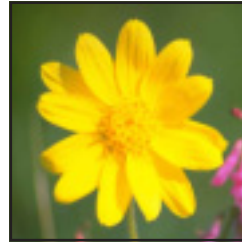
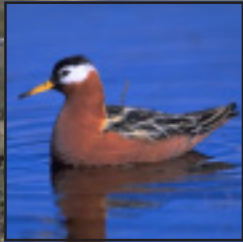


annual report

OF RESEARCH AND MONITORING

IN NATIONAL PARKS

OF THE WESTERN ARCTIC



2 0 0 2

Many people contributed to this report. We wish to acknowledge them for their commitment to the project, and their timely and enthusiastic response to our requests.

ACKNOWLEDGEMENTS

Reports on research and monitoring activities were provided by Parks Canada staff including: Herbert Allen, Jacquie Bastick, Christian Bucher, Cathy Cockney, Barry Greco, Karsten Heuer, Mervin Joe, James McCormick, Ian McDonald, Tom Naughten, Terry Skjonsberg, Michelle Theberge, Steve Travis and Joanne Tuckwell. Information on research and monitoring activities was provided to Parks Canada by: Dorothy Cooley of the Yukon Department of Environment, Doug Halliwell and Monique Lapalme of Environment Canada, John Nagy of the Department of Resources, Wildlife and Economic Development, Steve Solomon of the Geological Survey of Canada, Randy Wedel of Environment Canada, and Jean Veillette of the Geological Survey of Canada.

Photos were provided by: Parks Canada, Jacquie Bastick, Christian Bucher, Cathy Cockney, Dorothy Cooley, Karsten Heuer, Brian Johnston, Ron Larsen, Wayne Lynch, James McCormick, Ian McDonald, John Nagy, Joachim Obst, Steve Travis and Jean Veillette.



TABLE OF CONTENTS

INTRODUCTION.....	7
The Need to Report on Research and Monitoring	9
Structure of the Report	10

RESEARCH

Dall's Sheep Winter Range Survey	15
Surficial Geology and Glacial History	17
Tuktut Nogait Oral History Project	19

MONITORING

Wildlife

Wildlife Cards	23
NWT-Nunavut Bird Checklist Survey	25
Raptor Survey	27
Breeding Bird Survey	29
Lemming Monitoring	31
Babbage River Moose Survey	33
Yukon North Slope Muskoxen Population Monitoring	35
Tuktut Nogait Muskoxen Population Monitoring	37
Banks Island Peary Caribou Monitoring	39
Banks Island Muskox Monitoring	41
Cape Bathurst and Bluenose-West Caribou Monitoring	43
Porcupine Caribou Herd Monitoring	45

Habitat

Satellite Monitoring of Plant Productivity 47
Pingo Monitoring 49

Human Use

Firth River Campsite Monitoring 51
Human Use Monitoring 53

Climate Change

Weather and Permafrost Monitoring 57
River Water Flow Monitoring 59
Sea Temperature and Storm Surge Monitoring 61

Solid Waste

Komakuk Beach Clean-Up Monitoring 63

Long Range Transport of Pesticides

Water Quality Monitoring 65

Cultural Resources

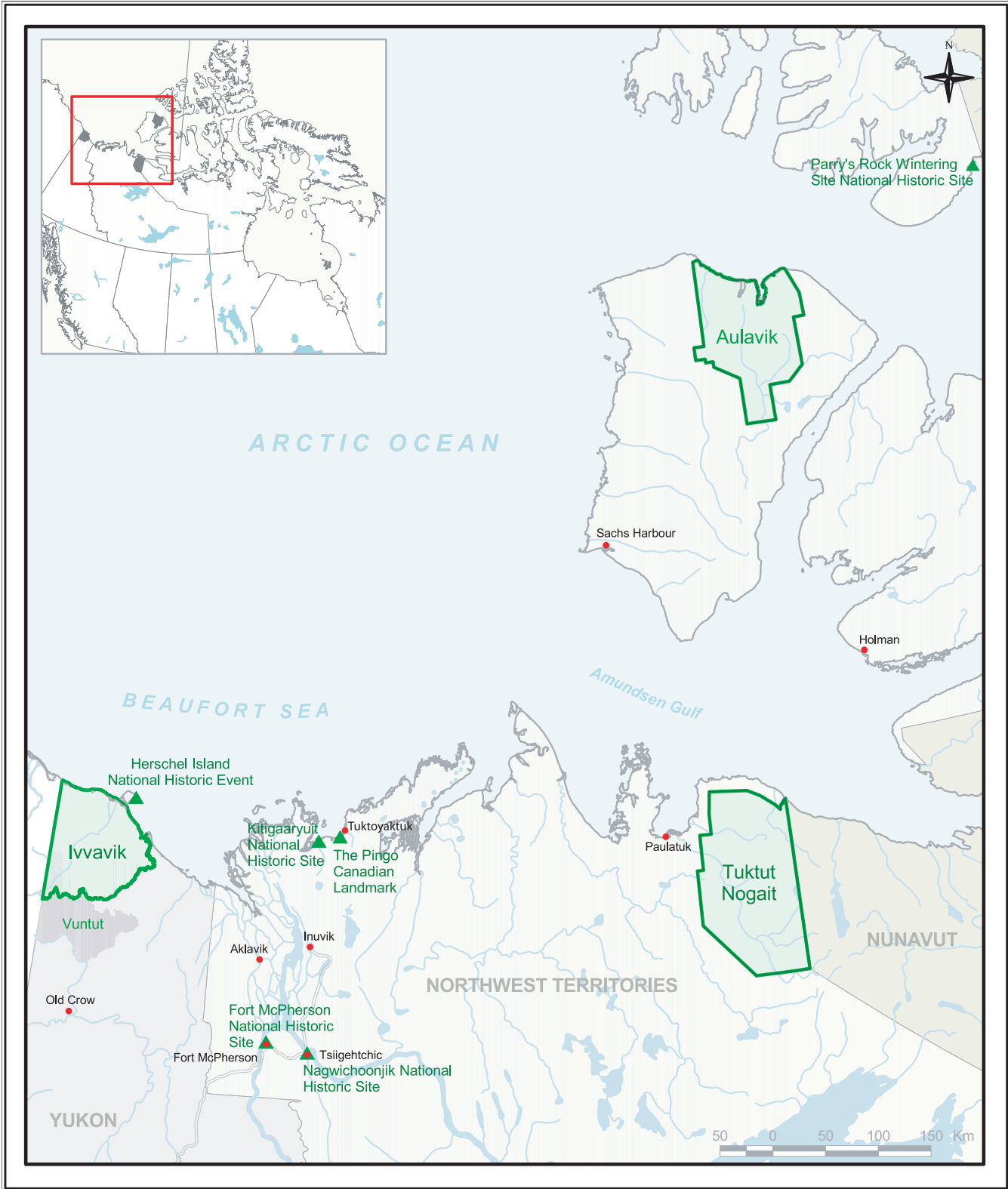
Firth River Cultural Resources Monitoring 67
Ivvavik Coast Cultural Resources Monitoring 69
Aulavik Cultural Resources Monitoring 71

INTRODUCTION

Research and monitoring are essential for managing protected heritage areas, such as Canadian national parks, historic sites and landmarks. Both activities lead to a better understanding of the cultural and ecological resources of these areas and how these resources are being affected by natural changes and human-caused disturbances. Research is conducted to improve our knowledge of cultural and ecological resources. Monitoring is conducted to determine how systems change over time, especially in response to human-caused disturbances. The Western Arctic Field Unit (WAFU) of Parks Canada uses research and monitoring to improve our understanding of cultural and ecological resources of protected heritage areas in the Western Arctic and to understand how these resources may be changing.

One challenge of implementing an effective research and monitoring program is making information about and collected by the program available to people. The goal of this report is to present the information about research and monitoring activities conducted in protected heritage areas in the Western Arctic Field Unit to Inuvialuit, Gwich'in and co-management organizations, government agencies and the public. All research and monitoring projects conducted in 2002, and ongoing monitoring projects not conducted this year, are included in this report.

The Western Arctic Field Unit is made up of three national parks, four national historic sites, one historic event and the Pingo Canadian Landmark (see map, page 8). Aulavik National Park of Canada is located on northern Banks Island and represents the Western Arctic Lowlands natural region. Ivvavik National Park of Canada is located in the northern Yukon and represents the Northern Yukon and Mackenzie Delta natural regions. Tuktut Nogait National Park of Canada is located east of the community of Paulatuk, inland from the Arctic Ocean, and represents the Tundra Hills natural region. All of these parks are relatively large compared with national parks in southern Canada and all three represent areas of remote northern wilderness. Kitigaaryuit, Nagwichoonjik, Fort McPherson and Parry's Rock Wintering Site national historic sites and the Herschel Island historic event commemorate the importance of these sites to Canada's history. The Pingo Canadian Landmark, the only landmark in Canada, represents the permafrost and pingo terrain of the Tuktoyaktuk Peninsula.



Parks Canada Western Arctic Field Unit

The Need to Report on Research and Monitoring

Direction for establishing a research and monitoring program in Canada's protected heritage areas comes from a number of sources. In the Inuvialuit Settlement Region (ISR), all planning, management, monitoring, research and operations are subject to the provisions of the Inuvialuit Final Agreement (IFA). One goal of the IFA is the protection and preservation of Arctic wildlife, environment and biological productivity through the application of conservation principles and practices. Information about cultural and ecological resources in protected heritage areas, and how they are changing, is required to meet these goals.

The IFA also established a number of Inuvialuit and co-management organizations with resource management responsibilities. These organizations need information from research and monitoring activities to be effective. These organizations are the Inuvialuit Game Council, Hunters and Trappers Committees, the Wildlife Management Advisory Council (North Slope), the Wildlife Management Advisory Council (Northwest Territories), the Fisheries Joint Management Committee, the Environmental Impact Screening Committee and the Environmental Impact Review Board.

At the national level the Canada National Parks Act, establishes the maintenance of ecological integrity as the first priority for all aspects of park management. Part of this commitment is the development of the State of Protected Heritage Areas Report which highlights the ecological condition of Canada's national parks. Research and monitoring activities conducted in protected heritage areas are used to assess the ecological condition of national parks.

A number of documents and initiatives support the need for research and monitoring in protected heritage areas in the Western Arctic. Direction for research and monitoring in the ISR comes from the Community Conservation Plans for Aklavik, Holman, Inuvik, Paulatuk, Sachs Harbour and Tuktoyaktuk. Workshops have been held to identify research and monitoring priorities for Aklavik and Tuktoyaktuk national parks. These workshops provide Parks Canada with input from community residents, resource managers and scientists regarding future research and monitoring needs. The Yukon North Slope Wildlife Conservation and Management Plan produced by the Wildlife Management Advisory Council (North Slope) identifies the need for research and monitoring on the Yukon North Slope, including Ivvavik National Park. The Yukon North Slope Long-Term Research and Monitoring Report identifies gaps in current knowledge of the Yukon North Slope environment and identifies research and monitoring priorities.

Structure of the Report

This report is divided into two sections. Section 1 summarizes research projects that were conducted in 2002. Section 2 summarizes all ongoing monitoring projects. These monitoring projects are divided into seven categories: Wildlife, Habitat, Human Use, Climate Change, Solid Waste, Long Range Transport of Pesticides and Cultural Resources.

Summaries for each project include:

Rationale

A short paragraph describing why the project is being conducted and why it is important.

Objectives

A description of the main objectives of the project.

Methods and Information Collected

A brief description of where the work was conducted, how the project was conducted and what information was collected.

Years of Data

How many years of data currently exist.

Partners

Other organizations that were involved in the project.

Results

A summary of the results, if they are available.

Contacts

Contact information.

Research and Monitoring Activities in National Parks of the Western Arctic.

	Ivvavik National Park	Aulavik National Park	Tuktut Nogait National Park
RESEARCH			
Dall's Sheep Survey	X		
Surficial Geology and Glacial History			X
Tuktut Nogait Oral History Project			X
MONITORING			
<i>Wildlife</i>			
Wildlife Cards	X	X	X
NWT-Nunavut Bird Checklist Survey	X	X	X
Raptor Survey	X	X	X
Breeding Bird Survey	X		
Lemming Monitoring		X	
Babbage River Moose Survey	X		
Yukon North Slope Muskoxen Population Monitoring	X		
Tuktut Nogait Muskoxen Population Monitoring			X
Banks Island Peary Caribou Monitoring		X	
Banks Island Muskox Monitoring		X	
Cape Bathurst and Bluenose-West Caribou Monitoring			X
Porcupine Caribou Herd Monitoring	X		
<i>Habitat</i>			
Satellite Monitoring of Plant Productivity	X	X	X
Pingo Monitoring	Location: The Pingo Canadian Landmark		
<i>Human Use</i>			
Firth River Campsite Monitoring	X		
Human Use Monitoring	X	X	X
<i>Climate Change</i>			
Weather and Permafrost Monitoring	X	X	X
River Water Flow Monitoring	X		X
Sea Temperature and Storm Surge Monitoring	X		
<i>Solid Waste</i>			
Komakuk Beach Clean-Up Monitoring	X		
<i>Long Range Transport of Pesticides</i>			
Water Quality Monitoring	X	X	X
<i>Cultural Resources</i>			
Firth River Cultural Resources Monitoring	X		
Ivvavik Coastal Cultural Resources Monitoring	X		
Aulavik Cultural Resources Monitoring		X	



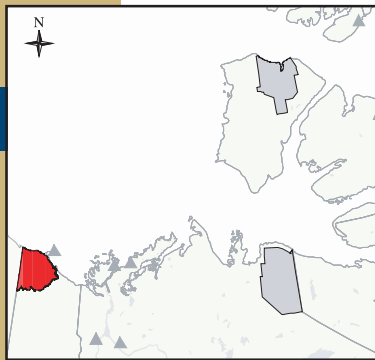
Research





Rationale

The size of Dall's sheep populations can be limited by the amount of winter range. In the winter, Dall's sheep require areas near rugged terrain that have a soft, shallow snow cover or are blown free of snow. There is a small population of Dall's sheep that overwinters in Ivvavik National Park (population surveys conducted in the park in 1984, 1986 and 2001 found 84-171 sheep). These sheep are mainly found in the mountainous areas of the park west of the Firth River, and are likely part of the larger Brooks Range population in Alaska. A survey to determine Dall's sheep winter range was conducted in March, 2002 to determine if winter range is limiting the size of the sheep population in Ivvavik National Park.



Research

DALL'S SHEEP WINTER RANGE SURVEY

Objectives

- To determine the extent of Dall's sheep winter range in Ivvavik National Park.

Methods and Information Collected

- A helicopter survey was flown from March 18-20, 2002.
- This survey was conducted in the mountainous area between the Firth and Malcolm rivers. This is the same area that was flown for the Dall's sheep population survey that was conducted in June 2001.
- Total flying time for the survey was 9.7 hours.
- The location of sheep observed during the survey was recorded. Sheep were classified into one of 7 sex and age categories, when possible.
- The location of other wildlife observed during the survey was also recorded.

Partners

- Government of Yukon, Department of Environment

Results

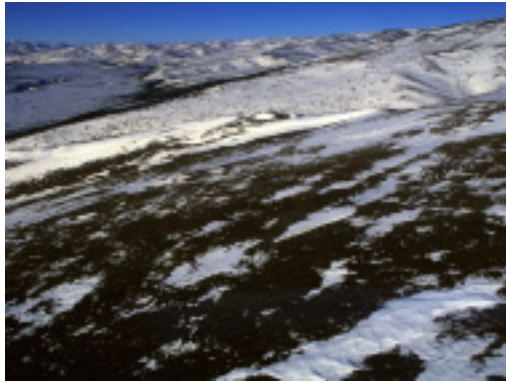
- The location of 71 Dall's sheep was recorded during the survey.
- Dall's sheep were observed throughout the study area during the winter range survey. Sheep were slightly more dispersed in the March survey than during the survey conducted in June 2001.
- Preliminary results indicate that there is not a lack of winter range for Dall's sheep in the study area.



