Location:** Holman**LONG-TERM COPPER INUIT - EUROPEAN INTERSOCIETAL INTERACTION**

A third year of sociocultural investigations was initiated and completed between July 21 and August 16, 2005, in the Hamlet of Holman, Victoria Island. A series of interviews with elders was conducted with excellent results in Holman. Jack Kataoyak of Holman and the staff of the Holman Community Corporation provided superb assistance in organizing and translating interviews. All interviews were initiated and carried out according to strict professional and ethical standards/protocols and are now being analyzed according to project plans and schedule.

Additionally, a formal presentation, organized by the Holman Community Corporation and the Olokhaktomiut Hunters and Trappers Committee, of project findings and activities to date was delivered to board members and staff of the Holman Community Corporation on August 8, 2005. The presentation (which included viewing of selected artifacts, documents, photographs and digital images) was well received. Both organizations have agreed (pending appropriate permitting, plans, etc.) to support further collaborative efforts between the researcher and community including: 1) a long-term archaeological project cataloguing archaeological sites; 2) hosting a three-week field school taught by the researcher; and 3) efforts by the researcher to obtain grant monies for the conservation of cultural collections located in local school.

**444****Social Sciences****Krogman, Naomi**

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**THE CONSTRUCTION OF COMMUNITY-BASED NATURAL RESOURCE MANAGEMENT: SOCIAL PERCEPTION AND COGNITION IN THE DEVELOPMENT OF NEW RESOURCE MANAGEMENT INSTITUTIONS IN DELINE, NWT**

This research project explores the perceptions and understanding of community-based natural resource management within increasing political devolution, such as self-government, in the NWT. This research is important as it examines the relationship between a science-based process of resource management planning and local aboriginal resource management practices. The questions addressed in the research are: in the development of new resource management institutions, how do outside organizations (such as the Department of Indian Affairs and Northern Development) perceive local resource management systems and their practices? At the same time, how do local organizations and their members (such as the Deline Renewable Resource Committee) perceive those outside organizations that are responsible for the management of lands and resources for the benefits of all Canadians?

Participant observation has been used in the research, where research notes have been taken and project-related materials collected during the Great Bear Lake Watershed Management Planning and Sahoyúé-?ehdacho Protected Areas candidate program meetings and related activities. At this stage of the research project, the organization of interviews with project participants has begun. These interviews will be conducted from December 2005 to August 2006.

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**445** **Social Sciences**

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**Region:** NS, SS, SA

**Location:** Yellowknife, Norman Wells, Fort Resolution

**FAMILY VIOLENCE PROTOCOL DEVELOPMENT AND TOOLKIT**

The objectives of this project were to: 1) collect inclusive community feedback on service gaps and better response procedures throughout the community of Yellowknife; 2) increase awareness of family violence issues, preventions, and response procedures; 3) build community partnerships among agencies and departments responding to family violence; 4) develop an integrated response to family violence through service providers and government departments.

While the project envisioned developing a protocol to improve responses to adult victims of family violence in Yellowknife, Fort Resolution and Norman Wells, time and resources were insufficient to accomplish the four objectives in more than one community. Three Yellowknife Interagency Family Violence Protocol documents (due in 2006) will report on the process and outcome of this work for the Yellowknife community.

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**446** **Social Sciences**

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**Region:** IN, GW, NS

**Location:** Yellowknife, Inuvik, Tuktoyaktuk

**ARTISTIC AND ARCHITECTURAL EXPRESSIONS OF THE CHRISTIAN/TRADITIONAL RELIGIONS IN NORTHERN (SUBARCTIC/ARCTIC) COMMUNITIES OF CANADA**

In 2005, the researcher conducted her doctoral fieldwork on the range of Christian/traditional artworks,

crafts and architectural structures found in NWT Christian churches. Photographic documentation (slides and prints) was obtained for all churches, with the exception of two churches in Yellowknife and one in Tuktoyaktuk (these churches were photographed externally to confirm their physical presence).

Archival research pursued at the Roman Catholic and Anglican diocesan offices and interviews conducted with congregation members and clergy yielded interesting data on church artworks, crafts and architecture. It is evident that people have pride in their churches and in their own contributions of varying artistic abilities. The works documented in this research reveal influences from both northern indigenous and Christian traditions, illustrating a fascinating variety of materials, techniques, colour usage and presentations. The churches contain a wide range of creative works produced from such materials as plastic flowers, lace, sealskin altar cloths (Tuktoyaktuk churches), narrative art (the Stations of the Cross in Our Lady of Victory Church, Inuvik), handcrafted crosses (the Armenian cross in St. Patrick's Parish, Yellowknife and the diamond willow cross in the Holy Trinity Anglican Church, Yellowknife), etc.

The fieldwork has shown that creatively active elements are located in Canada's Subarctic and Arctic churches, and presents solid, creative data for thesis discussion.

**447****Social Sciences****Mitchell, Kellie**

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**File No:** 12 410 662**Licence No:** 13923**Region:** DC**Location:** Princess Alexandra School, Hay River**SEEKING THE VOICE OF NWT YOUTH: USING PHOTOVOICE TO EXPLORE HEALTHY CHOICES**

This research project explored what healthy choices mean to NWT pre-teens. Reports have called for a greater focus to promote healthy lifestyles, prevention of illness, and development of individual responsibility for well-being. If youth are encouraged to make positive lifestyle choices early in life, this may aid in improving their health status as they age and in avoiding lifestyle-related diseases.

The territorial government business plan (2004) identified an outcome of people educated in how to pursue healthy lifestyles— they contribute and take advantage of life's opportunities. This study supports current efforts to understand the way healthy choices are made and approached from a phenomenological perspective. Participants used cameras to record their life experiences, and this recording of stories through photovoice served as a creative tool and conduit for the participants to partake in discussions and empower them to take action pursuant to healthy lifestyle choices.

Sharing of the stories helped the pre-teen participants to identify what was most important to them about healthy choices and to make meaning of this phenomenon.

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**File No:** 12 410 663**Licence No:** 13924**Region:** IN**Location:** Inuvik

**CROSS-CULTURAL DIFFERENCES IN EVALUATING AND INTERPRETING THE INUVIALUIT FINAL AGREEMENT**

Despite having been signed over 20 years ago, the Inuvialuit Final Agreement (IFA) remains a powerful and influential force in much of the NWT. This Bachelor's-level study investigated the perception of the IFA among both the Inuvialuit and white communities of Inuvik. Brief interviews were conducted with 26 participants who were asked about the perceived efficacy of the IFA as well as the quality of life in the North. The combined responses from all participants were analyzed to determine if any differences existed between Inuvialuit and white views of the IFA. Overall, no differences were found between how the Inuvialuit and whites responded to the questionnaire. However, conclusions were limited by the low number of participants who agreed to be interviewed. The final report discusses the results with reference to several prominent social psychological theories.

**449****Social Sciences****Pearce, Tristan D.**

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**File No:** 12 410 650**Licence No:** 13832**Region:** IN**Location:** Holman, Inuvik**ENVIRONMENTAL CHANGE, RISKS, MANAGEMENT AND INFRASTRUCTURE IN OLOKHAKTOMIUT (HOLMAN)**

This Master's-level research project was conducted with the community of Uluhaktok to characterize vulnerability to climate change. In collaboration with local people, 62 interviews were conducted in Uluhaktok to identify those conditions that the community is vulnerable to and outline opportunities for adaptation policy. Local people were active partners in all stages of the research process, including research design, informant selection, data collection and dissemination of results.

Results indicate that a combination of changing environmental conditions and changes in livelihoods has altered and often increased the exposure of community members to risks associated with climate change. These changes have affected harvesting activities by: 1) increasing the risk of travelling on the land; 2) compromising travel routes to harvesting grounds; and 3) affecting the health and availability of some wildlife species. As a result, people are spending less time on the land and are acquiring less country foods which have implications for community livelihoods.

Community members are currently employing adaptive strategies to deal with these changes, including taking extra precautions when travelling, travelling by alternative routes, and sharing harvesting resources. Key determinants of adaptation are access to income and the strength of local food and knowledge sharing networks. It was identified that by addressing current social problems in the community, such as unemployment and drug and alcohol abuse, the community is also enhancing its ability to cope with and adapt to environmental changes which are affecting harvesting activities.

**450****Social Sciences****Posynick, James**

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**File No:** 12 410 652**Licence No:** 13834**Region:** All**Location:** Inuvik, Fort McPherson, Norman Wells, Fort Simpson, Hay River, Rae-Edzo, Ndilo, Dettah, Yellowknife, and Fort Smith**DESIGNING APPROPRIATE DISPUTE RESOLUTION PROCESSES FOR USE IN CIVIL MATTERS IN THE NWT**

Fieldwork cancelled.

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**451 Social Sciences****Ritchie, Douglas**Ecology North/C-CIARN  
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doug@ecology.north.ca**File No:** 12 404 656**Licence No:** 13912**Region:** All**Location:** Communities in the NWT**COMMUNITY-BASED CLIMATE CHANGE IMPACTS AND ADAPTATION WORKSHOPS**

On September 20-21 and October 18-19, 2005, two Community Climate Change Impacts and Adaptation workshops were held in West Point (Hay River) and Aklavik, respectively. The West Point workshop was mainly attended by elders from West Point and Fort Providence whereas the Aklavik workshop included a mix of elders, adults and high school students.

West Point participants reported many concerns about what appears to be an environment heavily impacted by climate change. Elders however were reluctant to specify any one of their concerns as a priority for study. To develop research priorities, workshop facilitators suggested focussing future climate change research on key areas critical to community well-being, namely water quality, and fish, animals and plants that are harvested. The facilitators noted that on the surface not all of the concerns appeared to relate directly to climate change. However, in order to manage the impacts of climate change and the process of adapting to it, communities cannot ignore other factors that may be affecting their ability to meet their basic needs.

Aklavik participants identified flood prediction as one of their highest research priorities. They were also interested in ensuring that adequate emergency measures were in place for when flooding occurs. Living costs were another major concern that was highlighted and participants were interested in finding ways to help reduce them. Approaches that were suggested included: increased gardening; direct access to the Dempster Highway; increased housing; and the building of energy efficiency standards. Additional concerns that were raised included: water quality, water level changes, caribou- and bear-human interactions, and the impact of activities in upstream watersheds in British Columbia.

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**452 Social Sciences****Robinson, Suzanne**Aurora College/ Saint Francis Xavier University  
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srobinson@auroracollege.nt.ca**File No:** 12 410 611**Licence No:** 13757**Region:** IN, GW**Location:** Inuvik**A COMMUNITY-BASED PARTICIPATORY ACTION RESEARCH VIDEO-MAKING PROJECT TO CELEBRATE AND PROMOTE FAMILY LITERACY IN THE WESTERN ARCTIC**

The main goal of this project is to create a locally-produced video featuring local people. The open-ended interview format is designed to allow community members to have the chance to tell their stories and express their views about how education and learning are an important part of their families. The goal is to celebrate the learning that is already happening in the community and to promote greater participation in family literacy. This project is ongoing. Interviewing has concluded and the community video viewing and feedback process will begin in the fall of 2006.

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**453****Social Sciences****Salokangas, Raila**Aurora Research Institute  
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raila.salokangas@env.tpu.fi**File No:** 12 410 618**Licence No:** 13808**Region:** GW**Location:** Inuvik, Aklavik, Fort McPherson, and Tsiigehtchic**GWICH'IN VIEWS ON THE MACKENZIE GAS PROJECT, GWICH'IN SETTLEMENT AREA, NWT, CANADA**

Gwich'in beneficiaries in the Gwich'in Settlement Area were interviewed during the summer of 2005. The study concentrated on Gwich'in hopes and concerns related to the Mackenzie Gas Project's (MGP) potential social, cultural, economic and environmental impacts. The study results show that in the summer of 2005, the Gwich'in were divided in their opinions as to whether it was the right time to go through with the MPG. The participants who wanted the MGP to materialize believed that the project would bring employment and education opportunities, and financial benefits. The participants who wished for the reverse were concerned about possible negative environmental and social impacts, and a low level of education that would prevent the Gwich'in from benefitting from possible job and business opportunities. Clearly, the participants believed that the most negative social impact of the project would be an increase in substance abuse. The biggest environmental concern for the participants was spills, which they feared might affect wildlife habitat and the food web.

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**454****Social Sciences****Saxon, Leslie**University of Victoria  
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saxon@uvic.ca**File No:** 12 410 210**Licence No:** 13911**Region:** NS**Location:** Rae-Edzo, Wha Ti, Gameti**DOGRIB TEXTUAL STUDIES**

Work continued on the projects associated with this study, including tape digitizing and summarizing (Behchokö), phonetics research (University of Victoria and Massachusetts Institute of Technology), and work on stories (Behchokö and University of Victoria). Work on the Spelling Manual for Tâichô Yatî is nearing completion. This book, which will likely be published by the Tâichô Community Services Agency, includes a number of written stories and recordings related to the research.

Presentations on topics related to this research were made at three conferences: 1) (with Joseph Martel) "Vowel length neutralization in Dogrib stems: An acoustic study", Society for the Study of the Indigenous Languages of the Americas Annual Meeting (Oakland, CA, January 2005); 2) (with Mary Adele Mackenzie, Alikî Marinakis and Joseph Martel) "Dogrib Stories of Travel: Collaborating on Language and Culture", 12th Annual Stabilizing Indigenous Languages Symposium (Victoria, BC, June 2005); 3) (with Alikî Marinakis) "History of a history: Perspectives on Petitot's transcription of Tâichô Godî", Dene Languages Conference (Victoria, BC, June 2005). Presentations were also made at the University of British Columbia — (with Joseph Martel; invited lecture by Leslie Saxon) "Vowel length neutralization in Dogrib stems: An acoustic study" — and at the Tâichô Language and Culture Camp, held at Enèegoo, a fishing spot near Whatî — (with Rosa Mantla and Philip Rabesca) "Research on Stories".

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**455** **Social Sciences**

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**File No:** 12 408 130      **Licence No:** 13773  
**Region:** NS      **Location:** Stanton Hospital, Yellowknife

**THE TRANSITION INTO NURSING FOR NEW GRADUATE NURSES IN THE NWT: A GROUNDED THEORY STUDY**

The purpose of this study is to discover a substantive theory that explains how new graduates nurses begin to practice in the NWT. At present, the interviews and data collection are completed, including the interviews to confirm and review findings with participants. The data has been transcribed, coded and analyzed. The researcher is currently in the process of writing her thesis. An initial draft is under review by her thesis committee. Grounded Theory is employed as a research method, and therefore requires the integration of current literature as the final step in the study. Thesis completion will occur within the 2006/2007 academic year, following which study findings will be presented and circulated.

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**456** **Social Sciences**

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**File No:** 12 410 653      **Licence No:** 13867  
**Region:** IN      **Location:** Tuktoyaktuk

**LIVING WITH CHANGE: COMMUNITY EXPOSURES AND ADAPTATIONS IN TUKTOYAKTUK, NWT**

Fieldwork cancelled.

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## TRADITIONAL KNOWLEDGE

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**457****Traditional Knowledge****Armitage, Derek**

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**File No:** 12 410 594**Licence No:** 13802**Region:** SS**Location:** Fort Resolution**FLOOD HISTORY AND CLIMATE CHANGE IN THE SLAVE RIVER DELTA: A TRADITIONAL KNOWLEDGE STUDY**

Field activities in 2005 involved extended trips to Fort Resolution (May-September and December), to build on preliminary work carried out in 2004. A number of activities were undertaken in collaboration with community members, including: multiple meetings with the Fort Resolution Environmental Committee; six guided trips on the land during various seasons; four aerial flights over the delta; 30 semi-structured interviews with community leaders, harvesters and elders; five scenario-based focus groups; two open-house community presentations; a climate change workshop; and many informal discussions.