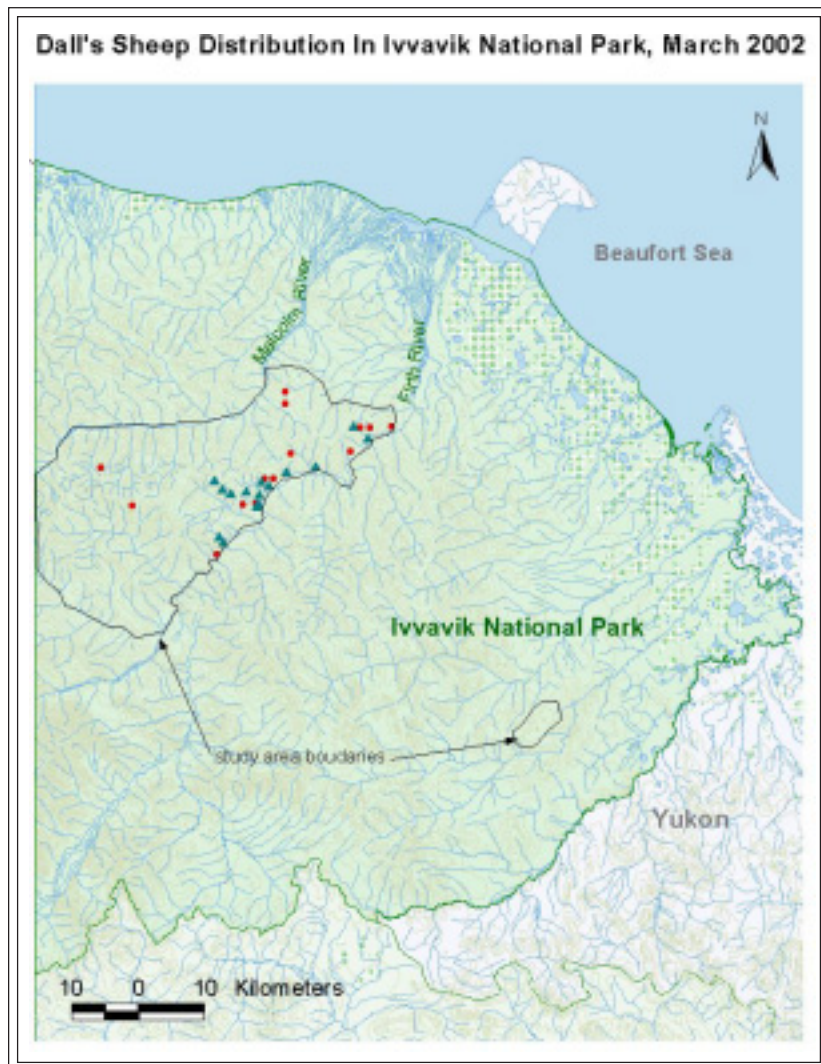
Dall's sheep in winter habitat, Ivvavik National Park.

Results (continued)

- A data report for June 2001 and March 2002 surveys will be produced.



Much of the study area was free of snow in March 2002.



Winter (red circles) and summer (green triangles) locations of Dall's sheep in Ivvavik National Park.

Contacts

Ian McDonald
Conservation Biologist
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8807
Fax: (867) 777-8820
Ian.McDonald@pc.gc.ca

Rationale

It is generally assumed that the Melville Hills, which occupy most of Tukturnogait National Park, were free of ice or covered by cold-based ice during the last glaciation. Mapping the surficial geology of the park will provide a better understanding of the glacial history of Tukturnogait National Park and the Amundsen Gulf area, and will help to complete a detailed resource inventory of the park. Information from this project will be used with the vegetation research conducted from 1998 to 2000 to create a basic description of the park environment.



Research SURFICIAL GEOLOGY AND GLACIAL HISTORY

Jean Veillette, Geological Survey of Canada

Objectives

- To produce a surficial geology map of Tukturnogait National Park.
- To reconstruct the glacial history of the region.
- To determine if the Melville Hills were glaciated during the last ice age.
- To determine the age of fossil wood discovered on the shores of Hornaday Lake.
- To identify areas that are highly sensitive to disturbance.

Methods and Information Collected

- Detailed air photo interpretation and site visits were conducted to record surface information and to collect rock, soil and organic material.
- 265 sites were visited by helicopter and foot in 2001 and 2002.
- 115 soil and till samples were collected to determine grain-size composition, carbonate content and basic geochemistry in 2001 and 2002.
- Wood and other organic material was collected for radiocarbon dating.
- 15 bedrock samples were collected for exposure dating in 2001 and 2002.
- Exposures showing multiple layers of unconsolidated Quaternary sediments were described and measured in sections along the Roscoe, Brock and Hornaday rivers.
- Photographs were taken of all terrain units at close range.
- Periglacial features such as polygonal ground, ice wedges, thermokarst and gelifraction phenomena, and thaw slides were described and photographed.



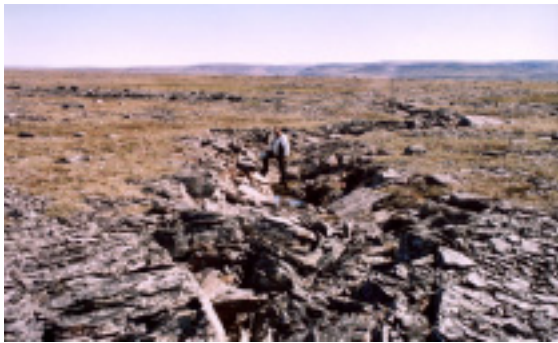
Jean Veillette collecting bedrock samples.

Methods and Information Collected (continued)

- Pebble and boulder counts were conducted and any lithological indicators of ice flow recorded.
- Glacial striations and other ice flow indicators were found and measured at 18 sites in 2001 and 2002.

Partners

- Geological Survey of Canada



Frost wedges formed by freeze-thaw action.



Conical kame deposit accumulated during glaciation.

Results

- A detailed interpretation of aerial photographs was completed in March 2002. A series of 1:50,000 scale surficial maps and a preliminary compilation at 1:250,000 were taken into the field in 2002 for ground truthing. This map shows the major terrain units organized in a legend according to geomorphological characteristics, age relationships and sediment profiles identified in the field.
- The surficial geology information was compiled by photogrammetric methods using Digital Video Plotter (DVP) software. The digital files are processed and edited using ArcInfo software.
- A comprehensive report and surficial geology map at 1:250,000 scale will be produced at the completion of the project in 2003.
- Based upon glacial striations and distribution of erratics, there is a strong possibility that the Melville Hills were glaciated by ice flowing westward and northwestward. The age and duration of this widespread ice movement remains to be determined and absolute ages will be required to assess this interpretation.
- Pebble counts, carbonate content analysis, grain size analysis, soil classification, cosmogenic dating and radiocarbon dating were completed for all samples collected in 2001 and will be completed for samples collected during summer 2002 before March 2003.

Contacts

Jean Veillette

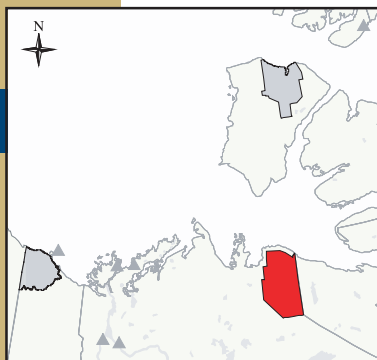
Emeritus Scientist
Terrain Sciences Division
Geological Survey of Canada
601 Booth Street
Ottawa, ON K1A 0E8
Phone: (613) 992-3630
jveillette@NRCan.gc.ca

Christian Bucher

Chief Park Warden
Tuktut Nogait National Park
P.O. Box 91
Paulatuk, NT X0E 1N0
Phone: (867) 580-3059
Fax: (867) 580-3234
Christian.Bucher@pc.gc.ca

Rationale

Little is known about the past history of the land, and use of the land by Inuvialuit, within and around Tuktut Nogait National Park. An oral history project was conducted to collect traditional knowledge from Elders about the physical, biological and cultural resources of the park. This project is a research priority for Tuktut Nogait National Park.



Research

TUKTUT NOGAIT ORAL HISTORY PROJECT

Objectives

- To collect traditional knowledge of the physical, biological and cultural resources of Tuktut Nogait National Park and the surrounding area from Elders.

Methods and Information Collected

- Elders who have lived in Paulatuk and travelled in and around Tuktut Nogait National Park were interviewed from 1999 to 2001.
- The following 9 people were interviewed: Edward Ruben, Billy Ruben, Mary Evik Ruben, Tommy Thrasher, Tony Green, Sam Green, Moses Arnauyak, Annie Illasiak and Father Leonce Dehurtevente.
- Interviews were conducted in English and Inuvialuktun. A translator was hired from the community when necessary.
- Elders were asked a set of questions about their family history, the Inuvialuktun language, wildlife, plants, fish, traditional foods, harvesting, travelling, living on the land and traditional clothing.
- The interviews were tape recorded and transcribed.



Lena Ruben interviewing Billy Ruben.

Results

- Elders possess extensive knowledge of the environment and past history of the park and surrounding area.
- They provided valuable information on cultural resources found in the park.
- Their knowledge has given insight into wildlife found in the area and their movements and changes over time.
- Recorded interviews have been edited.
- Transcripts of conversations with Father Leonce Dehurtevent have been produced into the report Paulatuq Oral History Project, Interview Transcripts of Father Leonce Dehurtevent. The remaining interviews will be completed and distributed in the winter of 2002/2003.



Cathy Cockney with Edward Ruben.

Contacts

Cathy Cockney

Cultural Resource Management Officer
Parks Canada

P.O. Box 1840

Inuvik, NT X0E 0T0

Phone: (867) 777-8803

Fax: (867) 777-8820

Cathy.Cockney@pc.gc.ca

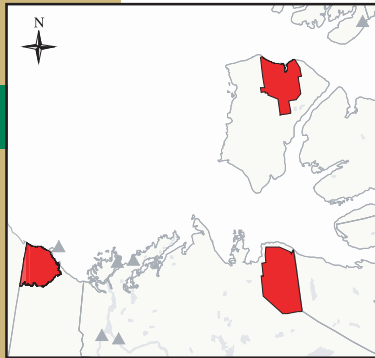
Monitoring





Rationale

Systematically recording wildlife observations is an inexpensive method of collecting information about wildlife populations. Wildlife observations are used to monitor changes in wildlife populations in Aulavik, Ivvavik and Tuktoyaktuk national parks and the surrounding regions. Special attention is paid to observations of bears and wolves, as there are long records of observations for both species and because they are good indicators of environmental health.



Wildlife

WILDLIFE CARDS

Objectives

- To collect basic information (presence, distribution, relative abundance) about wildlife populations in Aulavik, Ivvavik and Tuktoyaktuk national parks and surrounding regions.

Methods and Information Collected

- Incidental observations of wildlife are recorded by Parks Canada staff and park visitors.
- Information collected includes: date and time of observation, name of observer, species observed, number of individuals seen, location of observation, elevation, aspect, age, sex of animal, evidence of reproduction, habitat, weather and remarks.
- Information from the wildlife cards is entered into a database.
- Summaries and maps of incidental observations for each park are produced.



Red Phalarope.



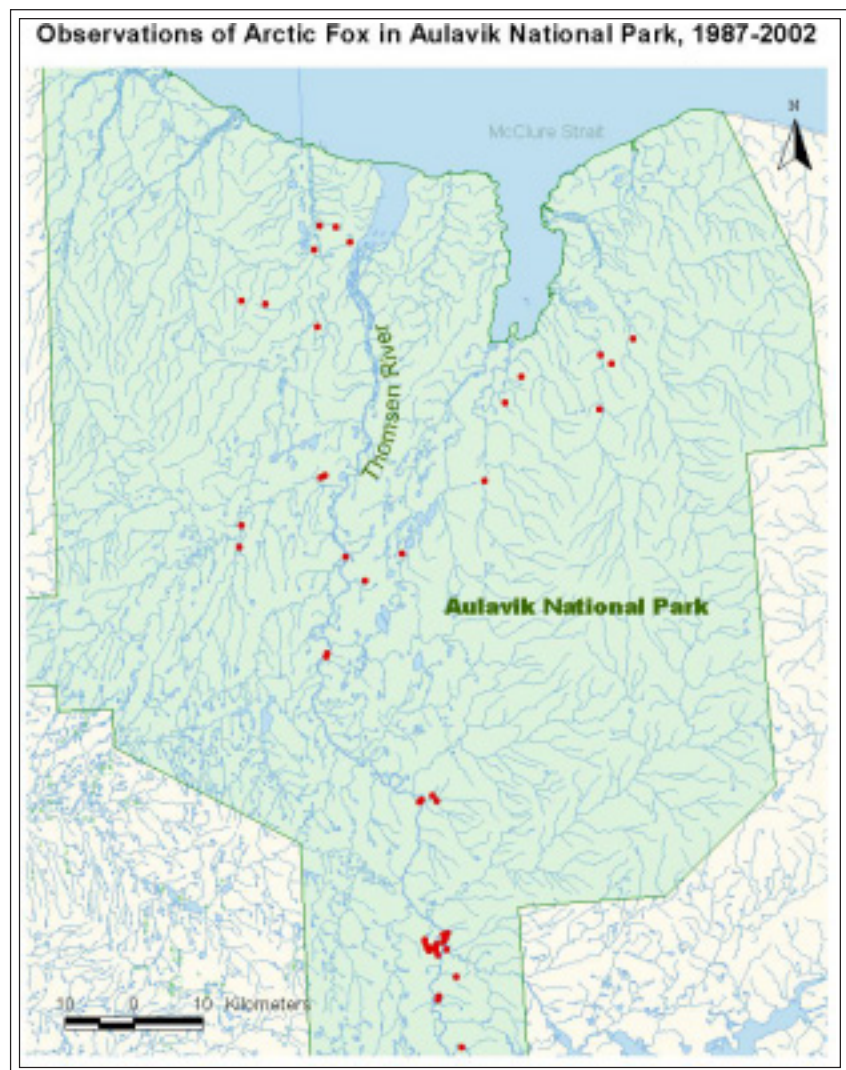
Muskox.

Years of Data

- 1986-ongoing
- The Department of Resources, Wildlife and Economic Development has an ongoing record of wolf observations on Banks Island that was initiated in the 1950's.

Results

- Information from this database is used to support resource management activities in the Western Arctic.
- Summaries of incidental observations of wildlife reported for Aulavik, Ivvavik and Tukturn national parks and surrounding regions in 1999 were developed in 1999 and 2000. Maps of bear and wolf observations from 1986 to 1999 were also developed. Additional summaries and maps using the wildlife cards database can be produced as they are required.



Contacts

Ian McDonald

Conservation Biologist
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8807
Fax: (867) 777-8820
Ian.McDonald@pc.gc.ca

Rationale

The NWT-Nunavut Bird Checklist Survey is part of a national effort to collect scientific information about the distribution, abundance and breeding status of birds in the north. Checklist data can provide useful information about birds that is difficult to collect in large, remote areas. Potential uses include baseline information for further studies, environmental assessments, mapping bird distributions more accurately and detecting major changes in bird populations. The survey was initiated in 1995 by the Canadian Wildlife Service (CWS) in response to a need for information identified in the Canadian Landbirds Monitoring Strategy. Parks Canada collects data for the survey and has assisted with the project's development.



Wildlife

NWT-NUNAVUT BIRD CHECKLIST SURVEY

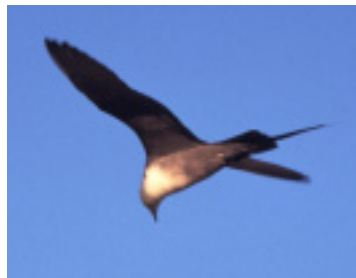
Canadian Wildlife Service

Objectives

- To collect information about the geographic distribution, abundance and breeding status of birds in the Western Arctic for use with national bird monitoring efforts.

Methods and Information Collected

- Checklists are completed for Aulavik, Ivvavik and Tukturnogait national parks.
- The number of birds of each species, and evidence of breeding, is recorded on the checklists.
- Checklists are completed for a 24 hour or shorter period in a 10 x 10 km or smaller area.
- Additional information is also recorded on the checklist (e.g. birding ability of the observer, survey location, habitat, presence of predators).



Long-tailed jaeger.



Tundra swans.

Results

- The NWT-Nunavut Bird Checklist Survey database was redesigned in 2001 to make it easier to update and more user-friendly. It is now possible to organize data by park. Some data fields from the checklist database are now accessible via the Internet (http://www.cbif.gc.ca/speciesanalyst/access_e.php). These data fields are updated periodically.
- Some of the more unusual reports from the 2000 survey are: harlequin ducks spotted on the Horton River, white-crowned sparrow reported in Sachs Harbour, an early american robin sighting March 30th on the Dempster Highway and a Say's phoebe seen on the Horton River.

Years of Data

- 1995-ongoing

Partners

- Canadian Wildlife Service (project lead)



Yellow-billed loon on nest.

Contacts

Craig Machtans

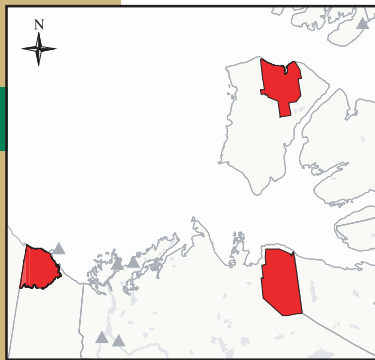
Canadian Wildlife Service
Suite 301, 5204-50th Ave.
Yellowknife, NT X1A 1E2
Phone: (867) 669-4771
Fax: (867) 873-8185
NWTChecklist@ec.gc.ca
<http://www.NWTChecklist.com>.

Ian McDonald

Conservation Biologist
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8807
Fax: (867) 777-8820
Ian.McDonald@pc.gc.ca

Rationale

Raptors, especially peregrine falcons, can be used as indicators of ecosystem health. Surveying raptors when they are in the Western Arctic to breed provides an indicator of the health of their populations and the condition of the ecosystem throughout their range. The raptor survey conducted in Aulavik, Ivvavik and Tuktut Nogait national parks coincides with the Canadian Peregrine Falcon Survey, a national effort to monitor the status of peregrine falcon populations in North America every five years.



Wildlife

RAPTOR SURVEY

Objectives

- To document the number of peregrine falcons and other species of raptors breeding in Aulavik, Ivvavik and Tuktut Nogait national parks.
- To provide information about peregrine falcon populations in Aulavik, Ivvavik and Tuktut Nogait national parks to the Canadian Peregrine Falcon Survey.
- The raptor survey is conducted every 5 years. The next survey will be conducted in 2005. Incidental observations of raptors in and around parks are recorded annually.

Methods and Information Collected

2000 Raptor Survey

Aulavik National Park

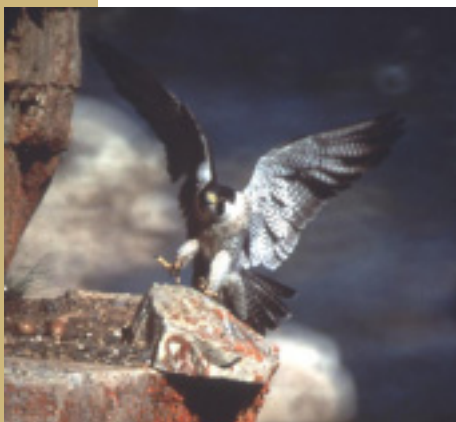
- Two boat surveys were conducted along the Thomsen River from Green Cabin to the Muskox River. One hiking patrol surveyed 30 km of the Muskox River. Two hiking patrols surveyed areas east and south of Mercy Bay. A helicopter survey was conducted south and east of Nangmagvik Lake.

Ivvavik National Park

- The survey was conducted by helicopter on the Yukon North Slope, concentrating on areas of known raptor and peregrine falcon nest sites. These areas included the lower reaches of the Firth, Malcolm and Babbage rivers and Herschel Island.
- Future surveys should include surveying the Firth and Babbage rivers by raft and kayak.

Tuktut Nogait National Park

- The Hornaday River was surveyed on foot and boat. The canyon section was hiked and the upper Hornaday River was surveyed by canoe. The Roscoe River was surveyed on foot.
- Future surveys may include the Brock and Roscoe rivers.



Peregrine falcon.

**Methods and Information
Collected (continued)**

Years of Data

Results

2001 -2002

- Raptor observations and nest sites were recorded in Ivvavik, Aulavik and Tuktut Nogait during regular park patrols throughout the summer.

Aulavik National Park

- Historic data as far back as 1952.
- Parks Canada raptor survey 2000.

Ivvavik National Park

- Peregrine falcon surveys on the Yukon North Slope since 1972.
- Parks Canada raptor survey 2000.

Tuktut Nogait National Park

- Raptor surveys along the Brock and Hornaday Rivers - 1988, 1990, 1991.
- Parks Canada raptor survey 2000.

2000 Raptor Survey

Aulavik National Park

- A total of 91 active raptor nests were located in the park: 10 peregrine falcon, 63 rough-legged hawk, 16 snowy owl and two short-eared owl.
- The two short-eared owl nests were the first recorded for Banks Island.

Ivvavik National Park

- Sixteen known peregrine falcon territories on the Yukon North Slope were visited and four new territories were found. In total, nine occupied territories were found in 2000. Seven of these were productive.
- These results indicate an increase in the number of peregrine falcons on the Yukon North Slope since 1995. However, a larger area was surveyed in 2000 than was surveyed in the past.

Tuktut Nogait National Park

- The 2000 survey found 13 productive territories, 1 territorial pair and 1 territorial adult male in 15 of 19 known peregrine falcon territories along the Hornaday River. Four new territories with productive pairs were also found.
- Results indicate a stable population of peregrine falcons on the Hornaday River from 1988 to 2000. The four new peregrine falcon territories found in 2000 indicate a positive, but unconfirmed, trend.

2001

- New raptor nest sites were identified and observations were recorded in Ivvavik, Aulavik and Tuktut Nogait national parks. This will increase the number of nest sites to be monitored in the next raptor survey in 2005.
- A database of all historical raptor data in all 3 parks was developed and all data was mapped.

2002

- 2 new nests were located in Tuktut Nogait National Park near the Roscoe River. Fewer nests were observed in Aulavik National Park in 2002 due to a decrease in lemming numbers. A higher number of golden eagles was observed in Ivvavik National Park.



Peregrine falcon chicks.

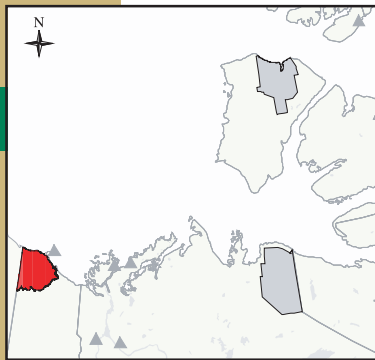
Contacts

Ian McDonald

Conservation Biologist
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8807
Fax: (867) 777-8820
Ian.McDonald@pc.gc.ca

Rationale

Environmental problems in wintering areas, breeding areas and along migration routes used by birds can affect the health of their populations. Breeding bird surveys are used to detect changes in the abundance and distribution of bird populations. The purpose of this survey is to create a long term record of breeding bird observations in Ivvavik National Park. This survey is based on the breeding bird surveys used by the Canadian Wildlife Service and the Alaska Offroad Bird Survey.



Wildlife

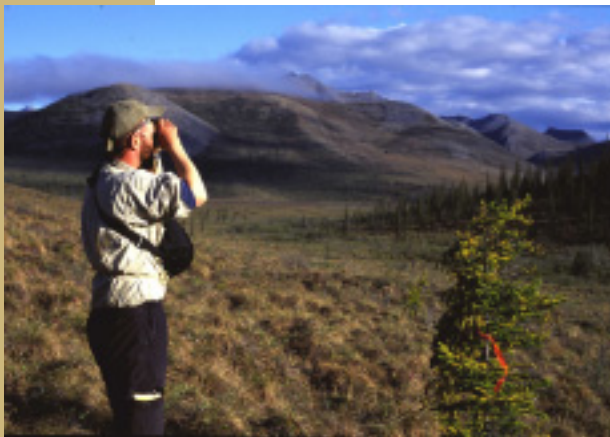
BREEDING BIRD SURVEY

Objectives

- To monitor the abundance and distribution of breeding birds at two locations in Ivvavik National Park.

Methods and Information Collected

- Surveys are conducted at Sheep Creek and Margaret Lake in the Firth River watershed.
- Four transects, each with 12 stations, are surveyed. There are 2 transects at Margaret Lake and 2 transects at Sheep Creek.
- Surveys are conducted in early to mid-June. Survey dates are kept relatively consistent from year to year.
- All surveys start at 5:00 am and conclude by 11:00 am.
- Only selected bird species are recorded for the survey. Additional species can be noted if the observer is certain of their identification.
- Birds are identified within a 50 m radius by sight and sound at each station. Observations at each station are made for 5 minutes.
- Birds observed after the five minutes, or while travelling between stations, are recorded separately.
- Wind and weather conditions are also recorded for each station.
- Incidental observations of ground squirrels and Dall's sheep are also recorded.



Ian McDonald surveying birds near Margaret Lake.



Red throated loon.



Horned lark.

Years of Data

- 1999 to 2002

Results

- Breeding bird surveys were conducted at Margaret Lake on June 14-15, 2002 and at Sheep Creek on June 18, 2002.
- Three of 4 routes were surveyed in 2002. The Sheep Creek South route was not surveyed because of poor weather and logistics.
- Northern Pintail, Spotted Sandpiper and Semipalmated Sandpiper were observed during the survey for the first time in 2002. All of these species are known to occur in the Margaret Lake and Sheep Creek areas.

Contacts

Ian McDonald

Conservation Biologist

Parks Canada

P.O. Box 1840

Inuvik, NT X0E 0T0

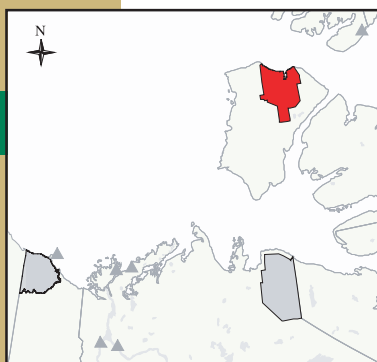
Phone: (867) 777-8807

Fax: (867) 777-8820

Ian.McDonald@pc.gc.ca

Rationale

Lemmings are an important part of many arctic ecosystems. They are a source of food for predators such as arctic fox, wolves, ermine and raptors, and can affect soil and vegetation. Lemming populations grow and decline cyclically, affecting the rest of the ecosystem as their abundance changes. Monitoring lemming abundance is important for understanding how lemming populations change and for interpreting how these changes affect the rest of the ecosystem.



Wildlife

LEMMING MONITORING

Objectives

- To measure relative changes in the abundance of collared and brown lemmings in one area of Aulavik National Park.
- To assess the cycles in lemming populations.
- To assess the numbers of lemming predators.

Methods and Information Collected

Plot Survey Method

- Lemming monitoring is conducted near Green Cabin, along the Thomsen River in Aulavik National Park.
- Five, one-hectare plots were created. The plots are located in areas that are typical habitat for lemmings, such as depressions or drainages in the tundra that tend to hold snow until early summer.
- In the early summer, preferably just after all of the snow has melted, the plots are systematically searched for lemming nests. The total number of nests in each plot are recorded.

Line Transect Survey Method

- Lemming monitoring is conducted near Green Cabin, along the Thomsen River in Aulavik National Park.
- Eleven transects of varying lengths were created. The transects are located in areas that are typical habitat for lemmings, such as depressions or drainages in the tundra that tend to hold snow until early summer.
- In the early summer, preferably just after all of the snow has melted, observers walk the transects looking for lemming nests. When a nest is sighted, its perpendicular distance from the line of travel is recorded. The density of lemming nests is calculated using the total distance the observer walks and these perpendicular distances.



James McCormick examining a lemming nest.



Conducting lemming surveys using the Line Transect Survey Method (left) and the Plot Survey Method (right).

Years of Data

- 1999 to 2002

Results

Plot Survey Method

- Lemming plots were surveyed on June 20, 21 and 29, 2002.
- A decrease in lemming nest counts from 2001 to 2002 corresponds with the observations of lemmings in Aulavik National Park. People reported seeing fewer lemmings in Aulavik this year compared to last year.

LEMMING NESTS COUNTED AT FIVE SAMPLE PLOTS IN AULAVIK NATIONAL PARK, BANKS ISLAND, JUNE 2002

Plot	1999	2000	2001	2002
1	0	3	3	4
2	3	1	4	0
3	6	18	9	4
4	11	6	9	1
5	0	5	6	0
Total	20	33	31	9

Line Transect Survey Method

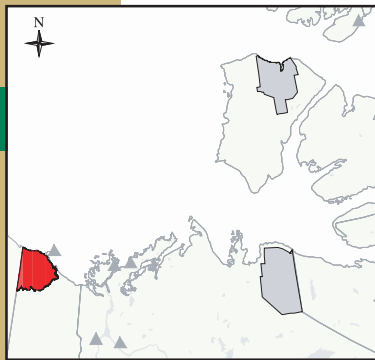
- Lemming plots were surveyed on June 22-24, 2002.
- 24 lemming nests and 0 weasel nests were counted over 24.2 km of transects.
- Since this is the first year of using this method, trends in lemming numbers cannot be analysed.

Contacts

James McCormick
 Park Warden
 Parks Canada
 P.O. Box 1840
 Inuvik, NT X0E 0T0
 Phone: (867) 777-06
 Fax: (867) 777-8820
 James.McCormick@pc.gc.ca

Rationale

Little is known about the abundance, seasonal movements and habitat use of moose in Ivvavik National Park. Surveys designed specifically for moose have not been conducted in Ivvavik National Park prior to 2000. The survey is conducted to determine abundance, sex and age composition, and distribution of moose in the Babbage River watershed. This information provides a baseline for future surveys that will allow Parks Canada to track changes in moose populations.



Wildlife

BABBAGE RIVER MOOSE SURVEY

Objectives

- To collect information about moose abundance, population characteristics and distribution in the Babbage River watershed on the Yukon North Slope.
- To track changes in moose abundance, population characteristics and distribution in the Babbage River watershed.

Methods and Information Collected

- The moose survey is conducted every 5 years. The next survey is in 2005.
- The survey area includes the Babbage River and all of its tributaries from the coast to the headwaters of the Babbage River.
- The 2000 survey was conducted on April 16 with a Bell 206B Jet Ranger helicopter by three observers and a pilot.
- Age and sex of moose, location and habitat type where moose were observed are recorded.



Moose in Ivvavik National Park.

Years of Data

- 2000

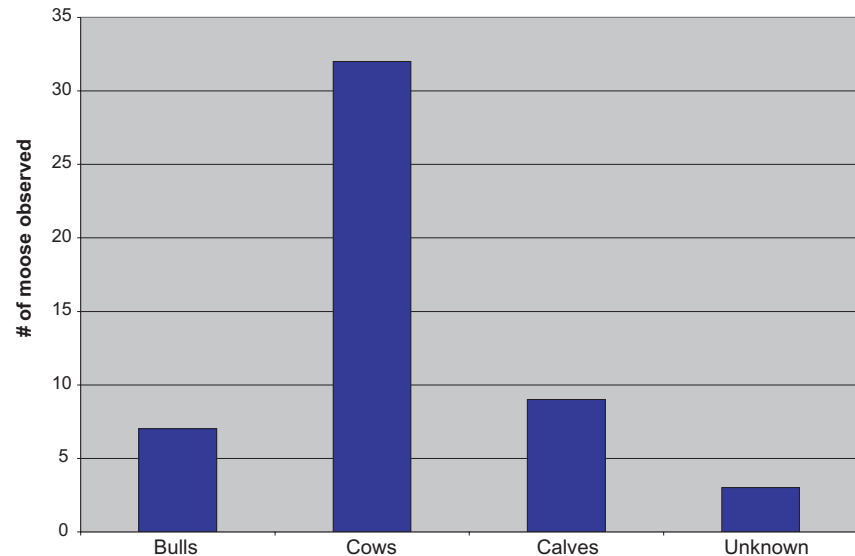
Partners

- Government of Yukon.

Results

- A total of 51 moose were counted in 2001.
- Changes in moose populations in the Babbage River area will be determined as future surveys are conducted.

Age and Sex Composition of Moose in the Babbage River Area, Ivvavik National Park, 2000.



Contacts

Dorothy Cooley

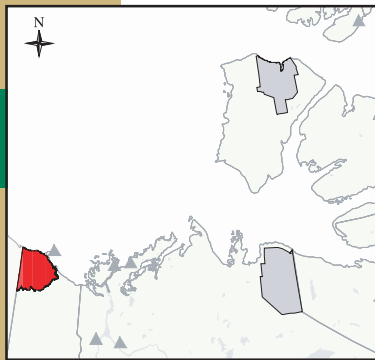
Regional Biologist
Department of Environment
P.O. Box 600 (R-5R)
Dawson City, YK Y0B 1G0
Phone: (867) 993-6461
Fax: (867) 993-6548
Dorothy.Cooley@gov.yk.ca

Ian McDonald

Conservation Biologist
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8807
Fax: (867) 777-8820
Ian.McDonald@pc.gc.ca

Rationale

Muskoxen were re-introduced to Alaska in the late 1960s and early 1970s. The population eventually expanded its range to the northern Yukon, and now ranges across the Yukon North Slope, south of the Yukon North Slope towards Old Crow, and in the Richardson Mountain in the Northwest Territories. Surveys of muskoxen have been conducted in the Yukon since 1986 to determine the size and age and sex composition of the population. Research has also been conducted to determine the movement and distribution of muskoxen, their behaviour and the presence of parasites. Research and monitoring of North Slope muskoxen is directed by the draft Canadian North Slope Muskoxen Co-management Plan, 2002-2007, developed by the Wildlife Management Advisory Council (North Slope).



Wildlife

YUKON NORTH SLOPE MUSKOXEN POPULATION MONITORING

Objectives

- To monitor the size, sex and age composition of the muskoxen population on the Yukon North Slope.
- To monitor the distribution and movement of muskoxen.
- To document muskoxen behaviour.
- To determine the presence of parasites in muskoxen on the Yukon North Slope.