A wealth of information about past, current and potential future changes and vulnerabilities, both environmental and socio-cultural, was collected. An important outcome from these activities was the recognition that land and water resources continue to provide a significant food source for residents, and access to traditional harvesting areas remains important for social and cultural integrity. In this region, the simultaneous occurrence of environmental and socio-cultural changes has made these human-environment relationships more complex; linkages among environmental changes, related human impacts, and past adaptations are not linear. Local adaptations have altered resource use pressures and caused strain on the socio-economic system, and shifting social relationships continue to affect the potential for adapting to future changes. These factors indicate the need for targeted strategies to build capacity and plan effectively for continued adaptation at multiple levels.

**458****Traditional Knowledge****Chambers, Cynthia**

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**File No:** 12 410 658**Licence No:** 13895**Region:** IN**Location:** Holman**RESEARCHING FORMS OF LITERACY IN A NORTHERN (NWT) COMMUNITY**

During 2005, the community-based researchers for the project continued to gather information on traditional forms of literacies from elders. New topics included: drum dances and songs, and clothing. In the coming year, the focus will be on collecting the life histories of elders. This information will allow the development of a context for the use of the literacies. As well as contextual information, the interviews will provide extensive and rich Inuinnaqtun terminology related to traditional literacies, which is being documented in a terminology bank. Preliminary interpretation of the topic data continues. Significant themes emerging from the data include the: continuing centrality of orality to the formation of Inuit identity; process and role of migration; significance of place; importance of genealogy in traditional literacies; process and stages of memory; process and stages of teaching and learning (passing on knowledge); significant time referents (in the absence of Western calendars); and merging and influence of different groups (western, Central and Qablunaaq) in a single community.

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**459** **Traditional Knowledge****Hart, Elisa**

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**File No:** 12 410 603**Licence No:** 13919**Region:** IN**Location:** Tuktoyaktuk**TUKTOYAKTUK PLACE NAMES PROJECT**

The Tuktoyaktuk Place Names Project is completed. The final work consisted of verifying information with elders in Tuktoyaktuk in December of 2005. Elders reviewed the traditional place names and their locations on maps, listened or read along as sections of text were read out, and assisted in identifying people and places in photographs. The verification of the pronunciation of many names was done so that they could be written in the Committee for Original Peoples' Entitlement (COPE) standard orthography. Updates on the project were presented at meetings of the Tuktoyaktuk Hamlet Council, Tuktoyaktuk Elders Committee, Tuktoyaktuk Hunters and Trappers Committee, and the Tuktoyaktuk Community Corporation. As of June 2006, a few of the tapes from the work in December are being translated. Satellite imagery needs to be created for the book, for use in showing the place names. After that the text will be copyedited and sent for graphic design and printing. The book should be ready for printing by late fall.

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**460** **Traditional Knowledge****Lyons, Natasha**

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**File No:** 12 410 647**Licence No:** 13795**Region:** IN**Location:** Aklavik, Inuvik, and Shingle Point**PUBLIC ARCHAEOLOGY FOR THE 21ST CENTURY: COLLABORATION WITH AN ARCTIC COMMUNITY**

In June and July 2005, a public archaeology project was initiated in the Western Arctic. Public archaeology is a type of archaeology that emphasizes community outreach and involvement. The main goal of this project is to work collaboratively with the Inuvialuit community and to collect information that is useful to them. Several community organizations saw the need to gather Traditional Knowledge from elders about the land and how people once traveled on it and used its resources. To this end, interviews will be conducted with 25 elders, including 16 from Aklavik and nine from Inuvik, in the summer of 2006. Elders will be asked to identify and describe a series of artifacts from the early to mid 20th century that were collected in the Yukon North Slope area in present-day Ivvavik National Park. The information gathered by this project will ultimately be used to develop resources geared towards teaching Inuvialuit youth about their elders' way of life.

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**461** **Traditional Knowledge****Maraj, Ramona**

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**File No:** 12 402 743**Licence No:** 13751**Region:** IN**Location:** Aklavik**GRIZZLY BEARS ON THE YUKON NORTH SLOPE - TRADITIONAL AND LOCAL KNOWLEDGE COMPONENT**

The North Slope Grizzly Bear Study, which began in 2004, is a seven-year project aimed at gathering the

knowledge of hunters. The research team worked with a GNWT biologist to review the 1998 GNWT Department of Environment and Natural Resources (ENR) interviews with hunters. The interview information was also checked to ensure that it was correctly coded. Contained in the interviews was information provided by 23 hunters on each hunting trip they made to the North Slope in 1996, 1997 and 1998. Information on route and each bear seen during the trips was recorded. The researchers did find that some of the mapped information had not been properly coded and worked to fix the databases.

In February 2005, a group interview was held with four bear hunters. They identified a set of current and future decision topics where information on bears would be necessary, and suggested products that would be needed to support the decisions. These ranged from decisions about summer tourism to buildings at Shingle Point to possible bear-viewing and access roads. These views were presented to the Aklavik Hunters and Trappers Committee.

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## **462 Traditional Knowledge**

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**File No:** 12 410 629

**Region:** NS

**Licence No:** 13863

**Location:** Lac de Gras

### **2005 TRADITIONAL KNOWLEDGE STUDY**

The Environmental Monitoring Advisory Board (EMAB) held three workshops in 2005 on: water quality monitoring (July 2005), caribou monitoring (August, 2005) and fish palatability and texture (August 2005). Diavik Diamond Mines Inc (DDMI) provided the necessary funding under a program specifically created for the affected communities to use the community-based monitoring camp. Participants of the workshops represent four of the five aboriginal parties to DDMI's Environmental Agreement (EA).

Three sampling sites were chosen by last year's participants for the water quality monitoring. These sites were deemed important relative to depth, currents, and man-made physical features within the lake (e.g., dike). They are located around the Diavik Mine and are not monitored under DDMI's Aquatic Effects Monitoring Program. Participants conducted biophysical profiles, and collected three water samples at 2 m below the surface, mid water column depth, and 2 m from the lake bottom. They also collected sediment specimens, and sampled and screened benthic invertebrates. Data will continue to be collected annually, and will be used to help detect whether there is any change to Lac de Gras. The water quality data from the 2005 monitoring will be added to the 2004 baseline data for analysis at future EMAB water quality workshops. Benthic and sediment data will be used as a baseline for future EMAB workshops. DDMI will also use the data from the EMAB sites to complement their existing water quality program. EMAB is currently looking into options for data analysis.

During the caribou monitoring workshop, participants received information on DDMI's caribou monitoring programs in the Lac de Gras area, and regional monitoring programs from the territorial government department, Environment and Natural Resources. They toured the mine to gain a better understanding of on-site caribou movement, on-site monitoring programs, and to view the temporary diversionary fencing set up to deflect caribou from the Processed Kimberlite Containment area. Finally, they discussed company and government monitoring efforts in the context of aboriginal involvement in monitoring, with a view to improving caribou monitoring. Participants also discussed the caribou-related recommendations in EMAB's Wildlife Effects Monitoring Program (WEMP) review. They developed key recommendations regarding caribou monitoring for consideration by EMAB, that is, the use of caribou tracking collars and aerial surveys. Participants agreed that the number of caribou collars used on the Bathurst herd should remain as is for now, and that joint aerial surveys by DDMI and BHP Billiton Diamonds Inc. could be expanded. They, however,

insisted that any changes (redesign) that might be made to aerial surveys or to any other monitoring effort needed to be made in consultation with the aboriginal people. The group also noted that youth should be involved in redesign to facilitate involvement in future monitoring. To improve caribou monitoring and aboriginal involvement, participants made the following decisions. Firstly, that a small, mobile two-person camp is set up where the caribou are present, for both Zone of Influence monitoring and regional monitoring (close to the mine and control sites far away from the mine) during the spring migration as well as the fall migration. Participants agreed that this could be a way for DDMI to do its caribou scanning as required by the WEMP. Secondly, that an aboriginal person be present at the Diavik Mine site to monitor caribou and report to the communities. Thirdly, that anyone passing through the area and sights caribou should report on what is sighted to one of the central agencies. The group also suggested that EMAB host a workshop that will bring together government and aboriginal groups to discuss cumulative effects.

During the fish palatability and texture workshop, participants collected and tasted fish from Lac de Gras. In addition, fish samples were collected for analysis to monitor fish populations and indices of fish health. As per subsection 35(2) 9 of the *Fisheries Act*, DDMI, in cooperation with its aboriginal partners and DFO, developed and conducted fish palatability and texture studies at the Diavik Mine site on Lac de Gras in 2002, 2003 and 2004. DFO requires that this study is repeated every five years, with the 2002 data used as a baseline; however, the study may be done more often depending on requests from the aboriginal participants. Two gillnets were set, one close to the community-based camp and one close to the Diavik Mine's A514 dike. Over the fishing period between August 16 and August 18, participants caught 34 lake trout. All four groups agreed that the taste of the fish in Lac de Gras continues to be good. DDMI provides a separate report with scientific data and results.

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#### **463 Traditional Knowledge**

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**Region:** DC

**Licence No:** 13765  
**Location:** Wrigley

#### **2005 TRADITIONAL KNOWLEDGE STUDIES IN WRIGLEY**

Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. A final report was completed in August 2005. These activities were conducted by Pehdzeh Ki First Nation under contract to Imperial Resources Ventures Ltd. All activities complied with licence conditions.

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#### **464 Traditional Knowledge**

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

**Licence No:** 13775  
**Location:** Tuktoyaktuk, Inuvik, Aklavik

#### **2005 TRADITIONAL KNOWLEDGE STUDIES IN THE INUVIALUIT SETTLEMENT REGION**

Inuvialuit communities within the Traditional Knowledge (TK) Study area for the Mackenzie Gas Project include Aklavik, Inuvik and Tuktoyaktuk. In 2005, the TK study activities focussed on conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. This work was

directed by an Inuvialuit Settlement Region TK Study Working Group that was formed in 2003 and consists of representatives of Hunters and Trappers Committees, Community Corporations and Elders Committees in each of the study area communities. All activities complied with licence conditions.

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#### **465 Traditional Knowledge**

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**File No:** 12 402 670

**Region:** GW

**Licence No:** 13776

**Location:** Aklavik, Fort McPherson, Inuvik, Tsiigehtchic and traditional lands in the Gwich'in Settlement Area susceptible to effects from the Mackenzie Gas Project

#### **2005 TRADITIONAL KNOWLEDGE STUDIES IN THE GWICH'IN SETTLEMENT AREA**

Gwich'in communities within the Traditional Knowledge (TK) Study area for the Mackenzie Gas Project include Aklavik, Fort McPherson, Inuvik and Tsiigehtchic. In 2005, activities were geared towards conducting interviews with holders of TK, analyzing the collected data and report writing. Final report was completed in July 2005. The research was conducted by the Gwich'in Social and Cultural Institute, under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

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#### **466 Traditional Knowledge**

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**File No:** 12 402 670

**Region:** DC

**Licence No:** 13777

**Location:** Fort Simpson and traditional lands susceptible to effects from the Mackenzie Gas Project

#### **2005 TRADITIONAL KNOWLEDGE STUDIES IN FORT SIMPSON**

The Traditional Knowledge (TK) study activities in 2005 focussed on analyzing previously collected TK and report writing. A draft report was completed and a final report is pending. These activities were completed by the Lidlii Kue First Nation, under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

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#### **467 Traditional Knowledge**

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**File No:** 12 402 670

**Region:** DC

**Licence No:** 13778

**Location:** Jean Marie River and traditional lands susceptible to effects from the Mackenzie Gas Project

#### **2005 TRADITIONAL KNOWLEDGE STUDIES IN JEAN MARIE RIVER**

Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. A final report was completed in May 2005. These activities were conducted by Jean Marie River First Nation under contract to

Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

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**468** **Traditional Knowledge**

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**Licence No:** 13779

**Region:** DC

**Location:** Kakisa Lake and traditional lands susceptible to effects from the Mackenzie Gas Project

**2005 TRADITIONAL KNOWLEDGE STUDIES IN KAKISA**

Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. A final report was completed in April 2005. These activities were conducted by Kaa'gee Tu First Nation under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

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**469** **Traditional Knowledge**

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**Licence No:** 13872

**Region:** DC

**Location:** Fort Providence

**2005 TRADITIONAL KNOWLEDGE STUDIES IN FORT PROVIDENCE**

Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. A final report was completed in November 2005. These activities were conducted by Fort Providence Resource Management Board, under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

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**470** **Traditional Knowledge**

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**File No:** 12 402 670

**Licence No:** 13879

**Region:** SA

**Location:** Tulita

**2005 TRADITIONAL KNOWLEDGE STUDIES IN THE TULITA DISTRICT OF THE SAHTU SETTLEMENT AREA**

Traditional Knowledge (TK) study activities focussed on conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and report writing. This work was directed by an Inuvialuit Settlement Region TK Working Group consisting of representatives from the Ernie MacDonald Land Corporation, Tulita Dene Band Council, Fort Norman Metis Local No. 60, Tulita Municipal Land Corporation and Deline Land Corporation. All activities complied with licence conditions.

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**471 Traditional Knowledge****Smith, Barney**

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**File No:** 12 402 744**Licence No:** 13752**Region:** IN**Location:** Aklavik**MARMOTS ON THE YUKON NORTH SLOPE - TRADITIONAL AND LOCAL KNOWLEDGE COMPONENT**

Marmots are members of the squirrel family that are the size of house cats. Little is known about: which species are found in the North Yukon (and the NWT), where the marmot colonies may be located, and how the animals are faring. This is Year 2 of a seven-year project being done in collaboration between Yukon Environment, Parks Canada, the Wildlife Management Advisory Committee (North Slope), the Aklavik Hunters and Trappers Committee, Vuntut Gwitchin First Nation, the Canadian Wildlife Service, and the University of Alaska. In 2005, the research team interviewed and obtained oral history and other information from the Vuntut Gwitchin First Nation, Inuvialuit people from Aklavik, and generally, people working and travelling in this area in the summer when marmots are active in mountain areas. One recent marmot colony location in the northern Richardson Mountains and five other old colony locations were obtained from the Vuntut Gwitchin First Nation and Aklavik Inuvialuit respectively. These locations will be explored in the coming years. Interviews also revealed that some Inuvialuit families, prior to the 1960s, regularly trapped a few marmots a year for food and parka trim.

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**472 Traditional Knowledge****Vincent, Bruce**

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**File No:** 12 410 661**Licence No:** 13916**Region:** DC**Location:** Fort Simpson Metis traditional lands**2005 TRADITIONAL KNOWLEDGE STUDY WITH THE FORT SIMPSON METIS**

Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK, analyzing the collected TK and writing a draft report. These activities were conducted by Fort Simpson Metis, under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

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**473 Traditional Knowledge****Vincent, Bruce**

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**File No:** 12 410 661**Licence No:** 13918**Region:** DC**Location:** Katlodeeche First Nation traditional lands**2005 TRADITIONAL KNOWLEDGE STUDY WITH THE KATLODEECHE FIRST NATION**

In 2005, Traditional Knowledge (TK) activities focussed on completing a literature review and conducting interviews with holders of TK to identify relevant TK. These activities were conducted by Katlodeeche First Nation, under contract to Imperial Oil Resources Ventures Ltd. All activities complied with licence conditions.

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**474****Traditional Knowledge****Wicks, Darren**

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Rae-Edzo, NT X0E 0Y0

dwicks@dogrib.net

**File No:** 12 410 644**Licence No:** 13747**Region:** NS**Location:** Rae-Edzo**DENE GAMES: A CURRICULUM TOOL**

The Dene Games website ([www.denegames.ca](http://www.denegames.ca)) is intended to facilitate learning opportunities for teachers, recreational coordinators, students and the general population. The scope of the information provided in the website has evolved over the past five years from the researcher's experiences teaching physical education at Chief Jimmy Bruneau Regional High School in Rae-Edzo, NT. The information provided on this website would not have been possible without the generous support of community elders, students and the Tlicho Community Services Authority. It is expected that the website will foster educational opportunities not only for students in the NWT, but for students anywhere that would like to learn a new game, with the possibility of this experience being exercised through schools and community recreation facilities. The aim of this learning tool is to highlight the creativity and spirituality behind the power of the Dene Games, which were developed during a time of powerful medicine power. Often, the games were used to celebrate the coming together of family and culture, and are meaningful performances of strength, courage, power, agility and friendship. With the continued development of Dene Games at both the territorial level and now the Arctic Winter Games level, this site will provide, through stories, rules, performance tactics and video, an opportunity for many people to participate and learn more about the Dene Games and its meaning.