Methods and Information Collected

- Muskoxen population size, and sex and age characteristics, are determined through aerial surveys conducted in the spring and summer.
- Surveys are conducted on the Yukon North Slope, from the Alaska/Yukon border to the Blow River, including Ivvavik National Park. The survey area includes the coastal plain and parts of the British and Barn mountain ranges.
- Muskoxen distribution and movements are determined by tracking muskoxen with satellite-radio collars and through aerial surveys. Satellite-radio collars were placed on 10 muskoxen (8 cows and 2 bulls) in 1999. These collars were either removed or replaced in 2002. There are now 8 muskoxen (5 cows and 3 bulls) on the Yukon North Slope with satellite-radio collars.
- Parasite research has been conducted for muskoxen on the Yukon North Slope and from the Richardson Mountains in the Northwest Territories. Muskoxen in the Richardson Mountains are part of the North Slope muskoxen population.
- Information about muskoxen behaviour is collected by observing muskoxen and recording their activity.



Martin Kienzler holding a collar used to track muskoxen movement on the Yukon North Slope.

Years of Data

- Population information for muskoxen in the Arctic National Wildlife Refuge (ANWR) has been collected since 1970.
- Population information for muskoxen west of the Canning River in Alaska has been collected since 1973.
- Incidental observations of muskoxen on the Yukon North Slope have been reported since 1973.
- Systematic surveys to determine the size and distribution of the Yukon North Slope muskoxen population have been conducted since 1986.
- A 4 year study of muskoxen distribution and movement was initiated in 1999.
- Parasite research was conducted in 2000 and 2002.

Partners

- Government of Yukon, Department of Environment
- Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development

Results

- Population, and sex and age composition, surveys were conducted in April and July, 2002.
- 186 muskoxen were counted in April, 2002 in the Yukon North Slope study area.
- In April, 2002 there were 35 yearlings: 100 adult females and 126 bulls: 100 adult females.
- 145 muskoxen were counted in July, 2002 in the Yukon North Slope study area.
- In July, 2002 there were 44 calves: 100 adult females, 31 yearlings: 100 adult females and 113 bulls: 100 adult females.

Contacts

Ian McDonald

Conservation Biologist
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8807
Fax: (867) 777-8820
Ian.McDonald@pc.gc.ca

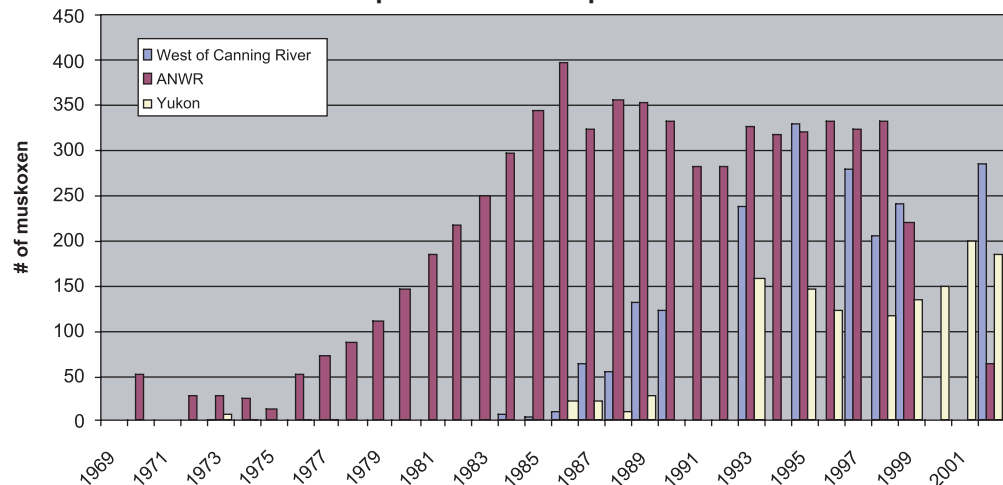
Dorothy Cooley

Regional Biologist
Department of Environment
P.O. Box 600 (R-5R)
Dawson City, YK Y0B 1G0
Phone: (867) 993-6461
Fax: (867) 993-6548
Dorothy.Cooley@gov.yk.ca

Steve Travis

Senior Park Warden
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8816
Fax: (867) 777-8820
Steve.Travis@pc.gc.ca

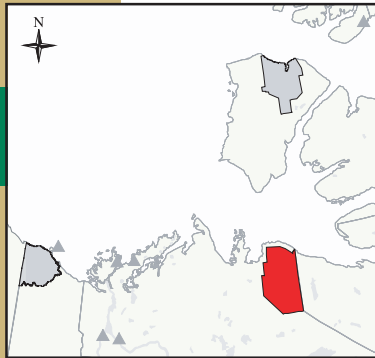
North Slope Muskoxen Population Estimates



Population estimates for muskoxen on the Yukon and Alaskan North Slopes, 1970-2002. ANWR = Arctic National Wildlife Refuge.

Rationale

There have been a limited number of surveys specifically for muskoxen in the mainland western arctic region of the Northwest Territories, north of Great Bear Lake to the Beaufort Sea coast. While two surveys were conducted in this area in 1987 and 1997, neither of these systematically covered the land within the boundary of Tuktut Nogait National Park. In March 1998 a research needs workshop for Tuktut Nogait National Park identified a muskoxen survey as a priority for the park. As a result, Parks Canada started this survey in conjunction with a long-term monitoring program of the Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories. Information from this survey will be used to resolve issues related to harvest quotas and muskoxen and caribou interactions.



Wildlife

TUKTUT NOGAIT MUSKOXEN POPULATION MONITORING

Objectives

- To estimate the number and distribution of muskoxen within the boundaries of Tuktut Nogait National Park.
- To document the observation of all other wildlife encountered during the survey.

Methods and Information Collected

- Muskoxen monitoring activities are conducted in Tuktut Nogait National Park and some surrounding area bounded by the Admundsen Gulf to the north, the Northwest Territories/ Nunavut border to the east, the Inuvialuit Settlement Region boundary to the south, and by longitude 123°20' to the west.
- Muskoxen are counted from a fixed-wing aircraft.
- The survey is conducted as a strip transect survey. Twenty transects, spaced 10 km apart at an altitude of 200 m above ground level were flown in an east-west direction over the entire study area.
- Information about muskoxen number and distribution, as well as other wildlife is collected by observing muskoxen and recording their activity on data sheets.



Muskoxen and their tracks are highly visible against snow, making them easy to locate during spring surveys.

Years of Data

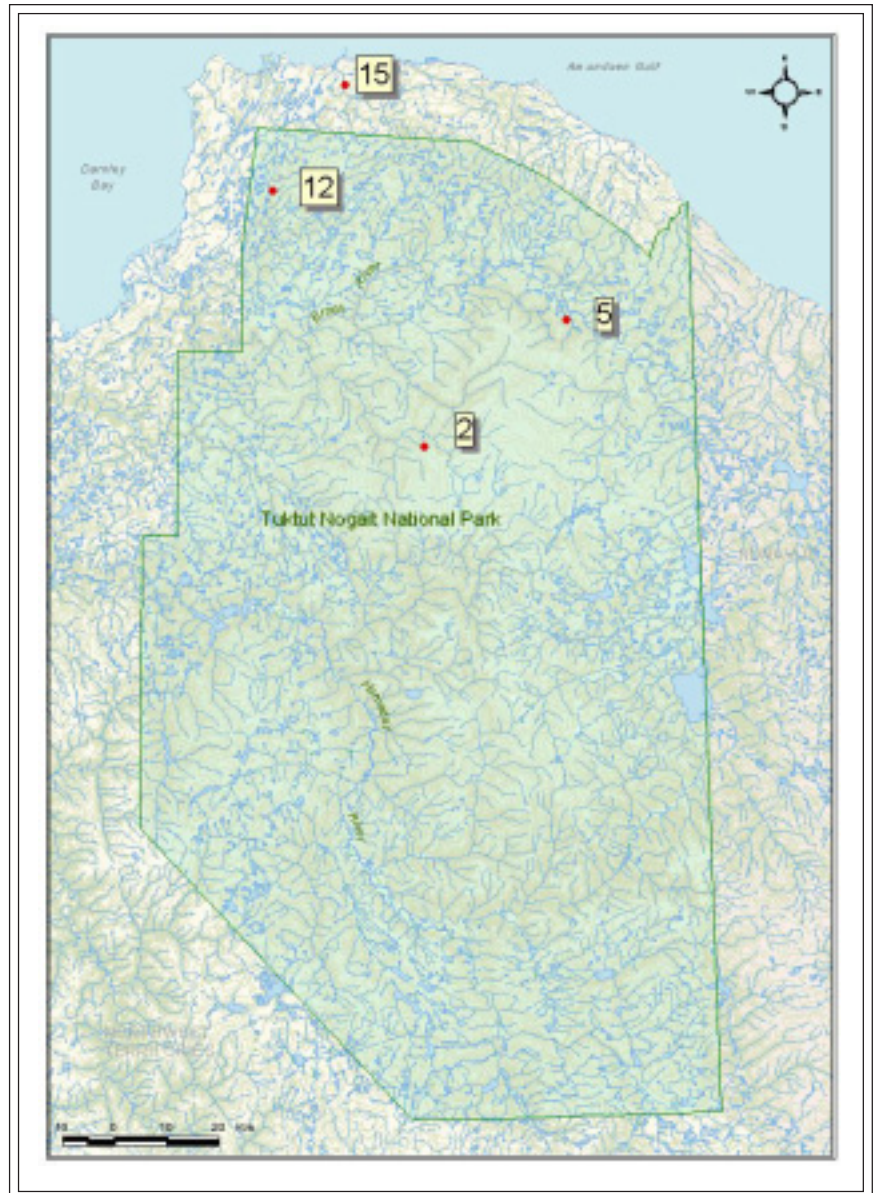
- 1997, 2002

Partners

- Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development

Results

- The survey was conducted from March 27 to 29, 2002.
- Four groups of muskoxen were observed; 32 adults and 2 calves. 15 muskoxen were on transect and 19 muskoxen were off transect.
- Other wildlife observations included 1 red fox, 2 wolverines, 1 polar bear and 7 caribou.



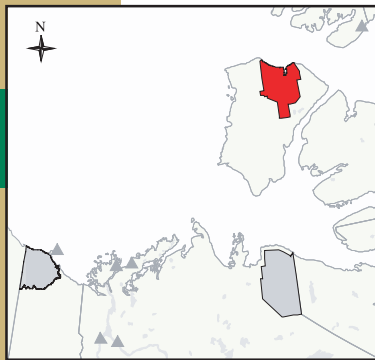
Map of muskoxen locations in Tuktut Nogait National Park, March, 2002. Numbers on map indicate the number of muskoxen found at each location.

Contacts

Christian Bucher
Chief Park Warden
Tuktut Nogait National Park
Parks Canada
P.O. Box 91
Paulatuk, NT X0E 1N0
Phone: (867) 580-3059
Fax: (867) 580-3234
Christian.Bucher@pc.gc.ca

Rationale

Peary caribou on Banks Island are classified as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The highest population estimate for the herd was 12,098 caribou in 1972. By 1998 there were 436 non-calf caribou and in 2001 the population had increased to 1196. Possible factors for the population decline include harvest, competition with other wildlife and inter-island movements. Information about the caribou population, seasonal habitat use, range conditions and predation is required to monitor the number of Peary caribou on Banks Island and to understand why the population decline has taken place. This project is led by the Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development and is carried out under the direction of the draft Co-management Plan for Caribou, Muskox, Arctic Wolves, Snow Geese, and Small Herbivores on Banks Island, 1998/99 to 2002/03. Parks Canada is a partner in this project, contributing funds and other resources.



Wildlife

BANKS ISLAND PEARY CARIBOU MONITORING

Department of Resources, Wildlife and Economic Development

Objectives

- To estimate the number of Banks Island Peary caribou.
- To determine caribou productivity and recruitment of calves.
- To determine caribou body condition.
- To assess late winter snow conditions in wintering range.
- To determine seasonal ranges, migration routes and habitat types used by caribou.
- To determine the movement of caribou between Banks and Victoria islands.
- To determine the presence and abundance of parasites and diseases in caribou.

Methods and Information Collected

- Banks Island, including Aulavik National Park, is surveyed.
- Caribou are counted from a fixed-wing aircraft.
- The number of calf to non-calf caribou are estimated.
- Incidental observations of wolves are recorded.
- Classification surveys are conducted by positioning surveyors near groups of caribou with a helicopter. Caribou are observed with spotting scopes or binoculars and classified by age and sex.
- Productivity is estimated by counting the number of calves present per 100 two-year-old or older females.
- Recruitment of calves is determined by counting the number of yearlings per 100 two-year-old or older females.
- Urine and fecal samples from caribou are collected and analysed to determine animal body condition.
- Satellite collars were placed on 10 adult female caribou in 1999.



Peary caribou on Banks Island.

Methods and Information Collected (continued)

Years of Data

Partners

Results

- Fecal and fourth stomach samples are analysed to assess parasite infection.
- The first caribou population survey was conducted on Banks Island in 1972. Additional surveys have been carried out every 3-4 years since 1982.
- Classification surveys have been conducted since 1994.
- Winter range conditions have been monitored since 1993.
- Caribou late winter body condition has been assessed since 1993.
- Parasite levels have been assessed since 2000.
- Information on caribou ranges during late June and early July has been collected during whole island population surveys and also from satellite tracking radio collared animals since 1982.
- Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development (DRWED) (project lead)
- The next population survey is scheduled to be conducted in 2004 or 2005.
- A classification survey was not conducted in 2002. The next classification survey will be conducted in 2003.
- Fecal samples were collected during winter 2002 to determine infection levels of gastro-intestinal parasites.
- Samples of the fourth stomach were collected from harvested animals during fall 2002 to determine the number and species of parasites present.
- Urine samples were collected in April 2002 to assess body condition.

Contacts

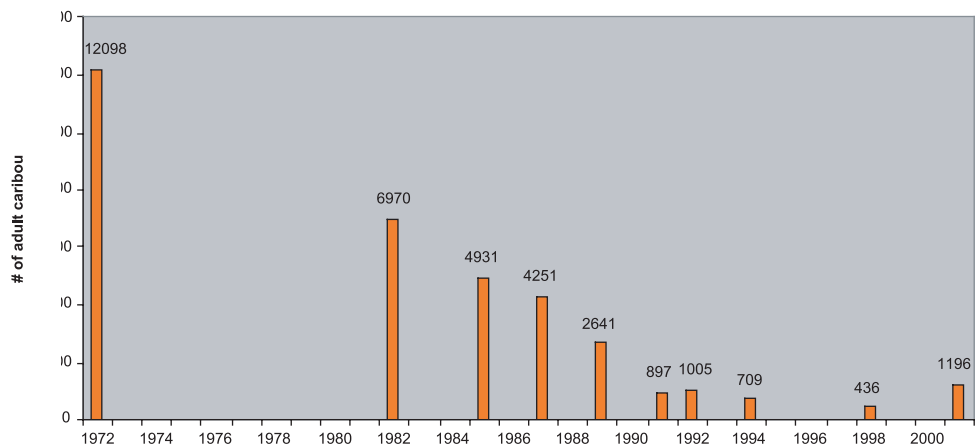
John Nagy

Supervisor of Wildlife Management
Department of Resources,
Wildlife and Economic Development
Inuvik Region
Inuvik, NT X0E 0T0
Phone: (867) 777-7305
Fax: (867) 777-7321
John.Nagy@gov.nt.ca

Ian McDonald

Conservation Biologist
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8807
Fax: (867) 777-8820
Ian.McDonald@pc.gc.ca

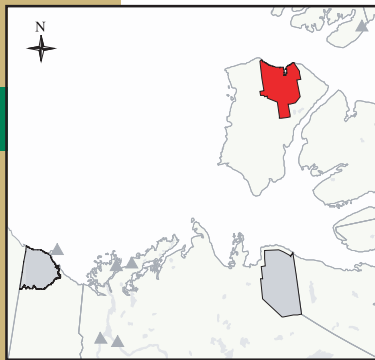
**Banks Island Caribou Population Estimates
1972-2001**



Population estimates for adult caribou on Banks Island, 1972-2001. Source: Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development.

Rationale

The number of muskoxen on Banks Island has changed dramatically from 1950s to the present. The population grew from hundreds of muskoxen in the 1950s to 3,800 in 1972 and then to 64,608 in 1994. The most recent population estimate, conducted in 2001, put the population at 68,788 muskoxen. Information about the population size and characteristics, habitat use, movements and health is important for managing muskoxen on Banks Island and understanding the Banks Island ecosystem. The information is also important to ensure the commercial harvest of muskoxen on Banks Island is sustainable. This project is led by the Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development and is carried out under the direction of the draft Co-management Plan for Caribou, Muskox, Arctic Wolves, Snow Geese, and Small Herbivores on Banks Island, 1998/99 to 2002/03. Parks Canada is a partner in this project, contributing funds and other resources towards the project.



Wildlife

BANKS ISLAND MUSKOXEN MONITORING

Department of Resources, Wildlife and Economic Development

Objectives

- To obtain current estimates of the number of non-calf and calf muskoxen on Banks Island.
- To determine productivity and recruitment of muskoxen calves in the Egg, Masik and Thomsen river areas.
- To assess late winter snow conditions in high density muskoxen areas.
- To determine body condition of muskoxen.
- To determine the presence and abundance of parasites and diseases in muskoxen.

Methods and Information Collected

- All areas of Banks Island are surveyed, including Aulavik National Park.
- Muskoxen are counted from a fixed-wing aircraft.
- Age and sex classification of muskoxen is conducted in their high density summer ranges. These ranges are in the vicinity of the Egg, Masik, Thomsen and Muskox rivers.
- Classification surveys are conducted by positioning surveyors near groups of muskoxen with a helicopter. Muskoxen are then observed with spotting scopes or binoculars and are classified by age and sex. Attempts are made to classify a minimum of 500 muskoxen, or 30 groups of muskoxen, in each area surveyed.
- Productivity is estimated by counting the number of calves present per 100 2-year-old or older females.
- Recruitment of calves is determined by counting the number of yearlings present per 100 3-year-old or older females.



Muskox.

Methods and Information Collected (continued)

- Urine, snow urine and fecal samples from muskoxen are collected in low and high muskoxen density areas and analysed to determine animal body condition.
- Incidental observations of wolves are recorded.
- Fecal and fourth stomach samples are collected and analysed to determine infection by parasites.

Years of Data

- The first whole island population survey of muskoxen took place in 1972, and has been conducted every 3-4 years since 1982.
- Classification surveys were conducted in the Thomsen River area during the 1980s and from 1999-2000.
- Winter range conditions have been monitored on Banks Island since 1993.
- Muskoxen late winter body condition has been assessed since 1993.
- Levels of different parasite species have been assessed since 1999.

Partners

- Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development (project lead)

Results

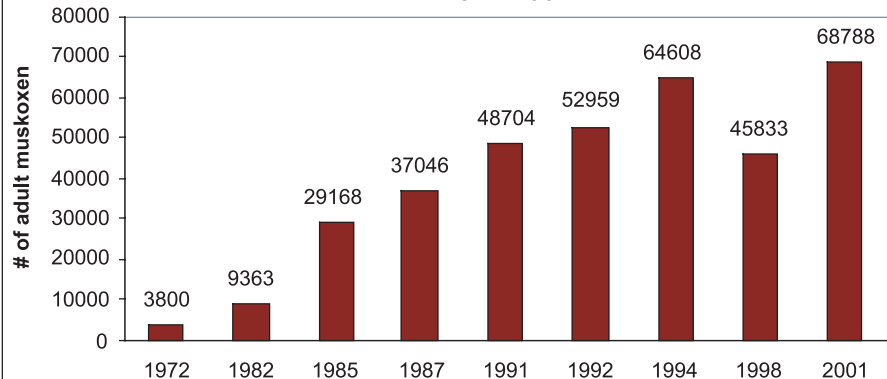
- Banks Island was surveyed from July 7-15, 2001 using a strip transect survey flown at 20% coverage. The population is estimated at 68,788 non-calf adults.
- A composition survey was completed on July 22-23, 2001. The results show 41 calves per 100 2-year-old or older cows.
- Urine samples were collected in April 2002 to assess body condition.
- Fecal samples were collected in August 2002 to determine infection levels of gastro-intestinal parasites.
- Fourth stomach samples were collected from animals harvested during the 2002 commercial muskoxen harvest on Banks Island to determine the number and species of parasites present.
- Data collected during commercial muskoxen harvests is being analysed to look at the change in pregnancy rates, body condition and size.

Contacts

John Nagy
 Supervisor of Wildlife Management,
 Department of Resources,
 Wildlife and Economic
 Development
 Inuvik Region
 Inuvik NT X0E 0T0
 Phone: (867) 777-7305
 Fax: (867) 777-7321
 John.Nagy@gov.nt.ca

Ian McDonald
 Conservation Biologist
 Parks Canada
 P.O. Box 1840
 Inuvik, NT X0E 0T0
 Phone: (867) 777-8807
 Fax: (867) 777-8820
 Ian.McDonald@pc.gc.ca

Banks Island Muskoxen Population Estimates 1972-2001



Population estimates of muskoxen on Banks Island, 1972-2001. Source: Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development.

Rationale

The Cape Bathurst and Bluenose-West caribou herds are two barren-ground caribou herds in the Northwest Territories and Nunavut. In 1992 the combined size of the two herds were estimated at 88,000 to 106,000 caribou. Information about the biology of the two herds is required to understand their current status and how their populations change over time. The draft Co-management Plan for the Cape Bathurst, Bluenose-West and Bluenose-East Caribou Herds, created in consultation with the Gwich'in, Sahtu, Inuvialuit and Inuit, indicates the need to conduct a variety of activities to monitor both caribou herds. This project is led by the Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development. Parks Canada is a partner in this project, contributing funds and conducting parts of the research.



Wildlife

CAPE BATHURST AND BLUENOSE-WEST CARIBOU MONITORING

Department of Resources, Wildlife and Economic Development

Objectives

- To determine the population size, productivity, recruitment of caribou calves, age and sex composition, mortality of females, parasite infection levels, distribution and movements of the Cape Bathurst and Bluenose-West caribou herds.

Methods and Information Collected

- Surveys of the Cape Bathurst and Bluenose-West caribou herds are conducted in the Cape Bathurst and Melville Hills regions in the Northwest Territories. Part of this area includes Tuktu Nogait National Park.
- Surveys to determine recruitment of calves and productivity are conducted in March and June. Age and sex composition surveys are conducted in October.
- Productivity, recruitment of calves and age and sex composition surveys are conducted with a radio telemetry equipped fixed-wing aircraft and a helicopter. The fixed wing aircraft is flown over suspected calving ranges for each herd to locate radio collared caribou. A helicopter is then used to classify caribou that were observed by the fixed-winged aircraft. Classifications are conducted by landing near groups of caribou and observing them with a spotting scope. For small groups of caribou, classifications are also conducted from the air.
- Female mortality rates are estimated from death rates of satellite collared female caribou.
- Forty-five caribou (35 adult females and 10 adult males) from the Bluenose-West herd and 14 caribou from the Cape Bathurst herd (11 adult females and 3 adult males) were



Caribou from the Bluenose-West herd.

Methods and Information Collected (continued)

equipped with radio collars in 1999 and 2000. Satellite-radio collars were placed on 13 adult caribou from the Bluenose-West herd in 1996, 1997 and 1999 and on two adult caribou from the Cape Bathurst herd in 1996 and 1999. 6 additional satellite radio collars were placed on Bluenose-West adults and 14 additional satellite radio collars were placed on Cape Bathurst adults in March of 2002.

- Fecal and fourth stomach samples are collected and analysed to assess infection by parasites.

Years of Data



Caribou calf.

- Productivity and age and sex composition surveys have been conducted since 2000.
- Population estimates of the Cape Bathurst and Bluenose West caribou herds on calving and post-calving ranges were conducted in 1986, 1987, 1992, 2000 and 2002.
- One productivity survey was conducted in 1981 and has since been conducted yearly from 2000. Eight surveys to determine recruitment of caribou calves were conducted between 1983 and 1994. One age and sex composition survey was conducted 1978.
- The presence and abundance of parasites was assessed in 2001.

Partners

- Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development (project lead)

Results

- A survey to determine productivity was conducted in the Bluenose-West calving area from June 19-22 and in the Cape Bathurst calving area from June 2-23, 2002. Results show a ratio of 55 calves per 100 2-year old or older cows for the Bluenose-West herd and 32 calves per 100 2-year old or older cows for the Cape Bathurst herd.
- Fecal samples were collected in 2001 and 2002 to determine infection levels of gastro-intestinal parasites.
- Satellite tracking data collected since 1996 was animated and distributed via CD.
- A recruitment survey was conducted in March 2001. Results show a low over winter survival of calves. The next survey will be in the spring of 2003.
- A fall body composition project was initiated using various caribou body parts collected from hunters to determine body size and body conditioning.
- Fourth stomach samples were collected from harvested animals during 2001 to determine the number and species of parasites present.

Contacts

John Nagy

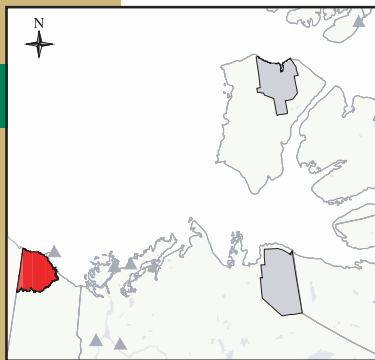
Supervisor of Wildlife Management
Department of Resources,
Wildlife and Economic
Development
Inuvik Region
Inuvik NT X0E 0T0
Phone: (867) 777-7305
Fax: (867) 777-7321
John.Nagy@gov.nt.ca

Christian Bucher

Chief Park Warden
Tuktut Nogait National Park
Parks Canada
P.O. Box 91
Paulatuk, NT X0E 1N0
Phone: (867) 580-3059
Fax: (867) 580-3234
Christian.Bucher@pc.gc.ca

Rationale

The Porcupine caribou herd is a large population of barren-ground caribou which migrate throughout the northern Yukon, Alaska and Northwest Territories. In 2001 the size of the herd was estimated at 123,000 caribou. Information about the Porcupine caribou herd is required for understanding the current status of the herd and how it is changing. Current monitoring is important because of existing and planned developments in the range of the herd, and changes in the arctic environment. Existing and planned developments include roads and oil and gas exploration and development in the calving grounds and in the wintering range of the herd. Changes to the arctic environment include the long range transport of pollutants and climate warming. This project is conducted by the Government of Yukon, the Canadian Wildlife Service, the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service. Parts of this work are conducted under the direction of the Porcupine Caribou Herd Management Plan. Parks Canada is a partner in this project, contributing funds and other resources towards the project.



Wildlife PORCUPINE CARIBOU HERD MONITORING

Government of Yukon, Canadian Wildlife Service,
Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service

Objectives

- To estimate the size, age and sex composition, body condition, productivity and over winter survival of caribou calves, adult female mortality and distribution and movements of the Porcupine caribou herd.
- Surveys are conducted throughout the range of the herd in northern Alaska, Yukon and the Northwest Territories.
- A photocensus of the Porcupine caribou herd is attempted every three years while the herd is congregating on their post-calving grounds. The photocensus is usually conducted in the Arctic National Wildlife Refuge in Alaska.
- Classification surveys are conducted entirely by helicopter or by positioning surveyors near groups of caribou with a helicopter. Caribou are observed with spotting scopes or binoculars and classified by age and sex.
- A calving survey is conducted by locating satellite and radio collared caribou starting in late May. Cows are located daily until they give birth and then located again in approximately 1 week to document perinatal calf mortality. Another survey is done in late June or early July to calculate calf survival rates to 1 month of age. Calf survival to 9 months of age is documented during the March composition count, .
- Adult female mortality rates are estimated from death rates of satellite and radio collared female caribou.
- Satellite collars are used to determine the seasonal distribution and movements of the herd, and form the basis for involving schools in several environmental educational programs.

Methods and Information Collected



Martin Kienzler and Lorelee Laberge with Catherine, the newest caribou of the satellite monitoring program, March 2002.

Years of Data

- Population estimates have been conducted since 1972.
- Calf mortality data, cow calf ratios and birth rates have been collected since 1983.
- Seasonal range use has been documented since 1970.

Partners

- Alaska Department of Fish and Game (project lead)
- U.S. Fish and Wildlife Service (project lead)
- Government of Yukon (project lead)
- Canadian Wildlife Service (project lead)
- Government of the Northwest Territories

Results

- The last photocensus was conducted in 2001. This photocensus estimated 123,000 caribou in the herd. The next photocensus is scheduled for 2003.
- A composition count telemetry flight and capture session was completed in March of 2002. 23 new cows were equipped with conventional telemetry collars.
- One cow was equipped with a satellite collar and one collar was replaced in 2002.
- Telemetry flights were conducted from May 30 to June 7, 2002, to locate cows and observe if they had produced calves. Follow-up flights on June 25 and 26, 2002 were undertaken to determine calf survival and locate bulls and nonpregnant cows that had not been located previously.
- Calf production in 2002 was up from 2000 and 2001. However, because the calf:cow ratio was lower from 1994 to 1999, it is feared that current levels of reproduction are not enough to stop the decline in herd size that has occurred since 1989.

Contacts

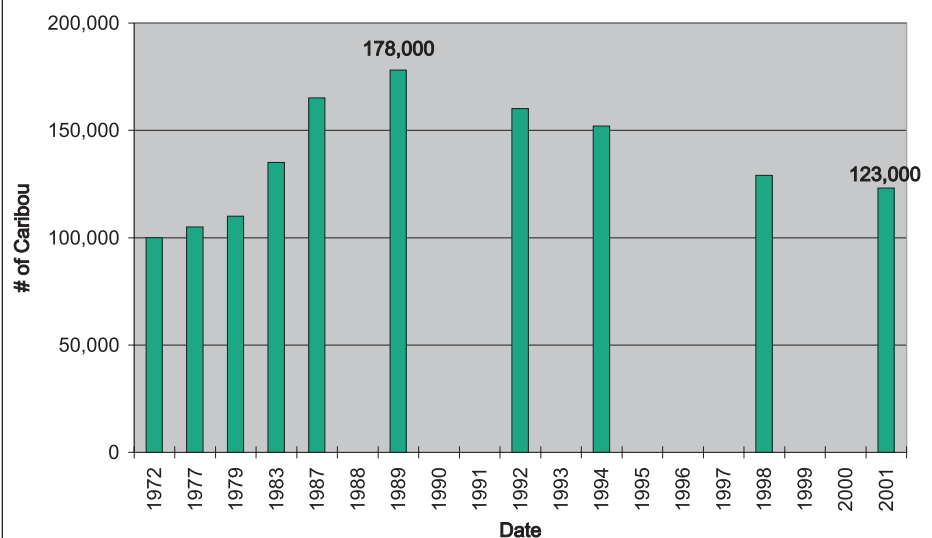
Dorothy Cooley

Regional Biologist
Department of Environment
P.O. Box 600 (R-5R)
Dawson City, YK Y0B 1G0
Phone: (867) 993-6461
Fax: (867) 993-6548
Dorothy.Cooley@gov.yk.ca

Ian McDonald

Conservation Biologist
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8807
Fax: (867) 777-8820
Ian.McDonald@pc.gc.ca

Population Estimates for the Porcupine Caribou Herd



Rationale

Some environmental changes are best understood by looking at entire landscapes. A “big picture” approach provides information about how entire ecosystems function and change. This can provide information that complements smaller scale monitoring activities. Parks Canada uses Advanced Very High Resolution Radiometer (AVHRR) satellite images to monitor landscapes. Of special interest is the Normalized Difference Vegetation Index (NDVI), which is recorded by the AVHRR satellite. NDVI measures the productivity or growth of vegetation. AVHRR satellite images make it possible to monitor ecosystems within parks, their surrounding regions and across the north.



Habitat

SATELLITE MONITORING OF PLANT PRODUCTIVITY

Objectives

- To monitor possible changes of plant productivity in Aulavik, Ivvavik and Tukturnogait national parks.

Methods and Information Collected

- Satellite monitoring of plant productivity is conducted for the Western Arctic Field Unit in Aulavik, Ivvavik and Tukturnogait national parks. This is part of a larger program that is conducted in 11 northern National Parks.
- Satellite images are taken daily from 1 April to 21 October each year. The images are created by combining the best images taken over a 10-day period.
- Analysis of satellite images is conducted by the Parks Canada Western Canada Service Centre in Winnipeg.
- Sampling units changed in 2002 from 3x3 km sites to ecodistrict boundaries in order to best integrate the satellite data with available landscape and biological information.
- A new statistical analysis method for the satellite images, fragmentation analysis, was also introduced in 2002. Fragmentation analysis is a method of measuring the ecological integrity of an area and will allow for the detection of change within each park.



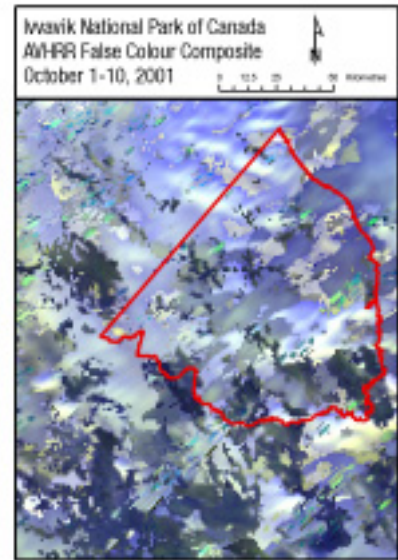
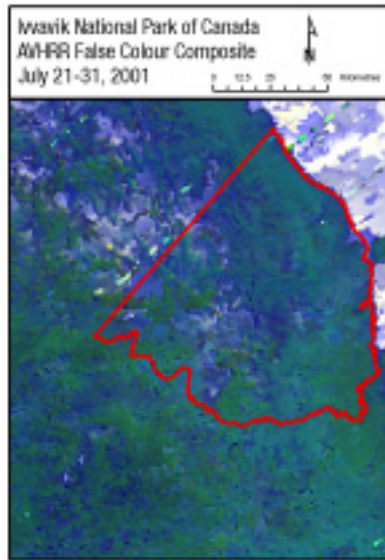
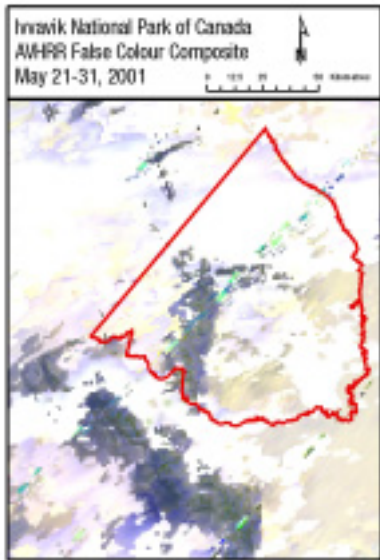
Purple mountain saxifrage (top) and Siberian phlox (side) in Tukturnogait National Park.