# Prince of Wales Northern Heritage Centre

## ARCHAEOLOGISTS PERMITS

475

Archaeology

**Andrews, Tom**

Prince of Wales Northern Heritage Centre

Yellowknife, NT

**File No:** (NWT Archaeologists Permit 2005-973)**Region:** SA      **Location:** Mackenzie Mountains**NWT ICE PATCH PROJECT**

During summer in the Mackenzie Mountains, caribou spend much of their time sitting on high elevation ice patches seeking relief from summer insect swarms and warm afternoon temperatures. Recent research in the Yukon indicates that this relationship has persisted for millennia and has been recorded in the ice. Ice patches formed as annual net accumulations of snow were gradually compressed into permanent ice lenses and, in the process, the ancient remains of caribou – bone, antler and primarily dung – were incorporated and preserved within the ice. Humans have known of this relationship for millennia and have a long history of hunting caribou on ice patches, sometimes losing or discarding their hunting implements in the process. Currently, with changing climate regimes, melting alpine ice patches in the Yukon are yielding caribou remains and hunting implements, providing a material record spanning the last 8 000 years. This record includes unique examples of Aboriginal hunting implements with preserved organic parts, a remarkable development for the archaeological record of the Subarctic, where the organic components of artifacts are quickly degraded by acidic soils and archaeologists are left to reconstruct past cultures from stone tools. The bone, antler, wood, sinew, and feather components of hunting implements are preserved within ice patches, and these complete artifacts have helped neighbouring Yukon archaeologists to redefine our understanding of the invention and use of various hunting technologies, such as the bow and arrow. Well-preserved biological specimens have also proven invaluable to Yukon biologists for reconstructing past environmental conditions and wildlife population dynamics. For example, pollen trapped in the dung provides a record of past climate and vegetation, and DNA studies on dung pellets have assisted in reconstructing the genetic histories of caribou herds and long-term changes in herd ranges. For Yukon archaeologists and biologists, this multidisciplinary approach has resulted in a unique database that informs important questions of human history and caribou behaviour. Yet, the most critical lesson from the Yukon experience is that new artifacts are melting from the ice patches on an annual basis and that these artifacts, wet, fragile and exposed, require immediate conservation measures to be preserved.

Recent work in the Mackenzie Mountains indicates that this ice patch phenomenon is also present in the Northwest Territories and in need of immediate attention. We initiated a project in 2002 to locate and assess ice patches in the Mackenzie Mountains. Working over three years with satellite imagery and aerial photos – in partnership with the NWT Centre for Remote Sensing – we were able to locate areas in the mountains that had visible summer ice patches. In 2005, working in partnership with Tulita First Nations Band, we conducted a 5-day helicopter survey in the middle Mackenzie Mountains, between Norman Wells and the Yukon border, south to the headwaters of the South Nahanni River, and as far north as the headwaters of the Arctic Red River. Two new archaeological sites associated with ice patches were recorded during this brief survey. One of the sites produced wooden artifacts – possibly fragments of a bow made from willow – and the second yielded broken caribou bone with fracture patterns indicative of human butchering practices. We also collected caribou dung from the second site. Analysis is still underway and includes radiocarbon dating of the cultural remains and bone. NWT biologists are leading the analysis of biological specimens from the sites, which include stable isotope analysis, diet composition and DNA analysis. These analyses will provide information on environmental changes and a comparison of past and present ecology of wildlife in the Mackenzie Mountains. This archaeological and biological work will lead to unique insights into the human

and ecological history of the Mackenzie Mountains and will also extend the geographical range of the ice patch work in the Yukon, providing a broader regional scope to these studies.

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**476** **Archaeology**

**Bussey, Jean**

Points West Heritage Consulting  
Langley, BC

**File No:** (NWT Archaeologists Permit 2005-968)

**Region:** NS **Location:** Kennady Lake

**ARCHAEOLOGICAL INVESTIGATIONS CARRIED OUT FOR THE GAHCHO KUÉ PROJECT IN 2005**

Points West Heritage Consulting Ltd. conducted archaeological investigations for De Beers Canada Inc. at their Gahcho Kué Project in 2005. The study area is located at Kennady Lake, which is approximately 300 km east/northeast of Yellowknife and 80 km southeast of Snap Lake. Jean Bussey directed the field investigations and was assisted by Olivia Donaher, also of Points West, and Henry Basil and Aaron Catholique of the Lutsel K'e First Nation. The archaeological work was conducted under a Class 2 NWT Archaeologists Permit and was primarily concerned with the assessment of previously recorded archaeological sites associated with a proposed diamond mine and its ancillary facilities.

In 2004, 26 previously recorded sites located within 1 km of the proposed Gahcho Kué mine were relocated and subjected to preliminary assessment. Subsurface testing and/or detailed surface examination was conducted at sixteen of these sites and resulted in a more accurate evaluation of site significance. In the 2004 report it was recommended that the remaining 10 sites be assessed and this site evaluation was completed in 2005. In addition, 10 sites located near two proposed gravel pits were also assessed through intensive surface examination and/or subsurface testing. In the process of accessing previously recorded archaeological sites, three new sites were discovered in 2005. All three were sufficiently near proposed development areas that detailed evaluation was conducted. As follow-up to another 2004 recommendation, an archaeological site located along the winter road route to Mackay Lake was also evaluated. Two previously recorded sites located near possible winter road routes for the gravel pits were revisited, but were not assessed since they are avoidable.

All recorded archaeological sites located within 1 km of proposed development areas associated with the Gahcho Kué project have now been assessed in detail. Sites located along the winter road to camp and near proposed winter roads within the project area have been evaluated for impact potential. The majority of the sites along the roads are avoidable. Sites located near the open pit mines are more likely to be affected and such sites were tested. The number and depth of these tests varied based on the size of the landform, amount of vegetation cover evident, surface yield and characteristics of the subsurface deposits. In the process of site assessment, a number of small surface sites were essentially mitigated, while at other archaeological sites sufficient data was collected to provide suitable mitigation recommendations in the event that avoidance is not feasible.

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**477** **Archaeology**

**Bussey, Jean**

Points West Heritage Consulting  
Langley, BC

**File No:** (NWT Archaeologists Permit 2005-969)

**Region:** NS **Location:** Kennady Lake

**NON-TECHICAL REPORT OF ARCHAEOLOGICAL ACTIVITIES AT THE EKATI DIAMOND MINE**

Jean Bussey of Points West Heritage Consulting Ltd. has conducted archaeological investigations for BHP Billiton Diamonds Inc. (BHPB) in its claim block north of Lac de Gras since 1994. Each year, she has undertaken to provide archaeological potential assessments, complete archaeological inventories, assess or

mitigate sites and conduct tours of archaeological resources for interested groups. Archaeological sites located near development areas have been tested and mitigated through systematic data recovery consisting of subsurface excavation and/or surface collection. Sites well removed from such activity areas have been recorded and are periodically revisited, but are otherwise avoided.

The majority of the recorded sites in the BHBP claim block are associated with eskers, but sites are also found on other terrain types, usually near the larger lakes. There are still many portions of the claim block that have not been inventoried because no development or exploration activity has been identified in the vicinity. The majority of the sites near EKATI are best described as lithic scatters, sites that are characterized by unworked flakes of stone with an occasional tool. The most common lithic or stone material is quartz, which is found naturally as veins in the bedrock of the Lac de Gras area. Quartz cobbles are also found naturally in the numerous eskers in the claim block and it is suggested that both sources of quartz were utilized prehistorically for stone tool manufacture. A number of the sites in the BHPB claim block have yielded small chert tools suggestive of the Arctic Small Tool tradition, which may date 2 500–3 500 years before present, but the majority of the archaeological sites probably relate to activities conducted in the last 2 500 years. Although most sites are associated with the prehistoric period, a number of traditional use sites have also been identified. Olivia Donaher, of Points West, and Darcy Ross of the North Slave Metis Alliance assisted with the archaeological field work conducted in July at EKATI. One new archaeological site, an isolated find was discovered in 2005, bringing the total in the BHPB claim block to 199 sites. Field investigations were conducted at 17 proposed exploration locations, along a section of the Ursula West esker, in the area of the Fox open pit and for a proposed winter exploration camp and winter access road.

As part of their ongoing commitment to share information on the archaeological work conducted at EKATI, BHPB requested that Jean Bussey conduct tours in 2005. Three representatives of five different groups attended the three to four day tours. The first group consisted of Mike Francis, Alfred Baillargeon and Noel Doctor representing the Yellowknives Dene First Nation. The second group of participants consisted of Irene Fatt, Delphine Enzoe and Frankie Rabesca from the Lutsel K'e First Nation. Representatives of the North Slave Metis Alliance, Ed Jones, Grant Beck and Ashton Hawker, formed the third group. The fourth group consisted of representatives of the Kitikmeot Inuit Association from Kugluktuk: Joseph Nipitanatiak, Helen Enogaloak and Lynn Carter. The final participants were Joe Migwi, Georgina Chocolate and Francis Williah, representatives of the Tlicho Government. During each of the tours, four or five sites were visited on the ground and others were pointed out from the air. Helicopter transportation is the only feasible way of conducting these tours, which is why the tours are limited to three participants. Sites throughout the study area were examined, not just those near existing pits or activity areas. Development areas were also viewed from the air and an explanation of the type of archaeological work conducted at such locations was provided.

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**478**
**Archaeology**
**Bussey, Jean**

 Points West Heritage Consulting  
 Langley, BC

**File No:** (NWT Archaeologists Permit 2005-970)

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

**ARCHAEOLOGICAL INVESTIGATIONS CONDUCTED ALONG THE TIBBITT TO CONTWOYTO WINTER ROAD**

In 2005, Jean Bussey of Points West Heritage Consulting Ltd. conducted archaeological investigations for the Joint Venture that operates the Tibbitt to Contwoyto (formerly the Lupin) winter road. The winter road runs from the south end of Tibbitt Lake near Yellowknife to almost the north end of Contwoyto Lake in Nunavut. Field investigations in the Northwest Territories portion of the winter road involved a multi-disciplinary inspection tour conducted in June and archaeological assessment of a number of proposed developments in July. Olivia Donaher of Points West and Noel Doctor of the Yellowknives Dene First Nation assisted with the July investigations. This is the fifth consecutive year that the Joint Venture has sponsored investigations as part of their commitment to ensure that archaeological impacts are avoided or minimized.

In 2001, an archaeological inventory was conducted and resulted in the discovery of 49 new archaeological sites and the revisit of 14 previously recorded sites near the NWT portion of the winter road. Because the inventory was conducted nearly 20 years after construction of the road, some archaeological sites are near developed areas. In 2002, all sites within 30 m of the winter road or related facilities were revisited and if threatened were subjected to site assessment and/or mitigation or were protected through the erection of markers. As of the 2005 inspection tour, there are six sites in the NWT that are protected by markers.

The major objective of the June 2005 field reconnaissance was to determine if markers had adequately protected sites during the winter when the road was in use. The markers erected at five sites consist of standard four-foot (1.2 m) wooden survey stakes that were pounded approximately 30 cm (1 foot) into the ground. At the sixth site, because of the proximity of a winter road camp (Lockhart Lake Camp), Nuna Logistics arranged to install taller and more permanent metal markers with reflectors. During the June 2005 inspection tour, it was noted that the stakes were primarily intact and no disturbances were evident at the protected sites. The stakes at each site were re-pounded to ensure they would stand for another year. All stakes were sprayed with fluorescent orange paint to make them more visible (Photos 1). Also during this inspection, stakes were erected LeNs-27, a site that was not previously marked.

It is recommended that the status of the markers and their ability to provide site protection be reviewed annually. During this recheck it is recommended that any weakened markers be replaced, loose stakes be re-installed and the tops of all wooden markers be sprayed with orange paint. The second reconnaissance was undertaken in July 2005 to assess the archaeological potential of seven potential repeater stations, a possible gravel pit and proposed revisions to the north end of Portage 28. Six repeater stations and one possible alternate location are located between Yellowknife and the Diavik Diamond Mine and are intended to improve communications. Each location was examined and no archaeological sites were discovered. Subsurface testing and surface examination was undertaken at the proposed gravel pit which is located in West Bay on Gordon Lake. The proposed gravel pit is adjacent to an abandoned one used by a mine that was previously located in the vicinity (Photo 2). This detailed examination did not uncover any archaeological sites.

Safety concerns regarding a sharp corner around a bedrock knoll at the north end of Portage 28 have prompted Nuna Logistics to propose an alternate route in this area. The archaeological investigations in the vicinity of Portage 28 consisted of foot traverses and the examination of natural exposures in all areas that might be affected by the proposed revision. No archeological resources were encountered during this reconnaissance.

No archaeological sites were found during the field inventory conducted in July and the protected archaeological sites revisited in June are intact; markers have been reinforced at each site to assist in protecting these locations.

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## **479 Archaeology**

**Hanna, Don**  
Bison Historical Services  
Calgary, AB

**File No:** (NWT Archaeologists Permit 2005-971)  
**Region:** IN      **Location:** Richards Island

### **ENCANA CORPORATION, RICHARDS ISLAND EXPLORATION AND DEVELOPMENT PROGRAMS, 2005 HERITAGE RESOURCES SURVEY**

In July of 2005, Bison Historical Services Ltd. and Axys Environmental Inc. carried out a survey for heritage sites on Richards Island in the Mackenzie Delta, NWT, on behalf of EnCana Corporation. Known sites were re-visited to ensure that they had not been damaged by last winter's Umiak N-05 drilling program. We also examined the location of the proposed new Umiak D-16 facility and related access route to ensure that upcoming winter projects would not damage any heritage sites.

Known sites in the close vicinity of the exploratory drilling program were re-visited and successful avoidance was documented at seven known heritage sites located next to the overland access route. Very limited development related disturbances were noted at an eighth heritage site near Corral Bay. At this historic reindeer herding station some damage to a gathering fenceline was documented. No previously un-recorded heritage sites were identified during these investigations.

EnCana also is also contemplating the construction of a facility designated as D-16, northeast of Umiak Lake. This facility will be serviced by a short overland access route connecting to existing access routes. Examination of this proposed new facility location at D-16 and associated access route identified no heritage concerns.

Investigations were carried out by Don Hanna of Bison Historical Services Ltd., assisted by Myles Dillon of Inuvik, who acted as wildlife monitor and local advisor. Fieldwork was based out of Inuvik and carried out by helicopter and on foot. Investigations centered on northern Richards Island, in the interior near Umiak Lake and north towards Mason Bay, and in the vicinity of Corral Bay.

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**480** **Archaeology**

**Hanna, Don**  
Bison Historical Services  
Calgary, AB

**File No:** (NWT Archaeologists Permit 2005-972)  
**Region:** SA **Location:** Summit Creek, 60 km from Tulita

**2005 SUMMIT CREEK HERITAGE SURVEY**

In September of 2005, Bison Historical Services Ltd. carried out an archaeological survey for heritage sites in the vicinity of Summit Creek, about 60 km south of Tulita, NWT. These investigations were carried out at the request of Northern EnviroSearch Ltd. on behalf of Husky Energy. Fieldwork was based out of Tulita and carried out by helicopter over-flight and on foot. Investigations were carried out by Don Hanna of Bison Historical Services Ltd. and accompanied by Peter Horassi of Tulita, who acted as guide, advisor and wildlife monitor. Our investigations were aimed at ensuring that previously unrecorded heritage sites will not be disturbed by future developments in the area.

We examined three possible wellsite locations and portions of their connecting access routes. Only one heritage site was identified during this phase of operations. This is a relatively recent traditional land use camp that will not be directly disturbed by development activities. Another objective of our study was to carry out baseline investigations in the area of the proposed Summit Creek 3-D seismic survey. We were hampered in these investigations by bad weather in the high country but were still able to identify four prehistoric campsite or workshop locales in upland settings in the general study area. These sites all contain evidence for the ancient manufacture and use of tools made from a distinctive stone called Tertiary Hills welded tuff.