Years of Data

- 1997-ongoing

Partners

- Parks Canada - Western Canada Service Centre (Winnipeg)



AVHRR satellite images for Ivvavik National Park.

Results

- Data from 1997 to 2002 for Ivvavik, Tukturnogait and Aulavik national parks were analysed to determine changes in the NDVI.
- Seven years of data were analysed to show that there is overall declining trend in NDVI, beginning in 1998. Late growing season onset is suspected to be the cause.
- The table below summarizes the results of statistical fragmentation analysis of data for Aulavik, Ivvavik, and Tukturnogait national parks.

CHANGE OVER TIME WITHIN ECODISTRICTS

	PPU (relative size of NDVI patches)	E (diversity of NDVI patch types)	SqP (relative complexity of shapes of NDVI patches in the park)
Aulavik National Park	increased slightly over time and varied among ecodistricts	increased with time amongst all ecodistricts	stable over time but differed significantly among ecodistricts
Ivvavik National Park	increased significantly over time but not across ecodistricts	increased with time amongst all ecodistricts	stable over time but differed greatly among ecodistricts
Tukturnogait National Park	did not increase significantly over time and differed only marginally amongst ecodistricts	increased slightly with time amongst all ecodistricts	stable over time but differed significantly among ecodistricts

Contacts

Tom Naughten

Data Manager
Western Canada Service Centre
Parks Canada
145 McDermot Av.
Winnipeg, MB R3B 0R9
Phone: (204) 984-6227
Fax: (204) 984-2240
Thomas.Naughten@pc.gc.ca

Jeff Truscott

Data Management Specialist
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8805
Fax: (867) 777-8820
Jeff.Truscott@pc.gc.ca

Rationale

Pingos are a permafrost feature represented by the Pingo Canadian Landmark near Tuktoyaktuk. The Pingo Working Group, comprised of the Western Arctic Field Unit, Inuvialuit Land Administration, Hamlet of Tuktoyaktuk, Tuktoyaktuk Hunters and Trappers Committee and Tuktoyaktuk Community Corporation, is the body that co-manages the Landmark. The community of Tuktoyaktuk is interested in protecting the pingos in the Landmark and developing the Landmark as an attraction for visitors. There is concern that recreational activities and natural processes are causing the pingos to deteriorate. Damage to the vegetation covering the pingos exposes their ice core and causes them to melt. There is concern that damage to the pingos will decrease the value of the Landmark as an area that represents permafrost landforms and as a visitor attraction.



Habitat

PINGO MONITORING

Objectives

- To conduct a reconnaissance monitoring and information gathering trip within the Pingo Canadian Landmark.

Methods and Information Collected

- Four PlantWatch plots and five Photopoint locations were established close to Ibyuk and Split pingos, in order to monitor ecological change. Plot locations and vegetative composition were determined. Photos were taken from each photopoint.

Years of Data

- Fieldwork was conducted in August, 2002.

Partners

- Hamlet of Tuktoyaktuk
- Inuvialuit Land Administration
- Tuktoyaktuk Hunters and Trappers Committee
- Tuktoyaktuk Community Corporation



Split pingo in the Pingo Canadian Landmark.



Ed McLean, Charles Gruben, Brian Johnston and Lisa Loreen at the Pingo Canadian Landmark

Results

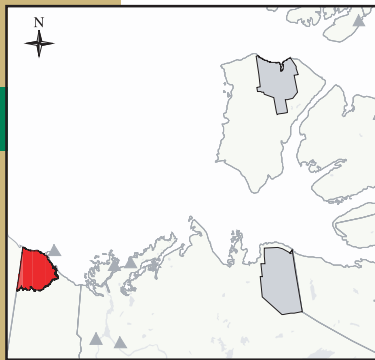
- Four PlantWatch plots are now in place to monitor the effects of climate change on vegetation within the Pingo Canadian Landmark. Data can be recorded from these plots in subsequent years should a decision be made to continue with the PlantWatch monitoring program.
- Photos were taken from each photopoint location in order to start an archival photo collection should the decision be made to continue with the Photopoint monitoring program. Each photo was documented by location.
- A monitoring program for the Pingo Canadian Landmark will be developed by the Pingo Working Committee.

Contacts

Jacque Bastick
Ecological Technician
Western Arctic Field Unit
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8824
Fax: (867) 777-8820
Jacque.Bastick@pc.gc.ca

Rationale

In Ivvavik National Park, approximately 80 percent of park visitors use some of the 35 identified campsites along the Firth River. A number of these sites are used repeatedly each summer by large groups of people. Potential impacts to these campsites from human use include damage to vegetation, soil erosion and improper disposal of human waste and garbage. All of these impacts can affect the park environment and the quality of the wilderness experience for park visitors. Campsites along the Firth River are monitored annually to identify human caused impacts and to determine if sites should be closed and restored.



Human use

FIRTH RIVER CAMPSITE MONITORING

Objectives

- To identify and track human caused impacts to campsites along the Firth River.
- To identify wildlife threats and sensitive species at campsites along the Firth River.
- To provide managers with information necessary to make decisions regarding campsite closures and restoration.

Methods and Information Collected

- There are 35 campsites monitored along the Firth River between Margaret Lake and Nanaluk Spit.
- The monitoring focuses on campsites that are not affected by seasonal spring flooding. These campsites are generally located upstream and downstream of the canyon section of the river. Campsites in the canyon section of the river that receive frequent use by large groups are also monitored.
- Campsite monitoring is conducted in the spring and in the fall every year.
- Spring monitoring occurs before the first visitor river trip. This monitoring is conducted to identify wildlife threats or concerns, such as wildlife carcasses near the site and active nest or den sites in the area. If any of these conditions exist the campsite will be closed. Once these conditions no longer pose a threat to humans or wildlife the site is reopened.
- Fall monitoring is conducted to identify impacts resulting from visitation during the summer. This involves comparing the composition and density of the vegetation at the campsite with the surrounding area, determining the



Muskeg Creek Campsite.

Methods and Information Collected (continued)

presence and extent of bare soil, bank erosion, trails and root exposure caused by human use of the site, identifying damage to vegetation in the surrounding area and identifying any waste or garbage left by people.

- The monitoring is conducted by completing an assessment form. Based on the results, or the existence of a wildlife threat or concern, additional monitoring is initiated or the campsite is closed.
- Additional monitoring involves a detailed examination of vegetation in heavily impacted areas. Photopoints are established along a transect and vegetation composition and density is measured.
- A campsite reporting program began in 2000, asking park visitors which campsites they used. This information is used by Parks Canada to identify which campsites are likely to be most impacted by human use.



Mervin Joe and Herbert Allen monitoring vegetation.

Years of Data

- 1997-ongoing

Results

- Campsites were monitored in the spring from June 25-July 9, 2002 to assess closures and check for wildlife problems.
- Joe Creek valley bottom was closed due to a nearby wolf den. The closure was lifted on August 13, 2002 as wolves had finished using the den for the year.
- The Firth River and all campsites between Sheep Creek and Engigstciak were closed between July 10-15, 2002 because of a high number of grizzly bears by the river. The bears were feeding on the carcasses of caribou which had drowned while trying to cross the river during spring flood.
- Campsites were also monitored from August 12-20, 2002. Photos were taken from established photopoints at Caribou Stick Fence, Wolf Tors, Lower Sluice Box, Margaret Lake West and Muskeg Creek campsites. These photos help with monitoring vegetation cover, and other changes to campsites.
- The remains of fires were found at 2 locations, despite the fact that fires are prohibited in the park.

Contacts

Ron Larsen

Chief Park Warden
Ivvavik National Park
P.O. Box 1840
Inuvik NT, X0E 0T0
Phone: (867) 777-8817
Fax: (867) 777-8820
Ron.Larsen@pc.gc.ca.

Rationale

Understanding the human use of national parks in the Western Arctic is required for effective park management. The Western Arctic Field Unit has monitored human use of Aulavik, Ivvavik and Tuktut Nogait national parks since 1989. Human use monitoring involves recording the number of visitors and Parks Canada staff who use the park, when and where they visit and the types of activities they conduct. This information is used by Parks Canada to develop and refine its public safety, law enforcement, resource management, interpretation and education activities. It is also used to reduce conflicts between people involved in different activities in the park and conflicts between people and wildlife.



Human use

HUMAN USE MONITORING

Objectives

- To document the extent and nature of human use of Aulavik, Ivvavik and Tuktut Nogait national parks.

Methods and Information Collected

- Human use monitoring is conducted for Aulavik, Ivvavik and Tuktut Nogait national parks.
- Information is collected for visitors, Parks Canada staff, researchers and students.
- The number of people in the park, the dates of their visit and their activities while in the park are recorded.
- This information is summarized every year.

Years of Data

- Aulavik: since 1994
- Ivvavik: since 1989
- Tuktut Nogait: since 1998

Results

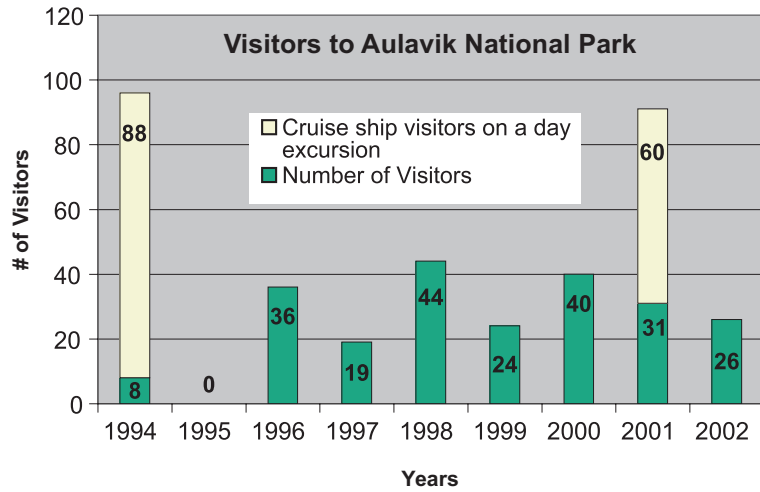
Aulavik National Park

- The number of visitors to Aulavik National Park has remained relatively constant in the last eight years.
- In 1994 and 2001, 88 and 60 visitors from a cruise ship visited the park on a day excursion.
- The number of visitors to Aulavik is not expected to increase in the future as the park is expensive to visit.



Camping by the Thomsen River in Aulavik National Park.

Results (continued)

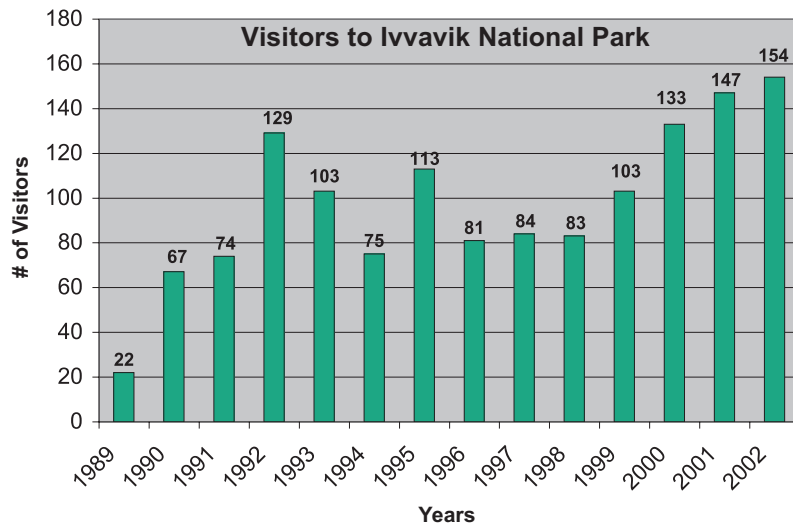


Ivvavik National Park

- The number of visitors to Ivvavik National Park in 2002 was the highest since the park was created in 1988. The number of visitors has been increasing for the last 4 years.
- Since 1988, the number of commercial raft trips has decreased and the number of private trips has increased.
- The number of hiking trips in the park has increased in recent years.



Hiking in Ivvavik National Park.

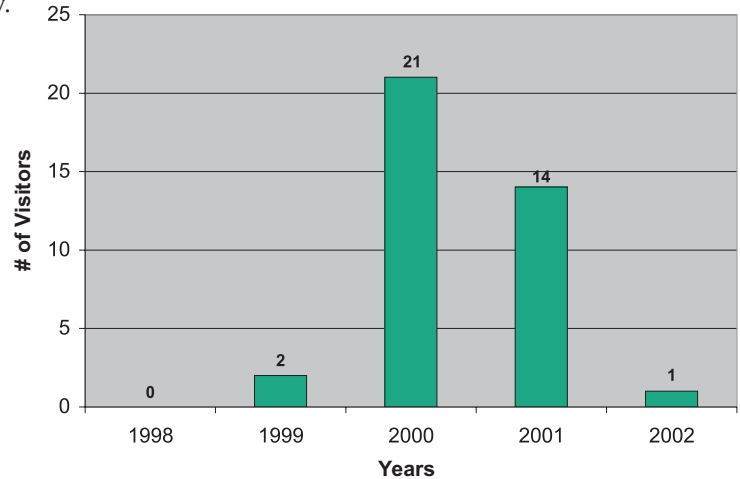




Canoeing the Hornaday River in Tuktut Nogait National Park.

Tuktut Nogait National Park

- There was only 1 visitor to Tuktut Nogait National Park in 2002. It is difficult to predict how visitation to the park will change as the park is relatively new.
- This park is the most easily accessible park in the Western Arctic as scheduled flights to Paulatuk bring hikers to within 44 km of the park boundary.



Staff and Researchers

- Parks Canada staff and researchers made a total of 609 visits of varying duration to Aulavik, Ivvavik and Tuktut Nogait national parks in 2002. A variety of resource management, public safety, law enforcement and education and interpretation activities were conducted during these visits.

Contacts

Ron Larsen

Chief Park Warden
Ivvavik National Park
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8817
Fax: (867) 777-8820
Ron.Larsen@pc.gc.ca

Christian Bucher

Chief Park Warden
Tuktut Nogait National Park
P.O. Box 91
Paulatuk, NT X0E 1N0
Phone: (867) 580-3059
Fax: (867) 580-3234
Christian.Bucher@pc.gc.ca

Terry Skjonsberg

Chief Park Warden
Aulavik National Park
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8802
Fax: (867) 777-8820
Terry.Skjonsberg@pc.gc.ca

2002 VISITOR STATISTICS FOR PARKS IN THE WESTERN ARCTIC FIELD UNIT

	Aulavik National Park			Ivvavik National Park			Tuktut Nogait National Park		
	# of groups	# of visitors	visit-or days	# of groups	# of visitors	visit-or days	# of groups	# of visitors	visit-or days
Canoe Trips	3	19	310						
Commercial Canoe Trips	1	7	98						
Raft Trips				8	68	994			
Commercial Raft Trips				4	55	591			
Kayak Trips				2	10	140			
Hiking Trips				1	5	45	1	1	10
Day Use Trips				2	16	16			



Rationale

Information about changes in the climate indicate that the temperature of the earth has increased over the past 100 years. This increase is likely caused by human activities, especially burning fossil fuels and deforestation. It is widely accepted that the greatest increases in temperature will take place in polar regions such as the Canadian Arctic. Long term monitoring of weather and permafrost temperature is required to track changes in the climate of national parks in the Western Arctic, and to understand how these changes will affect the environment of the Western Arctic.



Climate change

WEATHER AND PERMAFROST MONITORING

Objectives

- To monitor weather, permafrost temperature and active layer temperature in Aulavik, Ivvavik and Tuktoyaktuk national parks.

Methods and Information Collected

- Aulavik, Ivvavik and Tuktoyaktuk national parks each have two weather stations.
- All of the weather stations record the following:
 - precipitation
 - wind speed and direction
 - air temperature
 - incoming short wave radiation
 - relative humidity
 - dew point
 - snowfall and snow depth
 - barometric and vapour pressure
- UV-B radiometer is recorded at one station in each park.
- Active layer temperature is measured at a depth of 10 cm.
- Permafrost probes, which measure soil temperature at 2.5, 10, 20, 50, 100 and 150 cm in the ground, have replaced the active layer probes in Aulavik National Park and at Sheep Creek in Ivvavik National Park.
- All measurements, except for snow depth, barometric pressure, permafrost and active layer temperature, are taken every 5 seconds. Snow depth, barometric pressure, permafrost and active layer temperature are measured every 5 seconds during the last 10 minutes of the hour.
- Measurements are recorded on data loggers and are transmitted by satellite.