A final objective of our study was to identify elements of the old “Mountain Dene Trail to the Mountains”, portions of which are reported as passing through the project area. We were partially successful in this and were able to identify some portions of a trail system in the low-lying country along Summit Creek, as well as a large, early historic period traditional land-use campsite near the confluence of Summit Creek and the Keele River. Other indications of the trail may be found in the presence of two prehistoric workshops in the high altitude pass that crosses the Flint Stone Range southeast of Ground Squirrel Mountain.

These results indicate that there is considerable potential for more unrecorded heritage sites in this area, and that future developments must be carefully monitored to ensure these sites are not disturbed

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**481** **Archaeology**

**MacKay, Glen**  
Prince of Wales Northern Heritage Centre  
Yellowknife, NT

**File No:** (NWT Archaeologists Permit 2005-974)  
**Region:** DC **Location:** Trout Lake

### TROUT LAKE ARCHAEOLOGICAL SURVEY

Glen MacKay of the Prince of Wales Northern Heritage Centre (PWNHC) conducted an archaeological survey of Trout Lake, NWT under Archaeologist's Permit 2005-974. Tom Andrews of the PWNHC assisted MacKay and Violet Sanguéz, a Sambaa K'e cultural specialist with Crosscurrent Associates Ltd., facilitated the field project. Several community elders and students also participated in the fieldwork.

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

We recorded nineteen archaeological sites, including sacred sites, burials, historic cabins and camps, traditional trails and precontact sites, during the Sambaa K'e Archaeology Project. Working in close collaboration with Sambaa K'e Elders, we were also able to document some of the oral histories and traditions associated with these sites. Contextualized in this way, archaeological data illustrates how 'history is written on the land' at cultural places, and how these places are linked with the archaeological sites recorded during the project span several historical periods of Trout Lake. Archaeological site JcRg-1 is an abandoned United States Army Air Force weather station operated at Trout Lake during the Second World War. This station provided daily weather observations for military aircraft flying from Edmonton to the Yukon. This site represents a significant period of cultural contact between the Sambaa K'e Dene Band and the outside world. JdRg-1 is a multi-component precontact archaeological deposit at the confluence of Paradise River with Trout Lake. This site, buried beneath a contemporary fish camp, indicates that people have fished at this locality for thousands of years. Cultural places associated with stories from mythical times were also recorded. For example, JcRi-3 is a small stretch of beach covered in flat brown rocks. An important culture hero carried one of these rocks during his travels around the world and they are thought to contain significant medicine power. Together, these sites and the others recorded represent the beginnings of a culture-history of Trout Lake that incorporates the perspectives of both Aboriginal and Western cultural traditions.

The Sambaa K'e Archaeology Project seeks to integrate cultural and archaeological understandings into an integrated history of the Sambaa K'e cultural landscape. We hope to continue this project in future years.

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### 482 Archaeology

#### MacKay, Glen

Prince of Wales Northern Heritage Centre  
Yellowknife, NT

**File No:** (NWT Archaeologists Permit 2005-975)

**Region:** DC, NS **Location:** KM 136.1 of Highway 1; KM 30.1 of the Ingraham Trail

#### ARCHAEOLOGICAL ASSESSMENT: CULVERT REPLACEMENT; KM.136.1;HWY #1

Glen MacKay, Assessment Archaeologist at the Prince of Wales Northern Heritage Centre, conducted archaeological impact assessments for two GNWT Department of Transportation projects under NWT Archaeologist's Permit 2005-975.

A review of the development plans for the first project – a culvert replacement at KM 136.1 of Highway #1 – indicated that archaeological site JfQe-1 was located less than 30 m from the detour route proposed for the culvert replacement. We decided to facilitate avoidance of JfQe-1 by relocating the site and staking its perimeter.

Archaeological site JfQe-1, recorded by William Noble in 1966, is located on the top of a sand ridge trending northeast to southwest on the east side of the culvert. By the time of Noble's survey, bulldozing in the

highway right-of-way had erased a large section of this ridge, leaving intact portions on either side of the highway demarcated by steep cutbanks of reddish sand underlain by gravel. Noble surface collected several artifacts, including lithic debitage, fire-cracked rock and a large circular quartzite cobble chopper, in the exposed sediments of these cutbanks, indicating that JfQe-1 had once spanned the highway right-of-way. On the south side of the highway Noble found intact subsurface deposits of JfQe-1 on a flat, forested section of the ridge.

Thorough visual inspection of the forested ridge top on the south side of the highway resulted in the discovery of Noble's excavation units from 1966, still visible as distinct depressions on the west side of the forested area. Eighteen shovel tests led to the recovery of one black chert flake. Characteristic of the subarctic archaeological record, JfQe-1 is a low-density lithic scatter located on a raised landform overlooking a small watercourse.

A proposed gravel quarry at KM 30.1 of the Ingraham Trail was the focus of the second archaeological impact assessment conducted on behalf of the Department of Transportation. The proposed quarry is an approximately 100 x 100 m area of exposed bedrock sparsely vegetated with jack pine. The development area was assessed for archaeological resources by thorough visual inspection.

The majority of the proposed quarry, characterized by undulating bedrock with very few flat areas, exhibited low potential for archaeological sites. Several quartz veins were carefully inspected for evidence of precontact quarrying activity and tool manufacture but no definitive quartz artifacts were found; rather, the quartz debris associated with the veins appeared to be the result of natural exfoliation or historic prospecting activities.

The services of the Assessment Archaeologist at the Prince of Wales Northern Heritage Centre are available to all GNWT departments requiring archaeological impact assessment of their development projects.

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**483**

**Archaeology**

**Prager, Gabriella**

Points West Heritage Consulting  
Leduc, AB

**File No:** (NWT Archaeologists Permit 2005-967)

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

**TYHEE YELLOWKNIFE GOLD PROJECT**

In June 2005, on behalf of Tyhee NWT Corp., Points West Heritage Consulting Ltd. conducted archaeological assessments for the proposed Yellowknife Gold Project. This project is located approximately 85 km north of Yellowknife near the historic Discovery Mine that was abandoned in 1969. The proposed Yellowknife Gold Project is located in the vicinity of Winter Lake, about 3 km southwest of the Discovery Mine, with a possible future development at Nicholas Lake, approximately 12 km to the northeast.

Archaeological assessments were conducted of specific proposed development components identified on plans received in June, 2005. These consisted of:

- A proposed tailings containment area and associated facilities at Winter Lake;
- Potential all weather road route to Nicholas Lake;
- Existing winter road route to Yellowknife;
- Alternative locations for processing plant and camp;
- Preliminary assessment of a possible esker airstrip.

The specific mine area at Winter Lake was examined in 2004. Assessments were completed by a combination of low and slow helicopter overflights and surveys on foot of selected portions of each development area judged to have some potential for archaeological resources. Shovel testing was conducted wherever the

terrain suggested some possibility for past human use, for example, elevated, dry, level ground where people would like to camp.

Heritage resources found in 2005 were associated with hunting camps dating considerably less than 50 years of age. Three such camps were found on Winter Lake (in addition to the exploration camp recorded last year): two on the east shore of the lake and one on the island in Winter Lake. One additional camp was observed on Prosperous Lake. These sites displayed various ways that available resources were used for construction of shelters and other needs. Miscellaneous structural remains and debris related to exploration, mining and gravel extraction were also encountered. Because these remains are all comparatively recent, no further work is recommended.

No archaeological remains were found. It should be emphasized that these conclusions refer only to archaeological resources, that is, remains older than 50 years. The potential for archaeological sites in the specific areas to be affected by the mine and camp facilities is rated as low. Much of the area covered by the development of the Yellowknife Gold Project is characterized by low, waterlogged ground or rocky, irregular terrain, generally considered unappealing for human use. The major terrain features with archaeological potential in this vicinity are eskers but these are of limited extent within the presently proposed development zones. If final plans include use of eskers for borrow or other purposes, additional field assessment will be necessary. Within the remainder of the currently proposed development area, it is considered unlikely to encounter archaeological resources.

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**484**

**Archaeology**

**Thomson, Callum**  
Thomson Heritage  
Calgary, AB

**File No:** (NWT Archaeologists Permit 2005-976)

**Region:** NS      **Location:** Drybones Bay, Great Slave Lake

**NEW SHOSHONI VENTURES ASSESSMENT AT DRYBONES BAY**

An archaeological survey and impact assessment was conducted on behalf of New Shoshoni Ventures Ltd. by Callum Thomson and Euan Thomson of Thomson Heritage Consultants, Calgary, and Morris Martin, Yellowknives Dene First Nation, Dettah. The survey took place within New Shoshoni mineral claim blocks on the south side of the mouth of Drybones Bay, an area previously found to be quite densely populated with archaeological and recent sites demonstrating a long history of occupation and land use by Yellowknives Dene and other aboriginal groups. The main focus of the 2005 survey was on terrain in the vicinity of 13 planned drill sites, half of which will be drilled through winter ice on Drybones Bay; most of the rest are on bedrock outcrops close to the shore of the bay.

Thirty-three new archaeological sites were found and recorded within the study area; these and 20 previously-recorded sites were assessed for potential impacts from exploration activities. Most of the sites contained one or more boulder features such as tent rings, where people had camped, hide-drying rings where freshly-skinned moose or perhaps caribou hides had been stretched out to dry, birchbark presses where sheets of bark cut from nearby birch trees were flattened prior to use in making canoes, and hearths or fireplaces. A few other sites contained quartz quarries where veins had clearly been exploited during the pre-contact period and where recognizable tools or tool fragments were sometimes found; scatters of other stone tool-making material such as mudstone and chert were found at several sites. Little evidence was found of any previous disturbance of heritage resources in the New Shoshoni project area. Four sites were identified that may require mitigation if exploration proceeds as planned, as each site is located within 100-150 m of proposed drill sites.

Mitigation measures proposed included detailed inspection of the affected drilling locations, development of site protection procedures such as placement of fences around sites, avoidance of exploration activities within

30 m of site boundaries, and modification of drilling methods, where necessary. It was also suggested that New Shoshoni invite Yellowknives Dene elders and officials to inspect planned drill sites and review proposed mitigation strategies proposed for nearby archaeological sites.

# Department of Environment and Natural Resources

## WILDLIFE RESEARCH PERMITS

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### 485 **Wildlife**

**Auriat, Denise**

Gwich'in Renewable Resource Board

P.O. Box 2240

Inuvik, NT X0E 0T0

**File No:** 3103**Region:** IN **Location:** Inuvik region**DALL'S SHEEP HABITAT ECOLOGY PROJECT**

Objectives: To conduct a Dall's sheep habitat ecology project.

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### 486 **Wildlife**

**Bayne, Erin**

University of Alberta

CW 405, Biological Sciences Centre

Edmonton, AB T6G 2E9

**File No:** 3044**Region:** DC **Location:** Across the Mackenzie River, near Fort Simpson, Wrigley and Trout Lake**IMPACTS OF PIPELINE EFGES ON THE PREDATION DYNAMICS OF NESTING FOREST SONGBIRDS**

Objectives: To examine linear features created by the energy sector on rates of nest predation and small mammal abundance.

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### 487 **Wildlife**

**Bayne, Erin**

University of Alberta

CW 405, Biological Sciences Centre

Edmonton, AB T6G 2E9

**File No:** 3076**Region:** DC **Location:** Near Enterprise, Fort Providence, Hay River, Fort Smith, Kakisa**CUMULATIVE EFFECTS AND THE DEVELOPMENT OF MAMMALIAN DOSE-RESPONSE CURVES**

Objectives: To conduct ground surveys on boreal mammals in the South Slave and Deh Cho regions.

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### 488 **Wildlife**

**Bollinger, Karen**

US Fish and Wildlife Service

11510, American Holly Drive

Laurel, MD USA 20708-4002

**File No:** 3014**Region:** DC **Location:** Mills Lake

Objectives: To conduct bird banding at Mills Lake under the Western Canada Cooperative Waterfowl Banding Program.

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

**File No:** 3108  
**Region:** IN **Location:** Inuvialuit Settlement Region

**GRIZZLY BEAR POPULATION STUDY: PHASE 1 SATELLITE TRACKING**  
 No report available.

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

**File No:** 3112  
**Region:** IN **Location:** Inuvialuit Settlement Region

**PORCUPINE CARIBOU BODY CONDITION STUDY**  
 No report available.

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**491** **Wildlife**  
**Buckland, Laurie**  
 Golder Associates  
 1000, 940 - 6 Avenue SW  
 Calgary, AB T2P 3T1

**File No:** 3006  
**Region:** SS **Location:** Cameron Hills

**WINTER TRACK COUNTS ALONG CAMERON HILLS GATHERING SYSTEM AND TRANSBORDER PIPELINE**  
 Objectives: To conduct winter track counts along the Cameron Hills gathering system and transborder pipeline.

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**492** **Wildlife**  
**Buckland, Laurie**  
 Golder Associates  
 1000, 940 - 6 Avenue SW  
 Calgary, AB T2P 3T1

**File No:** 3049  
**Region:** SS **Location:** Fort Liard area

**MONITORING MIGRATORY BIRDS ALONG THE FORT LIARD PIPELINE ROW**  
 Objectives: To conduct breeding bird monitoring along Paramount Resources Ltd's Fort Liard Pipeline right-of-way.

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**493** **Wildlife**  
**Carrierre, Suzanne**  
 GNWT Department of Environment and Natural Resources  
 600, 5102 - 50 Avenue  
 Calgary, AB X1A 3S8

**File No:** 3087  
**Region:** All **Location:** Throughout the NWT

**NWT SMALL MAMMAL AND HARE SURVEY**

No report available.

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**494** **Wildlife****Carrierre, Suzanne**

GNWT Department of Environment and Natural Resources  
600, 5102 - 50 Avenue  
Calgary, AB X1A 3S8

**File No:** 3088**Region:** SA, GW, IN **Location:** Mackenzie Valley, from south of Norman Wells to Inuvik**FIVE-YEAR PEREGRINE FALCON SURVEY - MACKENZIE VALLEY 2005**

No report available.

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**495** **Wildlife****Catto, Steve**

Parks Canada  
P.O. Box 348  
Fort Simpson, NT X0E 0N0

**File No:** 3047**Region:** SA, DC **Location:** Greater Nahanni ecosystem**DISTRIBUTION AND TRANS-BOUNDARY MOVEMENTS OF GRIZZLY BEARS WITHIN THE GREATER NAHANNI ECOSYSTEM**

No report available.

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**496** **Wildlife****Catto, Steve**

Parks Canada  
P.O. Box 348  
Fort Simpson, NT X0E 0N0

**File No:** 3050**Region:** SA, DC **Location:** Greater Nahanni ecosystem**DALL'S SHEEP WITHIN THE GREATER NAHANNI ECOSYSTEM**

No report available.

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**497** **Wildlife****Cluff, Dean**

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

**File No:** 3086**Region:** NS **Location:** Alymer and Clinton-Colden lakes, Pellatt Lake, Point Lake, Jolly Lake, Mackay and Walmsley lakes**ECOLOGY AND MOVEMENTS OF TUNDRA WOLVES**

Objectives: To conduct studies on wolves, including aerial surveys and carcass collections.

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**498** **Wildlife****Coulton, Dan**

University of Saskatchewan  
115, Perimeter Road  
Saskatoon, SK X1A 2P9

**File No:** 3090  
**Region:** DC, SA **Location:** Mills Lake, Stage River and Willow Lake

**SOURCES OF RECRUITS TO LOCAL MALLARD POPULATIONS IN PRAIRIE CANADA**

No report available.

**499** **Wildlife**

**Derocher, Andrew**  
 University of Alberta  
 CW 405, Biological Sciences Building  
 Edmonton, AB T6G 2E9

**File No:** 3104  
**Region:** IN, GW **Location:** Inuvik region

**ECOLOGY OF GRIZZLY BEARS IN THE MACKENZIE DELTA OIL AND GAS DEVELOPMENT AREA**

Objectives: To conduct a grizzly bear ecology study.

**500** **Wildlife**

**Dickson, Lynne**  
 Canadian Wildlife Service  
 200-4999, 98<sup>th</sup> Avenue  
 Edmonton, AB T6B 2X3

**File No:** 3299  
**Region:** IN **Location:** Western portion of Victoria Island

**POPULATION SURVEYS OF LONG-TAILED DUCKS AND KING EIDERS**

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

**501** **Wildlife**

**Elkin, Brett**  
 GNWT Department of Environment and Natural Resources  
 600-5102, 50<sup>th</sup> Avenue  
 Yellowknife, NT X1A 3S8

**File No:** 3079  
**Region:** Various **Location:** Various locations in the NWT

Objectives: To conduct wildlife health and genetic monitoring by testing samples from sick/dead animals.

**502** **Wildlife**

**Elkin, Brett**  
 GNWT Department of Environment and Natural Resources  
 600-5102, 50<sup>th</sup> Avenue  
 Yellowknife, NT X1A 3S8

**File No:** 3091  
**Region:** Various **Location:** Various locations in the NWT

Objectives: To conduct wildlife health and genetic monitoring by testing samples from sick/dead animals.

**503** **Wildlife**

**Ellsworth, Troy**  
 GNWT Department of Environment and Natural Resources  
 P.O. Box 390  
 Fort Smith, NT X1A 0P0

**File No:** 3042**Region:** DC, SS **Location:** Liard River Valley, Nahanni area in South Slave**NAHANNI-LIARD BISON POPULATION DEMOGRAPHICS AND BISON DISTRIBUTION ALONG THE LIARD RIVER VALLEY**

Objectives: To conduct research on bison in the Liard Valley, including classification surveys to calculate density and distribution.

**504****Wildlife****Gunn, Anne**GNWT Department of Environment and Natural Resources  
600-5102, 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 3S8**File No:** 3080**Region:** IN **Location:** Bathurst Caribou herd location**MOVEMENT OF CARIBOU OF THE AHIK HERD**

Objectives: To continue to monitor the movements of the Bathurst Caribou herd.

**505****Wildlife****Gunn, Anne**GNWT Department of Environment and Natural Resources  
600-5102, 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 3S8**File No:** 3081**Region:** IN **Location:** Bathurst Caribou herd location

No report available.

**506****Wildlife****Haszard, Shannon**Ducks Unlimited Canada  
4921, 49<sup>th</sup> Street  
Yellowknife, NT X1A 2P1**File No:** 3045**Region:** DC **Location:** Sambaa K'e Region**DETAILED MAPPING OF THE SAMBAA K'E REGION FOR POTENTIAL WETLAND AND WATERFOWL CONSERVATION**

No report available.

**507****Wildlife****Haszard, Shannon**Ducks Unlimited Canada  
4921, 49<sup>th</sup> Street  
Yellowknife, NT X1A 2P1**File No:** 3089**Region:** SA, DC **Location:** Pehdzeh Ki Ndeh region (south of the Sahtu region to Deline extending to the mid Deh Cho region near Fort Simpson)**PEHDZEH KI NDEH VEGETATION MAPPING PROJECT**

No report available.

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**508** **Wildlife****Hines, Jim**Canadian Wildlife Service  
301-5204, 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2**File No:** 3105**Region:** IN **Location:** Anderson River Bird Sanctuary**FACTORS CAUSING DECLINING NUMBERS OF LESSER SNOW AND BRANT GEESE AT ANDERSON RIVER BIRD SANCTUARY**

No report available.

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**509** **Wildlife****Hines, Jim**Canadian Wildlife Service  
301-5204, 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2**File No:** 3106**Region:** IN **Location:** Inuvialuit Settlement Region**SURVEYS OF GEESE AND SWANS IN THE INUVIALUIT SETTLEMENT REGION**

No report available.

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**510** **Wildlife****Hines, Jim**Canadian Wildlife Service  
301-5204, 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2**File No:** 3109**Region:** IN **Location:** Wintin Banks Island Migratory Bird Sanctuary #1**SNOW GEESE POPULATION AND HABITAT STUDIES IN THE INUVIALUIT SETTLEMENT REGION**

Objectives: To conduct a snow goose survey.

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**511** **Wildlife****Hines, Jim**Canadian Wildlife Service  
301-5204, 50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2**File No:** 3111**Region:** IN **Location:** Inuvialuit Settlement Region**SURVEYS OF GEESE AND SWANS IN THE INUVIALUIT SETTLEMENT REGION**

Objectives: To conduct a swan survey.

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**512** **Wildlife****Johns, Brian**GNWT Department of Environment and Natural Resources  
P.O. Box 390  
Fort Smith, NT S7N 0X4**File No:** 3013**Region:** SS **Location:** South Slave region outside of Wood Buffalo National Park**WHOOPIING CRANE STUDIES BY WOOD BUFFALO NATIONAL PARK**

Objectives: To conduct whooping crane monitoring outside of Wood Buffalo National Park.

COMPENDIUM OF RESEARCH IN THE NORTHWEST TERRITORIES — 2004-2005

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**513** **Wildlife**

**Johnson, Deborah**  
Canadian Wildlife Service  
115, Perimeter Road  
Saskatoon, SK X0E 0P0

**File No:** 3007

**Region:** SS **Location:** Cameron Hills area

**BASELINE HEALTH, SURVIVAL AND RECRUITMENT OF BOREAL CARIBOU**

Objectives: To conduct baseline health, survival and calf recruitment studies, including radio-tracking on boreal caribou in the Cameron Hills area.

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**514** **Wildlife**

**Johnson, Deborah**  
Canadian Wildlife Service  
115, Perimeter Road  
Saskatoon, SK X0E 0P0

**File No:** 3008

**Region:** SS **Location:** Slave River Delta

**BASELINE CONDITIONS OF MUSKRAT AND PREVALENCE OF TULAREMIA IN SLAVE RIVER DELTA**

Objectives: To conduct research on baseline health, body condition, age and sex parameters, seasonal diet and reproductive parameters on muskrat.

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**515** **Wildlife**

**Johnson, Vicky**  
Canadian Wildlife Service  
301-5204, 50<sup>th</sup> Avenue  
Yellowknife, NT X0E 0P0

**File No:** 3083

**Region:** IN, GW, SA **Location:** Mackenzie Valley pipeline route and Mackenzie River from Inuvik to Norman Wells

**BOREAL SHOREBIRD MONITORING PROGRAM**

Objectives: To conduct a shorebird monitoring program as part of the Program for Regional and International Shorebird Monitoring (PRISM).

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**516** **Wildlife**

**Johnson, Vicky**  
Canadian Wildlife Service  
301-5204, 50<sup>th</sup> Avenue  
Yellowknife, NT X0E 0P0

**File No:** 3107

**Region:** IN **Location:** Inuvialuit region

**ARCTIC SHOREBIRD MONITORING PROGRAM**

No report available.

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**517** **Wildlife**

**Lafrance, Michel**  
Yellowknife Airport  
Yellowknife, NT X1A 3T2



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**522** **Wildlife****Larter, Nic**

GNWT Environment and Natural Resources  
P.O. Box 240  
Fort Simpson, NT X0E 0N0

**File No:** 4952**Region:** DC **Location:** Deh Cho region**MONITORING OF THE DENSITY AND DISTRIBUTION OF MOOSE IN AREAS IN THE LIARD VALLEY DEEMED IMPORTANT TO LOCAL FIRST NATIONS**

Objectives: To collect baseline information on the current density and distribution of moose along the Mackenzie and Liard rivers, and to conduct biological sampling on harvested moose in the Deh Cho region.

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**523** **Wildlife****Latour, Paul**

Canadian Wildlife Service  
301-5204, 50<sup>th</sup> Avenue  
Fort Simpson, NT X0E 0N0

**File No:** 3043**Region:** DC **Location:** Deh Cho region**TRUMPTER SWAN POPULATION DYNAMICS**

Objectives: To conduct an aerial survey of wetland to classify and tally trumpeter swans in age classes and the number of young in each brood.

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**524** **Wildlife****Latour, Paul**

Canadian Wildlife Service  
301-5204, 50<sup>th</sup> Avenue  
Fort Simpson, NT X0E 0N0

**File No:** 3084**Region:** SA **Location:** Ramparts River and wetlands (west of Ft. Good Hope)**ECOLOGICAL ASSESSMENT OF TS'UDELILINE–TUYETAH CANDIDATE PROTECTED AREA**

Objectives: To conduct an ecological assessment of Ts'udeliline–Tuyetah Candidate Protected Area.

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**525** **Wildlife****Machtans, Craig**

Canadian Wildlife Service  
301-5204, 50<sup>th</sup> Avenue  
Fort Simpson, NT X0E 0N0

**File No:** 3085**Region:** DC **Location:** Fort Liard/Liard Valley**LIARD VALLEY FOREST SONGBIRD STUDY**

Objectives: To conduct songbird counts along the Liard Valley.

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**526** **Wildlife****McLeod, Carla**

Wolverine Air  
P.O. Box 62  
Hills Spring, AB T0K 1E0

**File No:** 3046  
**Region:** DC, SA **Location:** South Nahanni (DOT/01)

**RESEARCH ON HARVESTED DALL'S SHEEP AND CARIBOU WITHIN THE SOUTH NAHANNI DOT/01 ZONE**

Objectives: To conduct research on harvested Dall's sheep and caribou within the South Nahanni DOT/01 zone.

**527** **Wildlife**

**Moore, Steve**  
 EBA Engineering Consultants Ltd.  
 210-4916 49<sup>th</sup> Street  
 Yellowknife, NT X1A 2P7

**File No:** 3015  
**Region:** SS **Location:** Pine Point, except Katlodeeche First Nation traditional lands

**BASELINE WILDLIFE UTILIZATION SAMPLING IN CONJUNCTION WITH DEVELOPMENT OF ECOSYSTEM CLASSIFICATION MAP FOR THE PINE POINT AREA**

No report available.

**528** **Wildlife**

**Moore, Steve**  
 EBA Engineering Consultants Ltd.  
 210-4916 49<sup>th</sup> Street  
 Yellowknife, NT X1A 2P7

**File No:** 3077  
**Region:** NS **Location:** Locations within Tyhee NWT Corp's (formally known as Discovery Mine) land use permit

**2005 BASELINE DATA COLLECTION YELLOWKNIFE GOLD PROJECT, TYHEE NWT CORP. (DISCOVERY MINE SITE)**

No report available.

**529** **Wildlife**

**Mulders, Robert**  
 GNWT Department of Environment and Natural Resources  
 600-5102, 49<sup>th</sup> Street  
 Yellowknife, NT X1A 3S8

**File No:** 3078  
**Region:** All **Location:** Throughout the NWT

**NWT WOLVERINE CARCASS COLLECTION**

To conduct wolverine carcass collection in the NWT.

**530** **Wildlife**

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

**File No:** 3110  
**Region:** IN **Location:** Banks Island and north-west Victoria Island

**BANKS AND NW VICTORIA ISLAND PEARY CARIBOU, MUSK-OX AND ARCTIC WOLF POPULATION SURVEY**

Objectives: To conduct a Peary caribou, musk-ox and arctic wolf population survey.

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**531** **Wildlife****Nagy, John**

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

**File No:** 3296**Region:** IN, GW **Location:** Inuvik region caribou herd ranges**PHOTOCENSUS, LATE WINTER RECRUITMENT AND POST-CALVING PRODUCTIVITY SURVEYS OF THE CAPE BATHURST, BLUENOSE-WEST AND BLUENOSE-EAST BARREN-GROUND CARIBOU**

Objectives: To conduct research on barren-ground caribou.

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**532** **Wildlife****Nagy, John**

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

**File No:** 3297**Region:** GW **Location:** Inuvik region, Gwich'in Settlement Area**BOREAL WOODLAND CARIBOU**

Objectives: To conduct research on boreal woodland caribou.

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**533** **Wildlife****Nishi, John**

GNWT Department of Environment and Natural Resources  
 P.O. Box 390  
 Fort Smith, NT X0E 0P0

**File No:** 3009**Region:** SS **Location:** Mackenzie Bison Sanctuary**POPULATION AND DISEASE MONITORING OF BISON IN THE MACKENZIE BISON SANCTUARY**

No report available.

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**534** **Wildlife****Nishi, John**

GNWT Department of Environment and Natural Resources  
 P.O. Box 390  
 Fort Smith, NT X0E 0P0

**File No:** 3010**Region:** SS **Location:** Slave River lowlands

Objectives: To conduct population and disease monitoring of bison in the Slave River lowlands.

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**535** **Wildlife****Nishi, John**

GNWT Department of Environment and Natural Resources  
 P.O. Box 390  
 Fort Smith, NT X0E 0P0

**File No:** 3011**Region:** SS **Location:** Hook Lake

Objectives: To conduct the Hook Lake Wood Bison Recovery Project.

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**536** **Wildlife**  
**Nishi, John**  
 GNWT Department of Environment and Natural Resources  
 P.O. Box 390  
 Fort Smith, NT X0E 0P0

**File No:** 3012  
**Region:** SS **Location:** Slave River region

Objectives: To conduct surveillance of the Bison Control Area.

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**537** **Wildlife**  
**Pretzlaw, Troy**  
 McGill University  
 21111, Lakeshore Road  
 Ste-Anne-de-Bellevue, QC H9X 3V9

**File No:** 3295  
**Region:** GW **Location:** Inuvik region along the Dempster Highway

**MAMMAL COMPOSITION ACROSS THE FOREST-TUNDRA TRANSITION: IMPLICATIONS OF CLIMATE CHANGE**  
 Objectives: To conduct research on mammal composition.

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**538** **Wildlife**  
**Shier, Catherine**  
 University of Alberta  
 CW 405, Biological Sciences Building  
 Edmonton, AB T6G 2E9

**File No:** 3294  
**Region:** IN, GW **Location:** Inuvik region

**SYNCHRONY BETWEEN MINK AND MUSKRAT POPULATIONS IN CANADA**  
 Objectives: To conduct a mink and muskrat carcass collection.

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**539** **Wildlife**  
**Slatterly, Stuart**  
 Ducks Unlimited Canada  
 P.O. Box 1160  
 Stonewall, MB R0C 2Z0

**File No:** 3300  
**Region:** GW **Location:** Tundra-Cardinal-Clearwater lakes complex

**DEMOGRAPHIC RATES AND FACTORS LIMITING BREEDING DUCK POPULATIONS IN THE MACKENZIE VALLEY, WITH SPECIAL EMPHASIS ON SCOTERS AND SCAUP**  
 Objectives: To conduct research on scoters and scaup.

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**540** **Wildlife**  
**Stirling, Ian**  
 Canadian Wildlife Service  
 5320, 122<sup>nd</sup> Street  
 Edmonton, AB T6H 3S5

**File No:** 3298  
**Region:** IN **Location:** Eastern Beaufort Sea and Amundsen Gulf

**POPULATION ASSESSMENT OF POLAR BEARS IN THE BEAUFORT SEA AND AMUNDSEN GULF**

Objectives: To conduct polar bear research.

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**541**

**Wildlife**

**Voelzer, James**

US Fish and Wildlife Service  
911 NE 11<sup>th</sup> Avenue  
Portland, OR USA 97232-4181

**File No:** 2875

**Region:** All      **Location:** Throughout the NWT

**COOPERATIVE US-CANADA WATERFOWL POPULATION SURVEYS**

No report available.

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**542**

**Wildlife**

**Wilson, Matthew**

US Geological Survey  
505 Azuar Drive  
San Francisco, CA USA 94592

**File No:** 3082

**Region:** All      **Location:** Throughout the NWT

**CROSS-SEASONAL LINKAGES OF SURF SCOTERS (*Melanitta perspicillata*) WINTERING IN THE PACIFIC FLYWAY AND BREEDING IN THE NWT**

Objectives: To conduct tracking of surf scoters in the NWT.

## Department of Fisheries and Oceans

### FISHERIES SCIENTIFIC LICENCES

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#### 543 Fisheries

**Babaluk, John**  
DFO  
501 University Crescent  
Winnipeg, MB R3T 2N6

**File No:** SLE-05/06-303

**Location:** South Nahanni River, 61°03', 123°21', Little Nahanni River, 62°28', 128°37' and Broken Skull River, 62°16', 127°39', outside the boundaries of Nahanni National Park

Objectives: To determine the occurrence and distribution of fish species, collect basic biological data from fish and document the distribution of bull trout. The data collected will be utilized to develop a protocol for use in the management and monitoring of species in the area.