Weather station in Aulavik National Park.

HQID	Station Name	Location	Elev. in m ASL	Date Installed	Date Permafrost Probes Installed
Aulavik National Park					
2503886	Green Cabin	73° 13' 49" N, 119° 32' 12" W	37.0	27/06/96	26/07/00
2500440	Polar Bear Cabin	74° 08' 30" N, 119° 59' 25" W	32.0	26/06/96	30/07/00
Ivvavik National Park					
2100660	Sheep Creek	69° 10' N, 140° 09' W	301.8	11/06/95	30/07/01
2100697	Margaret Lake	68° 48' N, 140° 51' W	524.5	09/06/97	07/07/02
Tuktut Nogait National Park					
2203918	Melville Hills	69° 11' 34" N, 122° 21' 14" W	551.6	25/07/98	N/A
2203341	Qavvik Lake	68° 13' 32" N, 122° 01' 14" W	530.0	07/07/99	N/A

The location of weather stations in Aulavik, Ivvavik and Tuktut Nogait national parks.

Years of Data

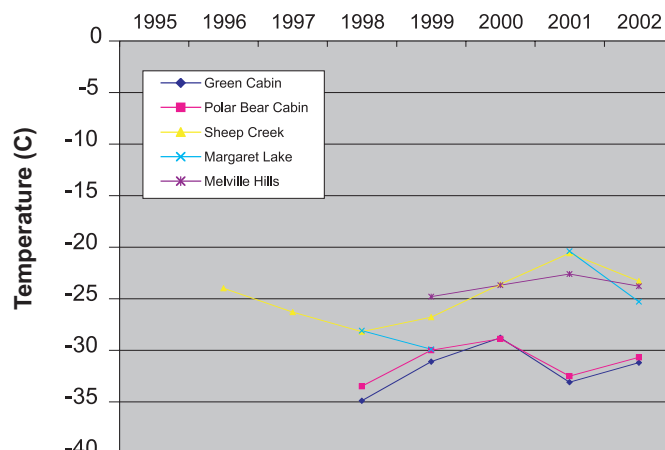
- The weather stations operated by the Western Arctic Field Unit were installed between 1995 and 1999.
- Permafrost probes were installed in Aulavik National Park in 2000, and in Ivvavik National Park in 2001 and 2002. Permafrost probes will not be installed in Tuktut Nogait National Park due to the nature of the substrate (bedrock) at the weather stations.

Partners

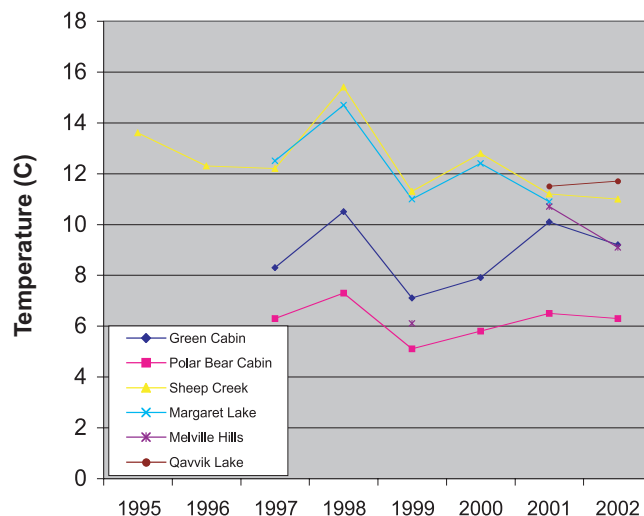
- Environment Canada, Atmospheric Environment Service

Results

Mean January temperature at weather stations in Aulavik, Ivvavik and Tuktut Nogait national parks, 1995-2002.



Mean July temperature at weather stations in Aulavik, Ivvavik and Tuktut Nogait national parks, 1995-2002.

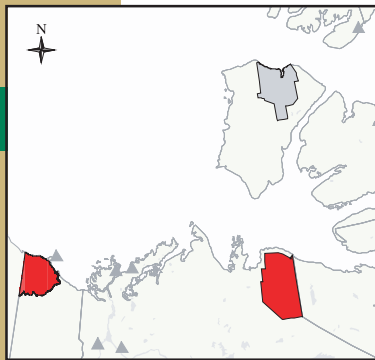


Contacts

Ian McDonald
 Conservation Biologist
 Parks Canada
 P.O. Box 1840
 Inuvik, NT X0E 0T0
 Phone: (867) 777-8807
 Fax: (867) 777-8820
 Ian.McDonald@pc.gc.ca

Rationale

Changes in the amount of water flowing in Arctic rivers, and the timing of peak and low water levels, may be affected by climate change. River water flow monitoring is conducted on the Firth River in Ivvavik National Park and the Hornaday River near Tuklut Nogait National Park to determine current water cycles and to identify long-term changes to these cycles. On the Hornaday River, river flow information is also used to look at relationships between river water flow, and fish habitat and productivity. River water flow information is also useful for people who are planning to canoe, raft, kayak or cross the Firth or Hornaday rivers.



Climate change

RIVER WATER FLOW MONITORING

Objectives

- To document and monitor water flow in the Firth River in Ivvavik National Park and the Hornaday River near Tuklut Nogait National Park.
- To examine the relationship between river water flow, fish habitat and fish productivity in the Hornaday River.
- To provide park visitors with current information on river navigability and river crossings.

Methods and Information Collected

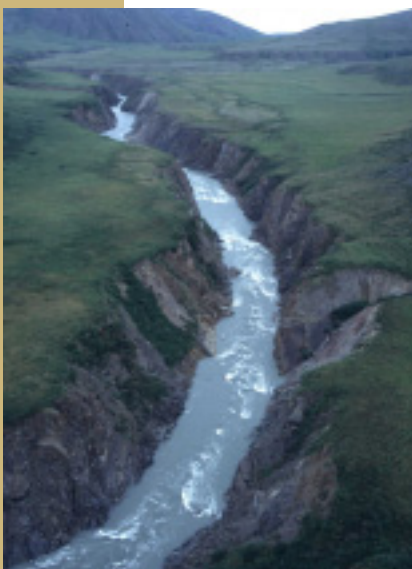
- Stations that measure water flow are located on the Firth River in Ivvavik National Park and on the Hornaday River near Tuklut Nogait National Park.
- The station on the Firth River is located at 69° 19' 37" N; 139° 34' 8" W.
- The station on the Hornaday River is located at 69° 10' 41" N; 123° 15' 01" W. The station is approximately 5 km downstream of the west park boundary.

Years of Data

- Firth River station from 1972-1994 and since 1997
- Hornaday River station since 1998

Partners

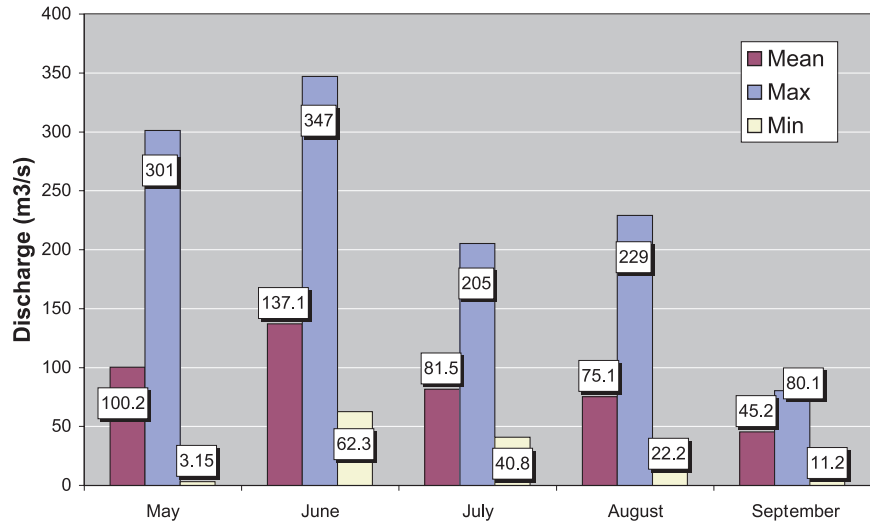
- Environment Canada, Water Survey Branch
- Fisheries and Oceans Canada
- Fisheries Joint Management Committee
- Polar Continental Shelf Project
- Campfire Conservation Fund



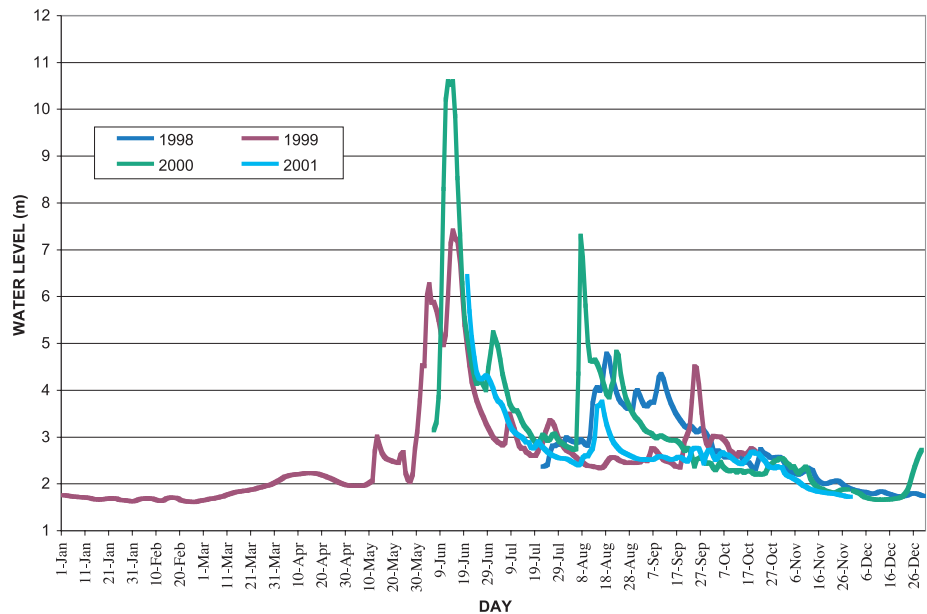
The Firth River in Ivvavik National Park.

Results

**Mean Monthly Discharge for the Firth River, YK
1972-2001**



**Hornaday River Water Levels
1998-2001**



Contacts

Ian McDonald

Conservation Biologist
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8807
Fax: (867) 777-8820
Ian.McDonald@pc.gc.ca

Lois Harwood

Stock Assessment Biologist
Fisheries and Oceans Canada
P.O. Box 1871
Inuvik, NT X0E 0T0
Phone: (867) 777-7505
Fax: (867) 777-7501
Harwoodl@dfo-mpo.gc.ca

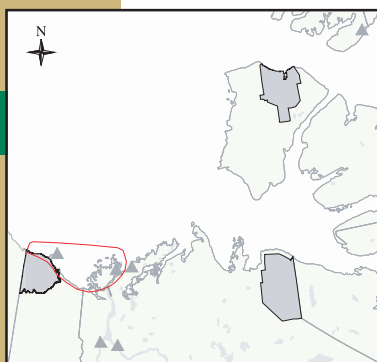
Randy Wedel

Hydrological Services Supervisor
Water Survey Branch
Environment Canada
301-3rd Floor Diamond Plaza
5204 50th Ave.
Yellowknife, NT X1A 2R2
Phone: (867) 669-4749
Fax: (867) 873-8185
Randy.Wedel@ec.gc.ca



Rationale

Climate change may increase the frequency and strength of coastal storms. Natural Resources Canada has started a sea temperature and storm surge monitoring program to collect information about the effect of storms on water levels and water temperature. This information can be used to understand how storms affect the permafrost and ice that occur along the coast. The information can also be used to look at how sea temperatures affect fish migration. The project is part of a network of sea temperature and storm surge monitoring projects across the Arctic Ocean coastline.



Climate change

SEA TEMPERATURE AND STORM SURGE MONITORING

Geological Survey of Canada, Natural Resources Canada

Objectives

- To measure changes in water levels and temperature during storms along the southeastern Beaufort Sea coast.
- To develop an understanding of how storms affect the erosion of permafrost and ice that occur along the Beaufort Sea coast.
- To relate coastal sea temperatures with fish migration.

Methods and Information Collected

- Sea temperature and storm surge monitoring is conducted at various locations along the Beaufort Sea coast.
- Probes are located at Shingle Point, Stokes Point and Nunaluk Spit along the coast of Ivvavik National Park. There are also probes at 5 locations in Alaska and 1 at Tuktoyaktuk.
- Probes are used to measure sea temperature and storm surges. The probes are cylinder shaped and are approximately 10 cm long and 3 cm in diameter. The probes are attached to a weight and placed in 1-3 m of water.
- Parks Canada is responsible for setting out and retrieving probes along the coast of Ivvavik National Park. The probes are set out in July and retrieved in July of the following year when the new probes are set.

Years of Data

- 2000 - present.

Partners

- Geological Survey of Canada, Natural Resources Canada (project lead)
- Fisheries and Oceans Canada

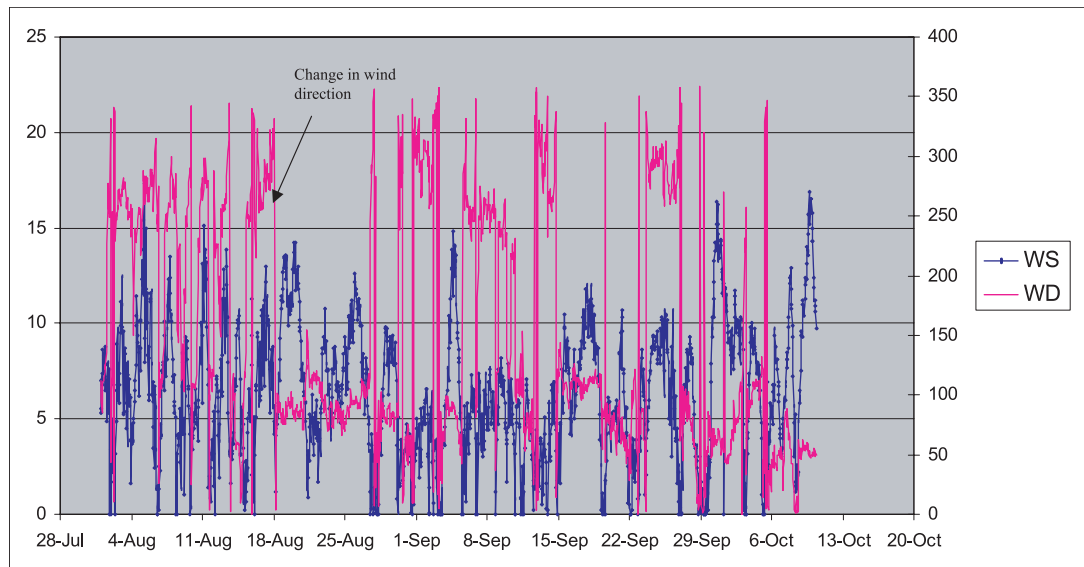


Coastal erosion along the Beaufort Sea.

Results

- In the absence of permanent tide gauges, storm surge probes have proven to be suitable tools for monitoring summer and early fall water levels along the Beaufort Sea shoreline.
- The probes recorded a water surge associated with a storm on August 10-14, 2000. This storm showed the differences in timing and height of water surges at different locations. Surges were later, higher and longer in the west.
- The chart below shows wind speed (WS) and wind direction (WD) for the summer of 2001. Note the dramatic change in prevailing wind direction from NW to E on 17-18 August. This coincides with a decrease in water levels throughout the region.

Wind Speed and Direction from Prudhoe for Summer 2001.



Contacts

Steven Solomon

Geological Survey of Canada (Atlantic)

P.O. Box 1006

Dartmouth, NS B2Y 4A2

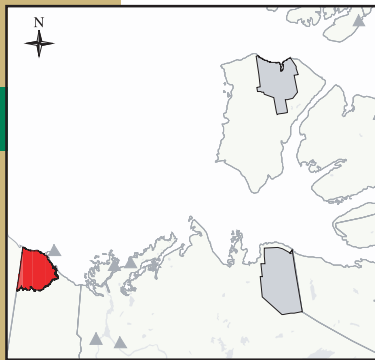
Phone: (902) 426-8911

Fax: (902) 426-4104

Ssolomon@nrcan.gc.ca

Rationale

The BAR-1 Distant Early Warning (DEW) line station at Komakuk Beach was closed in 1993 as part of a general closure of the DEW line. The site became part of Ivvavik National Park after a clean-up was completed in 2000. The clean-up involved demolishing buildings, excavating contaminated soil, remediating an area where fuel was spilled, collecting debris, excavating three landfills and closing a fourth landfill. A landfill and fuel spill monitoring program will be developed by the Department of National Defence (DND) in cooperation with the Inuvialuit Land Administration (ILA) and Parks Canada to monitor conditions at the site after clean-up.