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#### 544 Fisheries

**Babaluk, John**  
DFO  
501 University Crescent,  
Winnipeg, MB R3T 2N6

**File No:** SLE-05/06-304

**Location:** Prairie Creek, 61°23', 124°29' and Flat River, 61°24', 126°38', outside the boundaries of Nahanni National Park

Objectives: To determine the occurrence and distribution of fish species, collect basic biological data from fish and document the distribution of bull trout. The data collected will be utilized to develop a protocol for use in the management and monitoring of species in the area.

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#### 545 Fisheries

**Bekhuys, Tim**  
AMEC, 2227 Douglas Road  
Burnaby, BC V5C 5A9

**File No:** SLE-05/06-209

**Location:** Gahcho Kué (Kennady Lake) and tributaries within 10 km of 63°26'34", 109°11'45"

Objectives: To continue the collection of data for use in the preparation of an environmental impact assessment of mine development activities in the Gahcho Kué area. Sampling will be conducted to determine the movements of fish between lakes and streams and to gain a better understanding of fish community characteristics and spawning locations.

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#### 546 Fisheries

**Bekhuys, Tim**  
AMEC, 2227 Douglas Road  
Burnaby, BC V5C 5A9

**File No:** SLE-05/06-210

**Location:** Unnamed Lake (control lake): 63°27'44", 109°18'54"

Objectives: To continue the collection of data for use in the preparation of an environmental impact

assessment of mine development activities in the Gahcho Kué area. Sampling will be conducted to determine the movements of fish between lakes and streams and to gain a better understanding of fish community characteristics and spawning locations.

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**547 Fisheries**

**Bekhuys, Tim**

AMEC, 2227 Douglas Road  
Burnaby, BC V5C 5A9

**File No:** SLE-05/06-211

**Location:** Unnamed Lake (Lake 410): 63°32'04", 109°03'27"

Objectives: To continue the collection of data for use in the preparation of an environmental impact assessment of mine development activities in the Gahcho Kué area. Sampling will be conducted to determine the movements of fish between lakes and streams and to gain a better understanding of fish community characteristics and spawning locations.

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**548 Fisheries**

**Bekhuys, Tim**

AMEC, 2227 Douglas Road  
Burnaby, BC V5C 5A9

**File No:** SLE-05/06-261

**Location:** Kirk Lake and connecting stream to Lake 410 within 10 km of 63°40'00", 109°07'00"

Objectives: To determine fish absence/presence and species composition in areas that may be affected by the proposed mine development.

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**549 Fisheries**

**Bekhuys, Tim**

AMEC, 2227 Douglas Road  
Burnaby, BC V5C 5A9

**File No:** SLE-05/06-262

**Location:** Aylmer Lake and connecting streams to Kirk Lake within 10 km of 63°58'00", 108°51'00"

Objectives: To determine fish absence/presence and species composition in areas that may be affected by the proposed mine development.

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**550 Fisheries**

**Bergmann, Marty**

DFO  
501 University Crescent  
Winnipeg, MN R3T 2N6

**File No:** SLE-05/06-290

**Location:** Beaufort Sea (aboard *Nahidik*) within boundaries formed by the following coordinates:  
69.15205° to 70.46865° and 133.09160° to 138.68188°

Objectives: To "ground truth" data from hydroacoustic surveys of biota on the sea floor and water column; to collect information on the trophic structure of fish communities and obtain gut content and tissue collections for stable isotope analysis; and to continue the gathering of samples for ongoing genetic and contaminant studies.

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**551 Fisheries****Brewin, Kerry**

Dillon Consulting Ltd.  
101-6th Avenue SW,  
Calgary, AB T2P 3P4

**File No:** SLE-05/06-259

**Location:** Matthews Lake, Zone 12: 487756E, 7105202N; unnamed stream (Stream B): 490879E, 7105612N; unnamed water body (Pond B): 492550E, 7104400N

Objectives: To determine if fish are utilizing the rehabilitated habitats for migration, spawning/rearing.

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**552 Fisheries****Cott, Pete**

DFO  
5204-50<sup>th</sup> Avenue  
Yellowknife, NT X1A 1E2

**File No:** SLE-05/06-259

**Location:** Matthews Lake, Zone 12: 487756E, 7105202N; unnamed stream (Stream B): 490879E, 7105612N; unnamed water body (Pond B): 492550E, 7104400N

Objectives: To determine if fish are utilizing the rehabilitated habitats for migration, spawning/rearing.

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**553 Fisheries****Couture, Richard**

EBA Engineering Consultants Ltd.  
9<sup>th</sup> Floor – West Hastings Street  
Vancouver, BC V6E 3X2

**File No:** SLE-05/06-216

**Location:** Narrow Lake: 63°09'36", 113°56'24"

Objectives: To continue the assessments of fish and fish habitat to supplement the existing data base on the streams that may be crossed by an all weather road and water bodies which the streams connect.

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**554 Fisheries****Couture, Richard**

EBA Engineering Consultants Ltd.  
9<sup>th</sup> Floor – West Hastings Street  
Vancouver, BC V6E 3X2

**File No:** SLE-05/06-217

**Location:** Winter Lake: 63°10'12", 113°55'12"

Objectives: To continue the assessments of fish and fish habitat to supplement the existing data base on the streams that may be crossed by an all weather road and water bodies which the streams connect.

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**555 Fisheries****Couture, Richard**

EBA Engineering Consultants Ltd.  
9<sup>th</sup> Floor – West Hastings Street  
Vancouver, BC V6E 3X2

**File No:** SLE-05/06-218

**Location:** Various streams within a study area bounded by straight lines connecting the following coordinates in the order in which they are listed:  
63°08'24", 114°03'00"

63°00'00", 113°33'36"  
 63°00'00", 113°28'48"  
 63°08'24", 113°27'00"

Objectives: To continue the assessments of fish and fish habitat to supplement the existing data base on the streams that may be crossed by an all weather road and water bodies which the streams connect.

**556 Fisheries**

**Dick, Terry**  
 University of Manitoba  
 Department of Zoology  
 Winnipeg, MB R3T 2N2

**File No:** SLE-05/06-257

**Location:** Chitty Lake: 62°42'50", 114°07'55"

Objectives: To evaluate the trophic feeding structure through species composition, food habits and parasite studies and to establish patterns of movements of fish relative to habitat with the use of sonar tags.

**557 Fisheries**

**Eschenroder, Randy**  
 Great Lakes Fishery Commission  
 2100 Commonwealth Boulevard, Suite 100  
 Ann Arbor, MI 48105

**File No:** SLE-05/06-294

**Location:** Area 5 and 6 of Great Slave Lake (62–50° N x 113–50° W)

Objectives: To study the morphological diversity of lake trout and to differentiation between shallow and deep forms; and to collect and preserve cisco by-catch for later species identification by Dr. Jim Reist.

**558 Fisheries**

**Evans, Marlene**  
 Environment Canada  
 11, Innovation Boulevard  
 Saskatoon, SK, S7N 3H5

**File No:** SLE-05/06-296

**Location:** Area V in the Lutsel K'e area: 62°24' N, 110°44' W

Objectives: To determine changes in contaminants levels in fish harvested by commercial and subsistence users in the NWT.

**559 Fisheries**

**Evans, Marlene**  
 Environment Canada  
 11, Innovation Boulevard  
 Saskatoon, SK, S7N 3H5

**File No:** SLE-05/06-297

**Location:** Area III in the Fort Resolution area: 61°10' N, 113°42' W

Objectives: To determine changes in contaminants levels in fish harvested by commercial and subsistence users in the NWT.

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**560 Fisheries**

**Evans, Marlene**  
 Environment Canada  
 11, Innovation Boulevard  
 Saskatoon, SK, S7N 3H5

**File No:** SLE-05/06-298

**Location:** Cli Lake: 61°59'00" N, 123°18'00" W

Objectives: To determine changes in contaminants levels in fish harvested by commercial and subsistence users in the NWT.

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**561 Fisheries**

**Evans, Marlene**  
 Environment Canada  
 11, Innovation Boulevard  
 Saskatoon, SK, S7N 3H5

**File No:** SLE-05/06-299

**Location:** Colville Lake: 67°10'00" N, 126°00'00" W

Objectives: To determine changes in contaminants levels in fish harvested by commercial and subsistence users in the NWT.

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**562 Fisheries**

**Evans, Marlene**  
 Environment Canada  
 11, Innovation Boulevard  
 Saskatoon, SK, S7N 3H5

**File No:** SLE-05/06-301

**Location:** Tieda River: 66°42.430', 129°18.117'  
 Hare Indian River: 66°19.032', 128°32.866'  
 Chick Creek: 65°50.896', 128°08.189'  
 Oscar Creek: 65°26.427', 127°25.687'  
 Francis Creek: 65°11.853', 126°27.845'  
 Jungle Ridge Creek: 65°03.669', 126°03.399'

Objectives: To improve the existing understanding of the structure and function of the aquatic environment in water bodies that may be impacted by various aspects of the development of the Mackenzie Gas Pipeline. One hundred metre sections of streams will be closed off and quantitative investigations will be conducted to determine fish species presence/absence. Lengths, weights and other measurements will be collected. Mortalities will be kept for laboratory analysis.

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**563 Fisheries**

**Evans, Marlene**  
 Environment Canada  
 11, Innovation Boulevard  
 Saskatoon, SK, S7N 3H5

**File No:** SLE-05/06-302

**Location:** Mackenzie River, from 64°45' to 66°52' N

Objectives: To determine the health of fish at or near oil seepage sites, and to compare the findings to the health of fish in other parts of the Mackenzie River.

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**564 Fisheries****Ford, Bruce**

Gartner Lee Limited  
490-6400, Roberts Street  
Burnaby, BC V5G 4C9

**File No:** SLE-05/06-313

**Location:** Giauque Lake: 63°11'00", 113°51'00"  
Thistlewaite Lake: 63°10'00", 113°34'00"  
Unnamed lake (Control A): 63°13'00", 113°42'00"

Objectives: To determine the levels of mercury and other metals in fish.

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**565 Fisheries****Fortier, Martin**

Université Laval  
GIROQ, Pavillion Vachon,  
Quebec, QC G1K 7P4

**File No:** SLE-05/06-310

**Location:** Beaufort Sea / Amundsen Gulf (14 study stations) within coordinates 69°50'30" & 72°00'32" N and 121°40'00" & 135°00'00" W. Activities based aboard the CCG vessel Amundsen to conduct the Canadian Arctic Shelf Exchange Study (CASES)

Objectives: To continue the collection of data to gain a better understanding of the biogeochemical and ecological consequences that may be associated with the possible sustained reduction of ice cover due to global warming.

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**566 Fisheries****Gray, Michelle**

University of New Brunswick  
Department of Biology, 10 Bailey Drive  
Fredericton, NB E3B 6E1

**File No:** SLE-05/06-311

**Location:** In the vicinity of the Diavik mining operations at Lac de Gras, 64°30'00", 110°17'00"

Objectives: To document fish health and conduct a population assessment as per Fisheries Authorization #SC98001.

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**567 Fisheries****Harris, Les**

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

**File No:** SLE-05/06-246

**Location:** Travaillant Lake (67°36'53", 131°52'56") and all water bodies within a 25 km radius from same

Objectives: To track the movements of fish, which were fitted with radio transmitters during the past year. Fixed receiving stations and aerial methods will be utilized.

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**568 Fisheries****Harris, Les**

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

**File No:** SLE-05/06-247

**Location:** Mackenzie River delta (69°21'00", 133°54'00") and tributaries

Objectives: To collect fin and tissue samples from broad whitefish from local harvesters to establish a base that will eventually be used for phylogeographic analysis and classification of genetic population structure.

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**569 Fisheries****Harwood, Lois**

DFO  
 101 5204 50th Avenue  
 Yellowknife, NT X1A 1E2

**File No:** SLE-05/06-255

**Location:** Waters near Holman: 70° 35' 00", 117° 50' 00"; and Sachs Harbour: 72° 00' 00", 125° 15' 00"

Objectives: To collect measurements and samples for ageing, contaminants/disease testing, reproduction, diet and over-all health indicators from seals harvested by subsistence users. A collection of seals may be undertaken to augment the sample size if required.

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**570 Fisheries****Harwood, Lois**

DFO  
 101 5204 50th Avenue  
 Yellowknife, NT X1A 1E2

**File No:** SLE-05/06-260

**Location:** Unnamed stream (Tributary 1) at Fish Lake, 71°12'08", 116°44'16"

Objectives: To gather information on the movement of char through tributaries and upper water bodies of the Fish Lake system. A floy tagging program will be conducted to gain a better understanding of the life history, migration and inter-relation with other populations.

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**571 Fisheries****Harwood, Lois**

DFO  
 101 5204 50th Avenue  
 Yellowknife, NT X1A 1E2

**File No:** SLE-05/06-263

**Location:** Waters off Kendall Island: 69°30'00", 135°20'00"; and waters off Hendrickson Island: 69°30'00", 133°25'00"

Objectives: To collect ageing structures, tissues for contaminants and disease testing, reproductive and digestive tracts and lungs along with other measurements from beluga whales harvested by subsistence harvesters.

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**572 Fisheries****Harwood, Lois**

DFO  
 101 5204 50th Avenue  
 Yellowknife, NT X1A 1E2

**File No:** SLE-05/06-322

**Location:** Beaufort Sea within 100 km of 69.65015° N, 136.47105 W

Objectives: To determine the distribution, densities, behavioural patterns, body and reproductive condition of ringed and bearded seals in areas subject to exploration activities. Seals will be captured live, measured and tagged with satellite and roto tags. Seals harvested by subsistence users will be sampled and measured. This information may be used to provide advice and recommendations for future monitoring programs to mitigate negative impacts of hydrocarbon exploration and development.

**573**

**Fisheries**

**Herrington, Joey**

IEG Environmental

P.O. Box 673

Yellowknife, NT X1A 2N5

**File No:** SLE-05/06-309

**Location:** Unnamed water body (Uyaalialuq): 69°23'48.6", 133°02'14.1"; Tuktoyaktuk Harbour: 69°24'09.8", 132°59'23.3"

Objectives: To collect fish samples to evaluate the potential impacts of sewage discharges on species within the receiving environment.

**574**

**Fisheries**

**Horrocks, Kimberley**

De Beers Canada Inc.

300-5102 50th Avenue

Yellowknife, NT X1A 3S8

**File No:** SLE-05/06-242

**Location:** At the location of the Snap Lake Mine water intake (63°36'31", 110°51'59"); the water outlet (63°36'13", 110°51'31"); and four other locations with similar habitat at the peninsula where the water intake and outlet are located

Objectives: To collect baseline information on the presence/absence/abundance of small-bodied fish in the vicinity of the water intake/outlet.

**575**

**Fisheries**

**Horrocks, Kimberley**

De Beers Canada Inc.

300-5102 50th Avenue

Yellowknife, NT X1A 3S8

**File No:** SLE-05/06-243

**Location:** Unnamed stream (Stream 27) at Snap Lake, 63 36 07, 110 57 26

Objectives: To document spawning activity prior to removing a natural blockage to migration.

**576**

**Fisheries**

**Horrocks, Kimberley**

De Beers Canada Inc.

300-5102 50th Avenue

Yellowknife, NT X1A 3S8

**File No:** SLE-05/06-244  
**Location:** Snap Lake: 63°36'30", 110°51'32"

Objectives: To conduct a lake trout recruitment study.

**577 Fisheries**

**Horrocks, Kimberley**  
 De Beers Canada Inc.  
 300-5102 50th Avenue  
 Yellowknife, NT X1A 3S8

**File No:** SLE-05/06-245  
**Location:** Water bodies within a 30 km radius of the coordinates 63°36'30", 110°51'32" at Snap Lake

Objectives: To inventory the fish stocks in lakes near Snap Lake in order to establish a reference lake.

**578 Fisheries**

**Howland, Kimberley**  
 DFO  
 501 University Crescent  
 Winnipeg, MB R3T 1E2

**File No:** SLE-05/06-273  
**Location:** Travaillant Lake: 67°40'00", 131°54'00"

Objectives: To determine baseline population status, species composition and develop indicators of abundance and mortality rates.

**579 Fisheries**

**Howland, Kimberley**  
 DFO  
 501 University Crescent  
 Winnipeg, MB R3T 1E2

**File No:** SLE-05/06-274  
**Location:** Travaillant River North: 67°45'00", 131°52'00"

Objectives: To determine baseline population status, species composition and develop indicators of abundance and mortality rates.

**580 Fisheries**

**Howland, Kimberley**  
 DFO  
 501 University Crescent  
 Winnipeg, MB R3T 1E2

**File No:** SLE-05/06-275  
**Location:** Travaillant River South and Andrew Lake, 67°37'00", 131°52'00"

Objectives: To determine baseline population status, species composition and develop indicators of abundance and mortality rates.

**581 Fisheries**

**Landry, Francois**  
 Rescan Environmental Services Ltd.  
 6<sup>th</sup> Floor, 1111 West Hastings Street  
 Vancouver, BC V6E 2J3

**File No:** SLE-05/06-219

**Location:** North Panda Lake: 64°43'54", 110°34'38"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

**582**

**Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-220

**Location:** Kodiak Lake: 64°42'14", 110°37'00"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

**583**

**Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-221

**Location:** Panda Diversion Channel: 64°44'00", 110°40'00"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

**584**

**Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-222

**Location:** Pigeon Stream 64°45'22", 110°40'37"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

**585**

**Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-223

**Location:** Polar-Vulture Stream 64°44'27", 110°32'54"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

**586**

**Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-224

**Location:** Nero-Nema Stream: 64°39'29", 110°42'48"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

**587**

**Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-225

**Location:** Bearclaw Lake: 64°44'22", 110°35'17"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

**588**

**Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-226

**Location:** Buster Pond: 64°42'36", 110°36'10"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

**589**

**Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-227

**Location:** Unnamed water bodies: Fox 2 Lake and tributaries, 64°38'58", 110°43'00"; Fox 3 Lake and Tributaries, 64°38'46", 110°43'57"; South Fox 2 and tributaries, 64°38'52", 110°42'25"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

**590**

**Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-228

**Location:** Unnamed water bodies: Siksik Pond 1, 64°39'43", 110°39'51"; Siksik Pond 2 and tributaries, 64°39'37", 110°39'54"; Lake A and tributaries, 64°39'54", 110°39'29"; Pond B, 64°39'38", 110°39'29"; Lake I and tributaries, 64°38'25", 110°44'23"; Pond J and tributaries, 64°38'59", 110°44'20"; Pond K and tributaries, 64°38'59", 110°44'15"; Pond L and tributaries, 64°38'58", 110°44'30"; Pond M and tributaries, 64°38'57", 110°44'52"; Pond N and tributaries, 64°38'27", 110°44'40"; Pond P and tributaries, 64°39'04", 110°43'33"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

**591**

**Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-229

**Location:** Lac du Sauvage. Study area bounded by straight lines connecting the following coordinates:

64°34'08", 110°10'26"  
64°37'49", 110°01'35"  
64°33'17", 109°59'42"  
64°34'08", 110°07'54"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

**592**

**Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-230

**Location:** Unnamed stream: 64°36'25", 110°09'07"; unnamed stream: 64°35'53", 110°08'28"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion

Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**593 Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-231

**Location:** Ursula Lake: 64°48'58", 110°28'34"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**594 Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-232

**Location:** Ursula Stream: 64°47'20", 110°21'11"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**595 Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-233

**Location:** Upper Exeter Lake: 64°44'56", 110°43'37"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**596 Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-234

**Location:** Pigeon Pond: 64°45'29", 110°39'25"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion

Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**597** **Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-235

**Location:** Big Reynolds Pond and tributaries, 64°44'56", 110°38'46"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**598** **Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-236

**Location:** Little Reynolds Pond and tributaries, 64°44'46", 110°39'43"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**599** **Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-237

**Location:** Upper Pigeon Pond A: 64°54'52", 110°38'05"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**600** **Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-238

**Location:** Pigeon Pond to Fay Bay Stream, 64°45'25", 110°40'01"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion

Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**601 Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-239

**Location:** Carrie Lake and tributaries, 64°34'08", 110°12'22"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**602 Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-240

**Location:** Study area bounded by straight lines connecting the following coordinates in the order in which they are listed:

64°31'00", 110°11'01"

64°34'15", 110°10'55"

64°34'11", 109°59'11"

64°30'54", 109°59'16"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**603 Fisheries**

**Landry, Francois**

Rescan Environmental Services Ltd.  
6<sup>th</sup> Floor, 1111 West Hastings Street  
Vancouver, BC V6E 2J3

**File No:** SLE-05/06-240

**Location:** Twenty-four water bodies in the Long Lake Containment Facility Watershed. Study area bounded by straight lines connecting the following coordinates:

64°41'15", 110°49'33"

64°44'17", 110°49'32"

64°44'14", 110°41'19"

64°41'15", 110°41'20"

Objectives: To continue the fish population monitoring program initiated in 1998 at the Panda Diversion Channel (PDC) and assess the use of lake habitat at either end of the PDC and compare the biological characteristics of fish at these locations with other fish at nearby reference water bodies. To determine the presence/absence of fish in small water bodies within the Ekati claim block.

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**604 Fisheries****Low, George**

Department of Fisheries and Oceans  
42043 Mackenzie Highway  
Hay River, NT X0E 0R9

**File No:** SLE-05/06-292

**Location:** Carcajou River (65–34 N x 128–43 W)

Objectives: To document the presence of bull trout in the Carcajou River watershed.

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**605 Fisheries****Low, George**

Department of Fisheries and Oceans  
42043 Mackenzie Highway  
Hay River, NT X0E 0R9

**File No:** SLE-05/06-295

**Location:** Hay River "domestic area" (60–55N x 115–35 W)

Objectives: To provide training to Katlodeeche First Nation youth in DFO fish sampling protocol, setting and lifting lift gillnets, and the traditional methods of preparing and preserving of fish; and to collect traditional and scientific information on fish stocks in the Hay River domestic area.

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**606 Fisheries****Low, George**

Department of Fisheries and Oceans  
42043 Mackenzie Highway  
Hay River, NT X0E 0R9

**File No:** SLE-05/06-318

**Location:** Yellowknife River: 62° 31', 114°19'

Objectives: To determine the effects of seven years of experimental and sport fishery on the cisco spawning run in the Yellowknife River. Cisco will be sampled for fork length and weight, and an ageing structure will be collected. Fins will be clipped and floy tags utilized to help determine the movements of the fish.

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**607 Fisheries****Low, George**

Department of Fisheries and Oceans  
42043 Mackenzie Highway  
Hay River, NT X0E 0R9

**File No:** SLE-05/06-323

**Location:** Tathlina Lake: 60°33'00", 117°32'00"

Objectives: To collect data to assess the status of the walleye stocks in Tathlina Lake.

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**608 Fisheries****MacNeil, Scott**

Golder Associates Ltd.  
300, 10525-170 Street  
Edmonton, AB T5P 4W2

**File No:** SLE-05/06-249

**Location:** Burke Lake: 63.517971°, 116.708364°























<b>Degradation</b>	to reduce something or to place something at a lower level
<b>Dendrochronology</b>	a system of dating wooden objects using characteristic patterns of annual growth rings of trees to assign dates to timbers; also the study of tree growth rings
<b>Density</b>	a quantity of mass per unit volume
<b>Devonian</b>	the period between 410 and 370 million years ago when terrestrial plants began to spread across the land and when much development occurred in aquatic animals such as fish and other shell fish
<b>Diabase dikes and sills</b>	a geological feature consisting of intrusive diabase (dark coloured, fine grained igneous, basaltic) rock cutting across pre-existing layers
<b>Dialysis array (peeper)</b>	instrumentation to sample porewater (see below), which consist of an array of wells in a plexiglass plate, a filtration membrane, ultra-pure water and a peeper; after 10 to 14 days, the sample waters are removed from the wells and analyzed for dissolved metals
<b>Discontinuous permafrost</b>	permafrost (see below) that forms only in spots that are sheltered, in the case of the mean annual temperature falling slightly below 0°C; usually, permafrost remains discontinuous in places where the mean annual soil surface temperature is between -5 and 0°C
<b>Diversion</b>	a changing of the direction in which something is going
<b>Dorsal fin</b>	the vertical fin on the back of fish and certain marine mammals
<b>Ecology</b>	the science that deals with how living organisms live in relation to each other and their environment
<b>Ecological integrity</b>	ensuring the relationship in plant and animal communities remains healthy
<b>Ecosystem</b>	living organisms and non-living structures that work together to form a system
<b>Ecosite</b>	the last eco-unit in the terrestrial ecosystem hierarchy, consisting of ecozone, ecoprovince and ecoregion; the ecosite is a way of classifying land in ways that are useful to managers; done at a scale of 10–1 000 ha, this classification includes detailed climatic, physiographic, flora and fauna, soil, water and the land use characteristics of the site
<b>Effluent</b>	something that flows out from a main source, such as sewage or waste matter
<b>Ekman Grab</b>	a box core type of sediment sampling device
<b>Echinoderms</b>	marine animals that include, among others, sea stars/starfish, sea urchins, sand dollars and sea cucumbers
<b>Ecological Land Classification</b>	mapping of distinct ecological areas, identified by their geology, topography, soils, vegetation, climate conditions, living species, water resources, as well as human-influenced actors; as these factors are known to control or influence the composition of living organisms and ecological processes, they provide a useful approximation of ecosystem potentials
<b>Electrofishing</b>	using electricity to stun and kill fish, usually during scientific work
<b>Electromagnetic</b>	magnetism that is caused by electricity
<b>Emissions</b>	something that is radiated outward or discharged from a source
<b>Eocene</b>	a time when small mammals began to develop on earth between 54 and 38 million years ago

<b>Epoch</b>	a period of time during which something important developed or happened
<b>Erratics</b>	rocks carried to their current locations by glacial ice; they can vary in size from pebbles to large boulders and are different in size and type from rocks native to the area they are found
<b>Erosion</b>	group of natural processes (weathering, disintegration, abrasion, corrosion, transportation) where the earth's surface is worn away and removed
<b>Eskers</b>	a long, narrow ridge of coarse gravel deposited by a stream flowing under a decaying glacial sheet of ice
<b>Estuary</b>	a place where coastal seawater comes into contact with the current of a freshwater stream
<b>Ethnography</b>	research that uses fieldwork (interviews and observations) to describe a culture, community or society; the ethnographic method is used in several academic traditions, including anthropology, geography, sociology, psychology, economics and cultural studies
<b>Eutrophication</b>	enrichment of aquatic systems, promoting dense algal and plant growth in a body of water, depriving the water of oxygen and forcing change in species composition
<b>Evolution</b>	a process where different species come into existence by differentiation and genetic mutations from common ancestors over a long period of time
<b>Excavated</b>	extracting or revealing something by removal of the surrounding earth
<b>Exceedance</b>	the amount by which something, especially a pollutant, exceeds a standard or permissible measurement
<b>Fauna</b>	animal life of a particular region, environment, or geological period
<b>Fens</b>	a type of wetland fed by surface water and/or groundwater (see below); fens are alkaline or neutral whereas bogs are acidic ( <i>see pH</i> )
<b>Flora</b>	the plants of a particular region, environment or geological region
<b>Fluvial</b>	pertaining to something's existence or growth around a stream or river
<b>Focus group</b>	a qualitative (see below) research method based on asking a group of people about their attitude toward an issue, concept, service, product, etc.; questions are asked in an interactive group setting where people are free to discuss their ideas with one another
<b>Fossil</b>	trace of an organism of a past age, embedded and preserved in the earth's crust
<b>Frazzle ice</b>	ice crystals that form in the water column (see below) where the water is too turbulent to permit ice formation
<b>Fungi</b>	a kingdom of heterotrophic organisms that produce spores
<b>Gender</b>	one's characteristics or traits determined socially as a result of one's sex
<b>Genetic</b>	pertaining to an organism's traits or characters being linked to genes
<b>Genera</b>	a group of organisms that share common characteristics
<b>Geochemistry</b>	a science that deals with the chemical composition of and chemical changes in the solid matter of the earth
<b>Geochronological</b>	the chronology of the earth's history as determined by geologic events and not by human history
<b>Geomorphologic</b>	pertaining to the physical features of the earth's surface

<b>Geophysical survey</b>	investigations carried out on the various physical properties of the earth and the composition and movement of its component layers of rock; in mineral exploration, the survey is carried out to detect zones through magnetism, gravity or conductivity; a variety of sensing instruments are used to collect data from above or below the earth's surface or from aerial or marine locations
<b>Germination</b>	sprouting or budding
<b>Glacier</b>	mass of ice compacted from snow which flows slowly down valleys or a large land area, either melting as it flows or reaching the sea and breaking off into icebergs
<b>Glacial cirque</b>	an amphitheatre-like valley formed at the head of a glacier by erosion
<b>Global Positioning System (GPS)</b>	a portable receiver able to pinpoint the receiver's location anywhere on the earth's surface utilizing a system of satellites to navigate and for surveying
<b>Granitic rock</b>	light coloured coarse-grained rock that was formed at great depths such as quartz
<b>Granivory</b>	feeding on grain
<b>Gravel pad</b>	a stable gravel surface, usually 1-2 m in depth, created for oil drilling pads, roads and pipeline routes
<b>Groundwater</b>	the water found beneath the earth's surface that supplies wells and springs
<b>Ground Penetrating Radar (GPR)</b>	a geophysical method that uses radar pulses to obtain images of the subsurface; GPR is used in rock, soil, ice, fresh water, pavements and structures to detect objects, changes in material, etc.
<b>Grounded Theory</b>	a research method in which theory is developed from data, rather than vice versa; concepts, categories and propositions are the elements that make up the method, where reasoning is from specific to general
<b>Habitat</b>	the specific area in which a particular organism lives
<b>Heavy metals</b>	base metals that commonly occur in urban and industrial pollution
<b>Hester-Dendy plates</b>	artificial substrate sampler for aquatic bioassessment consisting of 14 round plates of natural, water-resistant masonite spaced on an 8 inch eye bolt
<b>Heterogeneous</b>	a situation where something is in a mixed composition
<b>High Arctic</b>	regions within the Arctic Circle, especially the northern islands
<b>Holocene</b>	the most recent 11 000 years of the earth's history starting at the end of the last major ice age, which has been relatively warm
<b>Host specificity</b>	how selective a parasite is when looking for a host to live on as a source of food
<b>Hydraulic</b>	pertaining to movement caused by water
<b>Hydroacoustic survey</b>	an echo-sounding (sonar) survey used for measuring such things as fish stocks, water velocity, etc.
<b>Hydrocarbon</b>	petroleum-based products such as fuel, oil and grease
<b>Hydrograph</b>	a graph showing the water level, discharge, or other property of river volume with respect to time
<b>Hydrology</b>	science dealing with the properties, distribution and circulation of water