Solid waste

KOMAKUK BEACH CLEAN-UP MONITORING

Objectives

- To monitor the condition of the remediated fuel spill and landfills at Komakuk Beach.

Methods and Information Collected

- Komakuk Beach is located on the Yukon North Slope at 69° 35' 53" N; 140° 11' 00" W.
- A monitoring program for the fuel spill and landfills will be developed by the Department of National Defence, Parks Canada and the Inuvialuit Land Administration.



Fuel spill monitoring wells, with close-up of individual well, at Komakuk Beach.

Years of Data

- Clean-up conducted in 1999 and 2000.
- Development of fuel spill and landfill monitoring program began in 2001.

Partners

- Department of National Defence
- Inuvialuit Land Administration



Cleaning up a landfill at Komakuk Beach.



Removal of contaminated soil from Komakuk Beach.

Results

- Monitoring will begin in 2003.

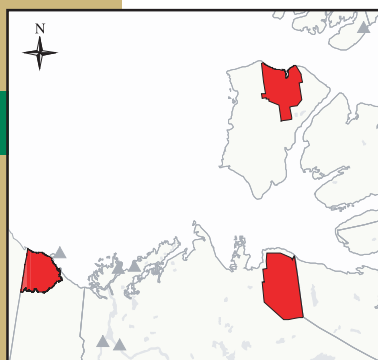
Contacts

Ron Larsen

Chief Park Warden
Ivvavik National Park
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8817
Fax: (867) 777-8820
Ron.Larsen@pc.gc.ca

Rationale

Contaminants from sources in the south have been found in Arctic ecosystems. These contaminants travel through the atmosphere and are deposited in the Arctic, where cold temperatures keep them from travelling any further. The presence of contaminants such as persistent organic pollutants (POPs), heavy metals and radionuclides are a concern because they can have negative effects on Arctic ecosystems and human health. Water quality monitoring is conducted on the Thomsen River in Aulavik National Park, the Firth River in Ivvavik National Park and the Hornaday River in Tuktoyaktuk National Park. Water quality information for these rivers is used to determine current water quality conditions and to monitor changes in water quality over time.



Long range transport of pesticides WATER QUALITY MONITORING

Objectives

- To determine the current water quality of the Thomsen River in Aulavik National Park, the Firth River in Ivvavik National Park and the Hornaday River in Tuktoyaktuk National Park.
- To determine if water quality changes over time in Aulavik, Ivvavik and Tuktoyaktuk national parks.

Methods and Information Collected

- Water quality samples are taken from the Thomsen River at Green Cabin, from the Firth River at the water survey site and at 2 sites in the Upper Hornaday River.
- Three sets of water samples are taken at each site from the Firth River and Hornaday Rivers each summer. The first set of samples are typically taken in May or June just after the ice breaks up on the river. The second set of samples are usually taken in late June or July and the third set of samples are taken in September.
- Two sets of water samples are taken from the Thomsen River each summer. Samples are typically taken in June and July. Two, rather than three, sets of samples are taken from the Thomsen River because of the expense of travelling to Aulavik National Park.
- Quality assurance and control samples are taken at some sites to test the quality of the samples and the accuracy of the laboratory analysis.
- Water temperature, conductivity and pH are measured at the site.
- Water quality samples are analysed for physicals, nutrients, major cations, major anions, trace metals and organics.



Water sampling site on the Thomsen River in Aulavik National Park.

Years of Data

- Aulavik and Tukturnogait: since 1999
- Ivvavik: since 2000

Partners

- Environment Canada
- Fisheries and Oceans Canada



Christian Bucher and Mary Anne Francey taking water samples from the Hornaday and Thomsen Rivers.

Results

- The Firth River was sampled in May, June and September, 2002 at the water survey site.
- The Thomsen River was sampled in June and August 2002 at Green Cabin.
- The Hornaday River was sampled twice in May and once in September, 2002 at 2 sites in the Upper Hornaday River. An additional two sites, one at the Hornaday River gauge and one at the mouth of the Hornaday River, were sampled in April. Sampling at the mouth of the river was unsuccessful due to thick ice. These sites were sampled in order to assist the Department of Fisheries and Oceans and Environment Canada with their sampling program.
- Results from the Thomsen, Firth and Hornaday River water quality samples indicate that all three rivers have excellent water quality.
- Traces of lindane, a pesticide used in other regions of Canada and around the world, were found in the 1999 Thomsen River samples. The presence of lindane in the Thomsen River is an example of the long range transport of pollutants to the Arctic.

Contacts

Ian McDonald

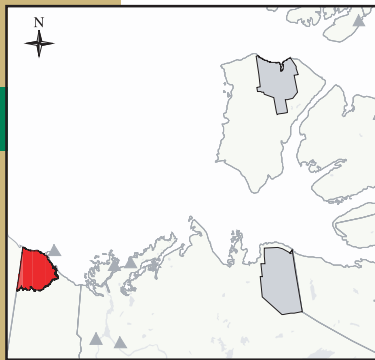
Conservation Biologist
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8807
Fax: (867) 777-8820
Ian.McDonald@pc.gc.ca

Doug Halliwell

Senior Aquatic Quality Officer
Environment Canada
Suite 301, 5204-50th Avenue
Yellowknife, NT X1A 1E2
Phone: (876) 669-4741
Fax: (867) 873-8185
Doug.Halliwell@ec.gc.ca

Rationale

The Firth River corridor has been used as a travel route and a hunting area for thousands of years. Evidence at some cultural sites on the Firth River suggest they were occupied as early as 8,000-10,000 years ago. The area was used more recently by prospectors and gold miners. Today, some of these sites may be impacted by humans, wildlife and natural processes such as erosion. Parks Canada monitors these sites to determine their condition, the rate at which they are changing and what is causing the changes. This information helps with determining if action needs to be taken to protect the site, and which actions would be the most effective.



Cultural resources

FIRTH RIVER CULTURAL RESOURCES MONITORING

Objectives

- To identify threats to cultural sites along the Firth River in Ivvavik National Park.
- To measure the rate and extent of change caused by known threats to cultural sites along the Firth River.
- To develop actions to protect these cultural sites and the artifacts contained within them, where they are required.
- To identify thresholds of change and/or degradation which have been reached or exceeded.

Methods and Information Collected

- The cultural sites along the Firth River are monitored every 5 years. The next site assessment will be in 2005.
- Monitoring is conducted for 7 cultural sites downstream of Sheep Creek.
- The cultural sites that are monitored were previously identified and described. In 1999, the sites were photographed and threats to the sites were identified.
- Photographs and measurements of soil erosion are used to determine if the sites have changed.



Parks Canada staff marking photo stake locations at Caribou Drive site.

Years of Data

- 1995 - original site surveys
- 1999 and 2000



Monitoring wind and water erosion to determine site stability.



Wind erosion and slope wash exposing flakes and bones at Paleo Inuit site.

Results

- The main threats to cultural sites along the Firth River are natural erosion, trampling and burrowing by animals, and human disturbance.
- Erosion may affect sandy sites that are on the riverbed. The sand is eroded by the wind, which reduces the size of the site and uncovers artifacts.
- Sites found on the raised cobble riverbed are very stable and unlikely to change much over the next few decades.
- The disturbance of sites by wildlife is a concern at sites near the river bank and on soft ground. Sites may be trampled by migrating caribou or damaged by burrowing ground squirrels.
- In 2002 the monitoring protocol was updated with accurate GPS points, new photographs and better descriptions to assure consistency and accuracy in the monitoring program.

Contacts

Cathy Cockney

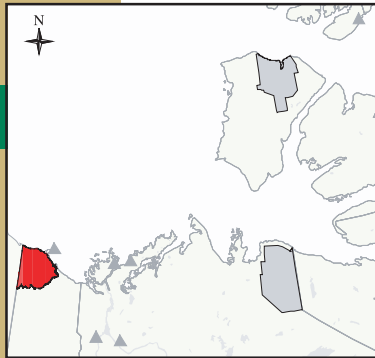
Cultural Resource Management Officer
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8803
Fax: (867) 777-8820
Cathy.Cockney@pc.gc.ca

Gary Adams

Archaeologist
Cultural Resource Management Unit
Western Canada
Service Centre
145 McDermot Ave.
Winnipeg, MB R3B 0R9
Phone: (204) 984-5821
Fax: (204) 984-2240
Gary.Adams@pc.gc.ca

Rationale

There are concerns that erosion is damaging and completely washing away cultural sites along the coast of Ivvavik National Park. The impact of coastal erosion on these sites may increase in the future if climate change increases the size and frequency of storms in the Beaufort Sea. Monitoring of cultural sites along the coast of Ivvavik National Park is conducted to assess and monitor the impact of erosion on coastal sites, and to recommend actions to protect these sites and their artifacts.



Cultural resources

IVVAVIK COAST CULTURAL RESOURCES MONITORING

Objectives

- To assess the impact of erosion and visitor disturbance on cultural resources along the coast of Ivvavik National Park.
- To develop a monitoring strategy for sites at risk of erosion and visitor disturbance.
- To recommend actions to protect cultural sites and artifacts at sites that are in danger of being lost.

Methods and Information Collected

- Cultural resources along the Ivvavik coast are monitored every 2 years. The next site assessment will be in 2004.
- Initial surveys of cultural sites in Ivvavik National Park were conducted in 1987 and in 1997. Approximately 20 of these sites are along the coast. Twelve of these sites were visited in 2000 to determine their condition and to develop methods for monitoring them.
- The monitoring of cultural sites was conducted by Park staff from July 23 to Aug 1, 2002. Cultural sites were visited during this patrol.
- A total of 14 sights were visited, measured, photographed. Exposed artifacts were inventoried according to the cultural sites monitoring protocol.
- GPS locations and bearings for each photopoint were taken to ease the task of replicating photos in the future.



Cathy Cockney and Mervin Joe recording monitoring data at one of the archaeological sites.

Methods and Information Collected (continued)

Site Number	Traditional Name/Location
30Y48 (82Y)	Niaqulik
30Y61 (85Y)	Qargialuk
30Y64 (83Y)	(Paul Kayotuk's place)
30Y64 (84Y)	(Wilson Suplu, Charlie Gordon/ Daniel Kapuk's place)
30Y90 (69Y)	Nunaaluk Spit
30Y78 (68Y)	Nunaaluk village, Shinikruaq
30Y96	Clarence Lagoon
30Y97 (74Y)	Hudson Bay post, Clarence Lagoon
30Y113 (76Y)	Clarence Lagoon
30Y59	Roland Bay
30Y57 (36Y)	Umiak site
30Y56 (91Y)	Near Stokes Point DEW Line station

The name and location of the cultural sites monitored along the coast of Ivvavik National Park.



Remains of an Inuvialuit sod house.



Unidentified artifact found during site monitoring.

Years of Data

- 1987, 1997, 2000 and 2002.
- 14 sites monitored in 2002

Contacts

Cathy Cockney
 Cultural Resource Management Officer
 Parks Canada
 P.O. Box 1840
 Inuvik, NT X0E 0T0
 Phone: (867) 777-8803
 Fax: (867) 777-8820
 Cathy.Cockney@pc.gc.ca

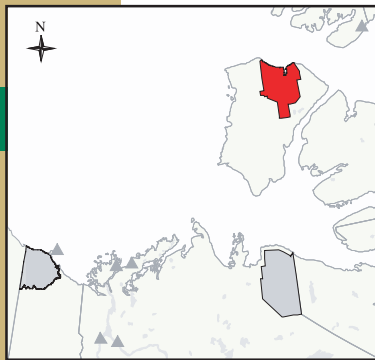
Gary Adams
 Archaeologist
 Cultural Resource Management Unit
 Western Canada Service Centre
 145 McDermot Ave.
 Winnipeg, MB R3B 0R9
 Phone: (204) 984-5821
 Fax: (204) 984-2240
 Gary.Adams@pc.gc.ca

Results

- Many of the 14 sites are increasingly threatened by coastal erosion.
- House foundations and gravesites at many sites are being threatened by the encroachment of banks, and, in some cases, storms have already washed them away.
- Evidence of recent human activity, such as new windshelters can be found at some sites. Artifacts appear to have been untouched by visitors.
- A decision was made to monitor the sites every 2 years in order to provide frequent updates about their condition.
- Decisions about preventing the sites from eroding or allowing them to be destroyed will have to be made. These decisions will be made in consultation with the Inuvialuit.
- A salvage project was completed in 2001 at Niaqulik to document and recover artifacts from this site. This site had 2 remaining sod houses that were likely to be destroyed by erosion.

Rationale

Monitoring cultural sites helps to ensure the sites are protected and the important artifacts they may contain are not damaged or lost. Nasogaluak, M'Clure's Cache and Head Hill are three large cultural sites in Aulavik National Park. Nasogaluak cultural site consists of approximately 100 stone structures including tent rings, caches, akatut (areas paved with large, flat slabs of stone) and wind breaks. The M'Clure's Cache site has the remains of a cache built by Robert M'Clure and his crew when they wintered in Mercy Bay from 1851 to 1853. The Head Hill site consists of at least 43 identifiable features, including tent rings and hearths, and the remains of an estimated 800-1000 muskoxen. These sites are monitored to identify threats to the sites, to determine if the sites have changed and to recommend measures for protecting the sites.



Cultural resources

AULAVIK CULTURAL RESOURCES MONITORING

Objectives

- To identify impacts to the cultural resources at Nasogaluak, M'Clure's Cache and Head Hill cultural sites.
- To monitor changes to these cultural sites.
- To recommend measures to protect these cultural sites.

Methods and Information Collected

Nasogaluak Cultural Site:

- The Nasogaluak cultural site is located on the east bank of the Thomsen River approximately 8 km south of Green Cabin. The site is monitored every year during routine park patrols.
- Seven photographs are taken of specific features from designated photopoints.
- Measurements are taken to determine if items at the site have been moved.
- Fragments of grey quartz sandstone are counted.

M'Clure's Cache Cultural Site:

- M'Clure's Cache cultural site is located along the western shore of Mercy Bay. The site is monitored every 2-3 years during routine park patrols.
- Photographs are taken at 9 photopoints. These photos are compared with existing photos of the site to determine if there are any major changes to the artifacts and to the overall site.
- Barrel parts are counted in three areas.
- The condition of 3 selected artifacts is described.



A cache at Nasogaluak Cultural Site.

Methods and Information Collected (continued)

Years of Data

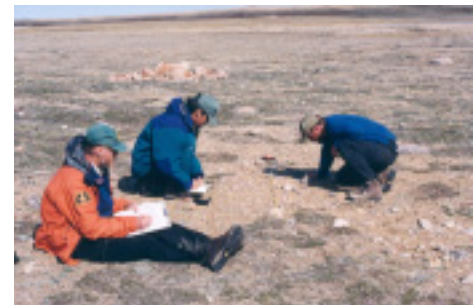
Head Hill Cultural Site:

- The Head Hill cultural site is located at the junction of the Muskox and Thomsen rivers. The site is monitored every year during routine park patrols.
- Photographs are taken from 5 photopoints to determine if the site has changed.
- The distance from reference points to artifacts is measured to determine if the artifacts have been moved.
- A count of muskoxen skulls is conducted.

- Nasogaluak: 1997, 1999, 2000, 2001 and 2002
- M'Clure's Cache: 1997, 2000
- Head Hill: 1997, 1999, 2000, 2001 and 2002



Muskoxen remains at Head Hill Cultural Site.



Terry Skjonsberg, Ian McDonald and Eugene Green counting lithic fragments at Nasogaluak Cultural Site.

Results

Nasogaluak Cultural Site:

- The site was visited on June 26, 2002.
- Photographs indicate that there have not been any significant changes to the site since 1997.
- Measurements indicate that one item at the site had been moved. It was replaced in its original location. Other items had not been moved.

M'Clure's Cache Cultural Site:

- The site was not monitored in 2001 or 2002.
- Counts of barrel parts have been inconsistent between years. Methods used to count barrel parts need to be reviewed.
- The condition of 3 artifacts that are monitored have not changed since 1997.

Head Hill Cultural Site:

- The site was visited on August 4, 2002.
- Two animal bone parts had been moved when comparing pictures from known photopoints. Wild animals or people may have moved these bones. The two animal bone parts were returned to their original positions.
- The technique of counting muskoxen skulls was altered. A more accurate sample count will be used rather than a total count.

Contacts

Cathy Cockney

Cultural Resource Management Officer
Parks Canada
P.O. Box 1840
Inuvik, NT X0E 0T0
Phone: (867) 777-8803
Fax: (867) 777-8820
Cathy.Cockney@pc.gc.ca

Inside Back Cover BLANK

ANNUAL REPORT OF

RESEARCH AND

MONITORING IN

NATIONAL PARKS

OF THE WESTERN

ARCTIC

2002