<b>Ice scour</b>	long, narrow ditches in a seabed, caused when land-fast ice (see below) and pack ice (large mass of floating sea ice) collide
<b>Ice sheet</b>	glacier (see above) ice that has a terrain coverage of greater than 50 000 km <sup>2</sup>
<b>Igneous</b>	a rock or mineral that solidified from molten or partly molten material, i.e. from magma; one of three rock types with metamorphic and sedimentary characteristics
<b>Inconnu</b>	<i>Stenodus leucichthyes</i> , a freshwater species of fish somewhat similar to whitefish; also known as coney
<b>Informant</b>	an individual who participates in a research project as an information or sample giver; depending on the type of research, the person can also be referred to as a subject, participant, respondent or interviewee
<b>In situ</b>	in the natural or original location or position
<b>Interview</b>	a research method used to obtain information about people's points of view, experiences or situations through dialogue; interviews can be unstructured (no set questions, informal conversation about topics of interest), semi-structured (some general, broad questions but flexible ordering and wording of questions) or structured (set list of specific questions)
<b>Invertebrate</b>	animals without a backbone
<b>Jackfish</b>	<i>Esox lucius</i> , a freshwater predatory fish; commonly known as northern pike
<b>Karstic sink hole</b>	a formation caused when layers of bedrock, consisting usually of rock like limestone or dolomite, dissolve and subsurface drainage occurs, leaving a hole in the surface topography
<b>Kimberlite</b>	a type of rock, produced by volcanic activity that can contain diamonds
<b>Kitigazuit</b>	the traditional gathering place where the Kitigaaryumiut people would hunt beluga and hold celebrations
<b>Lacustrine</b>	of or relating to lakes
<b>Lake chub</b>	<i>Conesius plumbeus</i> , a freshwater species of fish belonging to the carp or minnow family
<b>Lake whitefish</b>	<i>Coregonus clupeaformis</i> a species of freshwater whitefish; also known as crooked back and humpback whitefish
<b>Land-fast ice</b>	sea ice that has 'fastened' or frozen along coasts, shoals or the sea floor; the land-fast ice zone consists of two subzones: bottom-fast ice (see above) and floating fast ice (seaward of the bottom-fast ice and extending from shore to sea).
<b>Larvae</b>	a premature stage for an insect where it feeds a lot before it becomes a pupa
<b>Late Pleistocene</b>	the period, 250 000-10 000 years ago, which was dominated by glaciation and marked by megafauna extinction and the spread of humans to all continents except Antarctica
<b>Latitude</b>	a measurement of the angular distance from the equator to a given point on the earth's surface
<b>Light Detection and Ranging (LiDAR)</b>	a technology that uses laser pulses (properties of scattered light) to detect the distance of an object or surface; LiDAR is used in several fields, including: archaeology; geography; geology; and geomorphology
<b>Ligotrophic (oligotrophic)</b>	the opposite of eutrophic; waters having very low levels of primary productivity and (usually) low concentrations of nutrients; good, clear water quality

<b>Limestone</b>	a sedimentary rock that contains mostly calcium carbonate and can be formed by either inorganic or organic processes
<b>Limnology</b>	the scientific study of the life and phenomena of fresh water, especially lakes and ponds
<b>Literature review</b>	an account of what has been published on a given topic by scholars and researchers; the purpose of preparing a literature review is to give a sense of the knowledge and ideas (including their strengths and weaknesses) that have been created on a topic
<b>Lithology</b>	the branch of geology that studies the mineral composition and structure of rocks, especially hand and outcrop specimens
<b>Lithic</b>	of, like, or made of stone; archaeological artifacts made of stone
<b>Longnose sucker</b>	<i>Castastomus castastomus</i> , a freshwater species of sucker; also known as sucker
<b>Magnetotelluric profile</b>	a ground electromagnetic survey method of exploring ore bodies and sub-surface geological features
<b>Manganese</b>	a metallic element that is used to make alloys
<b>Memoryscape</b>	a concept that refers to memories of the landscape, especially images of places that were visited
<b>Mesic</b>	moderately moist
<b>Mesoproterozoic</b>	a geologic era that occurred between 1 600 and 1 000 million years ago; the splitting up of the Columbia supercontinent, the formation of the Rodinia supercontinent and the evolution of sexual reproduction occurred in this era
<b>Metamorphic rock</b>	any rock derived from pre-existing rocks by changes in response to environmental factors such as temperature and pressure over a long period of time; one of three types of rocks with igneous and sedimentary characteristics
<b>Metallothionein</b>	a group of proteins that bind heavy metals
<b>Methane</b>	the simplest hydrocarbon (see above) that is the main ingredient in natural gas (CH <sub>4</sub> )
<b>Methanogenic</b>	microorganisms that produce methane (CH <sub>4</sub> ) by the fermentation of simple organic carbon compounds with the production of carbon dioxide
<b>Methodology</b>	a set of practices, procedures or methods related to a particular research area or discipline
<b>Microbes</b>	bacteria that can cause disease
<b>Microclimate</b>	the climate close to the earth's surface or the climate of a small area
<b>Microfossils</b>	very small fossils that can only be viewed with the aid of a microscope
<b>Microorganisms</b>	organisms that must be viewed under a microscope, such as bacteria or viruses
<b>Microtopography</b>	measurement of the microscopic fluctuations on the surface of nominally smooth bodies
<b>Molecular analysis</b>	a detailed look at the chemical structure and properties of a molecule
<b>Moraine</b>	a mound of rock debris carried and deposited by a glacier
<b>Morpheme</b>	a linguistics term that refers to the smallest unit of meaning (either a word or a part of a word), e.g., <i>work</i> (one morpheme) and <i>workable</i> (two morphemes)
<b>Morphometric</b>	measurements taken at designated places to compare individuals of a species

<b>Nine-spine stickleback</b>	<i>Pungitius pungitius</i> , a freshwater species of scaleless fish; also known as stickleback
<b>Nodwell</b>	a two track vehicle capable of traversing a wide variety of terrain
<b>Non-plastic silt</b>	particles of sand and clay that dry rapidly but powder easily when dry
<b>Organic</b>	material pertaining to plants or animals
<b>Otolith</b>	any of the small particles of calcium carbonate in the inner ear.
<b>Outcrop</b>	a portion of bedrock or other stratum protruding through the soil level
<b>Overlie</b>	sedimentary or volcanic rock that lies on top of older rock
<b>Paleo-Eskimo</b>	the people who migrated across the north ~ 2 000 years ago; it is not known if they are the ancestors of the modern Inuit
<b>Paleoecological</b>	a relationship or study of ancient organisms and how they related to their ancient environment
<b>Paleoenvironmental</b>	of an environment that existed in the past
<b>Paleohydrological</b>	a study of ancient water features preserved in rocks
<b>Paleolimnological</b>	a study of ancient lake conditions, especially sediment
<b>Paleosol</b>	fossil soil that is found underneath sedimentary or volcanic deposits or soil formed in the remote past that has no relationship to present-day climate or vegetation
<b>Paleozoic</b>	era of from 600 to 200 million years ago, characterized by the appearance of fish, reptiles and insects
<b>Parameter</b>	one set of measurable factors (such as temperature and pressure) that defines a system and determines its behaviour and are varied in an experiment
<b>Parameterized</b>	expressing something in terms of a parameter
<b>Participant observation</b>	a research method that aims at intensive involvement with people, often over an extended period of time, in their natural environments to obtain detailed information about their societies and cultures
<b>Periphyton</b>	microscopic aquatic organisms living attached to surfaces projecting from the bottom of freshwater aquatic environments (rocks, wrecks, weeds, etc.)
<b>Permafrost</b>	soil at or below the freezing point of water (0 °C) for two or more years
<b>pH</b>	a measure of acidity or alkalinity; the pH scale ranges from 0-14, with 7 representing neutral solutions, and values above and under 7 representing acidic and alkaline solutions, respectively
<b>Phenophase</b>	the timing of recurring biological phases; examples of a phenophase may be the date of the first flowering, budbreak, the first bird migration or insect appearance
<b>Phenomenological perspective</b>	an approach that takes into account the everyday lives and experiences of people to understand an issue
<b>Photovoice</b>	a method based on asking research participants to document facets of interest through photography and discussion of the photos taken; also known as photo novella
<b>Phylogeography</b>	the study of the geographic distribution of phylogenetic lineages, usually within species and to reconstruct the origins and diffusion of lineages

<b>Physiological</b>	pertaining to the physical structures and functions of living organisms
<b>Phytoplankton</b>	a group of plant-like plankton that all sea animals depend on either directly or indirectly
<b>Pleistocene</b>	an age of notable ice ages and development of humans between 2 000 000 and 10 000 years ago
<b>Piedmont</b>	a foothill, or land formed or lying at the foot of a mountain or mountain range
<b>Piling</b>	a column of wood or steel that is driven into the ground to provide support to a structure such as an offshore platform
<b>Point counts</b>	a method for surveying birds, which involves counting all the birds located within a circle with a specified radius (e.g., 20m) for a certain length of time (e.g., 10 minutes)
<b>Polishing pond</b>	a pond designed to receive treated underground waters and mining plant discharge and to be the final settling area for sediment and mineral precipitate
<b>Polychaete</b>	a class of segmented worms, generally marine
<b>Polygons</b>	interconnected trough-like features formed through a mix of climatic and ground-based processes, often containing ground ice in the form of ice wedges
<b>Population metric</b>	a measure of an aspect of population, such as abundance, age structure, growth rate, mortality rate, life expectancy, etc.
<b>Porewater</b>	water that fills the spaces between grains of sediment
<b>Postglacial</b>	relating to or occurring during the time following a glacial period
<b>Proterozoic</b>	era preceding the Paleozoic, having the oldest known animal fossil forms
<b>Putative</b>	to assume something
<b>Qualitative</b>	complete detailed descriptions usually taken from a small sample that allows for distinctions to be drawn from the data; qualitative research is usually associated with social science research and delves into the <i>why</i> and <i>how</i> of a problem rather than on just <i>what</i> , <i>where</i> and <i>when</i>
<b>Quantitative</b>	use of large amounts of data where statistics can be applied to interpret the data; the process of measurement is central to quantitative research and is used in both the natural sciences and social sciences
<b>Quaternary</b>	the period of geologic time 2.6 million years ago; the Quaternary is divided into the Pleistocene and the Holocene epochs, and characterized by major climatic changes around the earth and the evolution and spread of humans
<b>Radiocarbon dating</b>	the determination of the approximate age of an ancient object, such as an archaeological specimen, by measuring the amount of carbon 14 it contains
<b>Random Meander technique</b>	a type of vegetation survey that involves walking the entirety of a site and identifying every species encountered during the traverse (see below)
<b>Raptor</b>	a bird of prey such as an eagle, falcon or osprey
<b>Reclamation</b>	the reconversion of disturbed land to its former state or other productive uses
<b>Remediation</b>	removal, reduction, or neutralization of substances, wastes or hazardous material from a site; the goal of remediation is to prevent or minimize any adverse effects to the environment or human health

<b>Reef</b>	a structure formed by coral and its remains that lie above the bottom sediment
<b>Remote videography</b>	detailed, remote monitoring or recording of animals using a closed-circuit television camera and infrared/red light illuminators; a monitor interfaces with a motion detector and time-lapse video cassette recorder to automatically record animal activity
<b>Revitalization</b>	to give new life or vitality to something
<b>Riprap</b>	a permanent, erosion resistant ground cover of large, loose, angular rocks with a geotextile or granular underlining, used to protect stream banks, drainage channels, steep slopes, and other such features from erosion
<b>Rock glacier</b>	a glacier created from a combination of cold climate, abundance of rock debris and a sloping environment; like ordinary glaciers, ice is present in large amounts to move the rock glacier downhill
<b>Roving gamma survey</b>	a radiometric (natural radiation in the earth's surface) survey to measure the gamma radiation field and locate prospective areas of high-grade uranium and polymetallic deposition; gamma rays can be measured on the ground or from a low flying aircraft using a spectrometer
<b>Sandstone</b>	sedimentary rock that contains fine-grained fragments that are firmly cemented together
<b>Satellite imagery</b>	computer images generated by a satellite which allow researchers to look at a specific area and monitor surface features such as vegetation
<b>Satellite passive microwave measurements</b>	measurements of naturally emitted microwave radiation from the earth's surface, carried out using a microwave radiometer; the measurements are used in snow and sea ice monitoring
<b>Scarification</b>	to break up or rake a surface (of soil); in botany, the cutting or softening of the outer seed coating in order to speed germination (see above)
<b>Sediment</b>	solid fragmented material that occurs from the weathering of rocks; in water it is material that has settled from a state of suspension
<b>Sedimentary rock</b>	rock derived from loose particles that have accumulated over time; one of three rock types with igneous (see above) and sedimentary characteristics
<b>Sedimentation</b>	the process where small particles are moved and deposited to accumulate into layers
<b>Seed viability</b>	the possibility of germination (see above); seeds vary in their time of viability from a few days to years
<b>Seismic</b>	pertaining to vibrations in the earth, both natural and induced
<b>Settling pond</b>	a pond designed for removing silt and suspended clays from water that is used to wash aggregate (mixed mineral substances)
<b>Shovel testing</b>	a crude test where a sample of ground is taken by use of a shovel
<b>Slimy sculpin</b>	<i>Cottus cognatus</i> , a freshwater cottid fish that have sharp spines instead of scales
<b>Solutes</b>	a substance that has dissolved
<b>Species</b>	a group of organisms that share common characteristics that group them together and also distinguish them from others
<b>Sponges</b>	aquatic organisms that characteristically have a porous skeleton composed of fibrous material and often form colonies attached to an underwater surface

<b>Stone flakes</b>	debris left over from a rock while making tools
<b>Stratified</b>	a system that is set up in layers or strata
<b>Stratigraphic</b>	formation of rock where different layers can be picked out based on type and age of the rock
<b>Subnivean</b>	a zone that is in or underlain by snow
<b>Subsidence</b>	to flatten out so as to form a depression; to sink or fall to the bottom
<b>Substrate</b>	a surface on which an organism grows or attaches itself to
<b>Succession</b>	a progressive change in the biological community as a result of a response from species to the changing environment
<b>Sump</b>	a pit for catching and storing liquids such as wastewater
<b>Surficial</b>	pertaining to something that is on the surface
<b>Synthetic aperture radar</b>	a high-resolution broad-area imaging system that collects the echo returns of radar pulses and processes them into a single radar image; the system is used in environmental monitoring, earth resource mapping, and military operations and is useful for acquiring imagery in inclement weather or during night
<b>Tailings</b>	portions of washed or milled ore that are regarded as too poor to be treated further
<b>Tectonic</b>	relating to the structure of the earth's crust, the forces and conditions within the earth that cause movements of the crust, or the results of crustal movements (e.g., tectonic valleys)
<b>Terratorch</b>	a vehicle mounted device that throws a stream of flaming liquid to rapidly ignite a prescribed fire
<b>Thermistor</b>	a semiconductor sensor whose electrical resistance varies rapidly and predictably with temperature; thermistors are used to measure temperature and gas flow or wind velocity
<b>Thermokarst</b>	sinking holes, caves and underground drainage that are produced in regions with permafrost from melting of ground ice and settling of the remaining ground
<b>Thermocline</b>	a layer in a large body of water that sharply separates regions differing in temperature; an abrupt temperature gradient in a lake
<b>Till</b>	unsorted sediment deposited directly from glacier ice, containing particles that range in size from clay to boulders
<b>Tillites</b>	sedimentary rock (see above) formed by the burial and eventual hardening of till
<b>Topography</b>	a description of the surface of a given area
<b>Trace metals</b>	a metal that is not essential in the sample but is found in small quantities
<b>Transcript</b>	a typed copy of an interview (see above)
<b>Transect</b>	an imaginary line across a surface where observations are made
<b>Tree mensuration</b>	the measurement of volume, growth and development of harvested and/or standing trees
<b>Tributary</b>	a place where a stream feeds into a larger stream or lake
<b>Trophic structure</b>	feeding relationships that include predator-prey, parasite-host and plant-herbivore (plant-eater) relationships; trophic structure studies look at competition for food among organisms

<b>Tube-dwelling anemone</b>	<i>Cerianthus sp.</i> , an animal closely related to the sea anemone
<b>Tunicate</b>	a filter-feeding sea animal that has a sac-shaped body with two siphons
<b>Turbid</b>	stirred up material suspended in a medium leaving it unclear and opaque
<b>Vascular plants</b>	plants that have developed a good conductive system and that have structural differentiation
<b>Velocity</b>	rate of occurrence or action; quickness of motion
<b>Volatile</b>	an easily vaporized compound
<b>Walleye</b>	<i>Stizodeum vitreum</i> , a piscivorous (fish-eating) freshwater species of fish belonging to the perch family
<b>Water column</b>	the open-water environment of a water body, distinct from its shore or bed, where swimming freshwater or marine organisms may be found
<b>Watershed</b>	the region draining into a river, river system, or other body of water
<b>Whitefish</b>	<i>Coregonus nasus</i> , a species of freshwater whitefish; also known as broad whitefish
<b>Zooplankton</b>	microscopic animal organisms floating in water

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