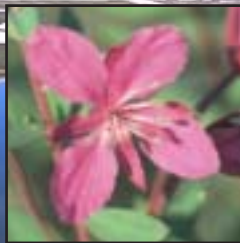


# annual report

OF RESEARCH AND MONITORING

IN NATIONAL PARKS

OF THE WESTERN ARCTIC



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*This report is the product of contributions from many people. We wish to acknowledge them for their commitment to the project, and their timely and enthusiastic response to our requests for project reports.*

## ACKNOWLEDGEMENTS

Reports on research and monitoring activities were provided by Parks Canada Agency staff including: Herbert Allen, Christian Bucher, Cathy Cockney, Karsten Heuer, Mervin Joe, Jocelyne Leger, James McCormick, Ian McDonald, Angus Simpson, Jennifer Shaw, Terry Skjonsberg and Steve Travis. Information on research and monitoring activities were provided to Parks Canada Agency by: John Nagy of the Department of Resources, Wildlife and Economic Development, Dorothy Cooley of Yukon Renewable Resources, Randy Wedel of Environment Canada, Pat Kyle of Environment Canada, Steve Solomon of the Geological Survey of Canada, Sam Stephenson of Fisheries and Oceans Canada, Ed McLean of the Fisheries Joint Management Committee, Jean Veillette of the Geological Survey of Canada, and Scott Lamoureux and Brandon Beierle of Queens University.

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## 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 their resources are being affected by natural change and human-caused disturbances. Research activities are 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 Agency uses research and monitoring to improve our understanding of cultural and ecological resources of protected heritage resources in the Western Arctic Field Unit 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 Parks Canada Agency staff, our co-management partners and the public. All research and monitoring projects conducted in 2001, and ongoing monitoring projects not conducted this year, are included in this document.

The Western Arctic Field Unit is made up of three national parks, four national historic sites, one historic event and the Pingo Canadian Landmark (figure 1). 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. Tuktoyaktuk 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, Nagwicheonjik, 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 characteristic of the Tuktoyaktuk Peninsula.



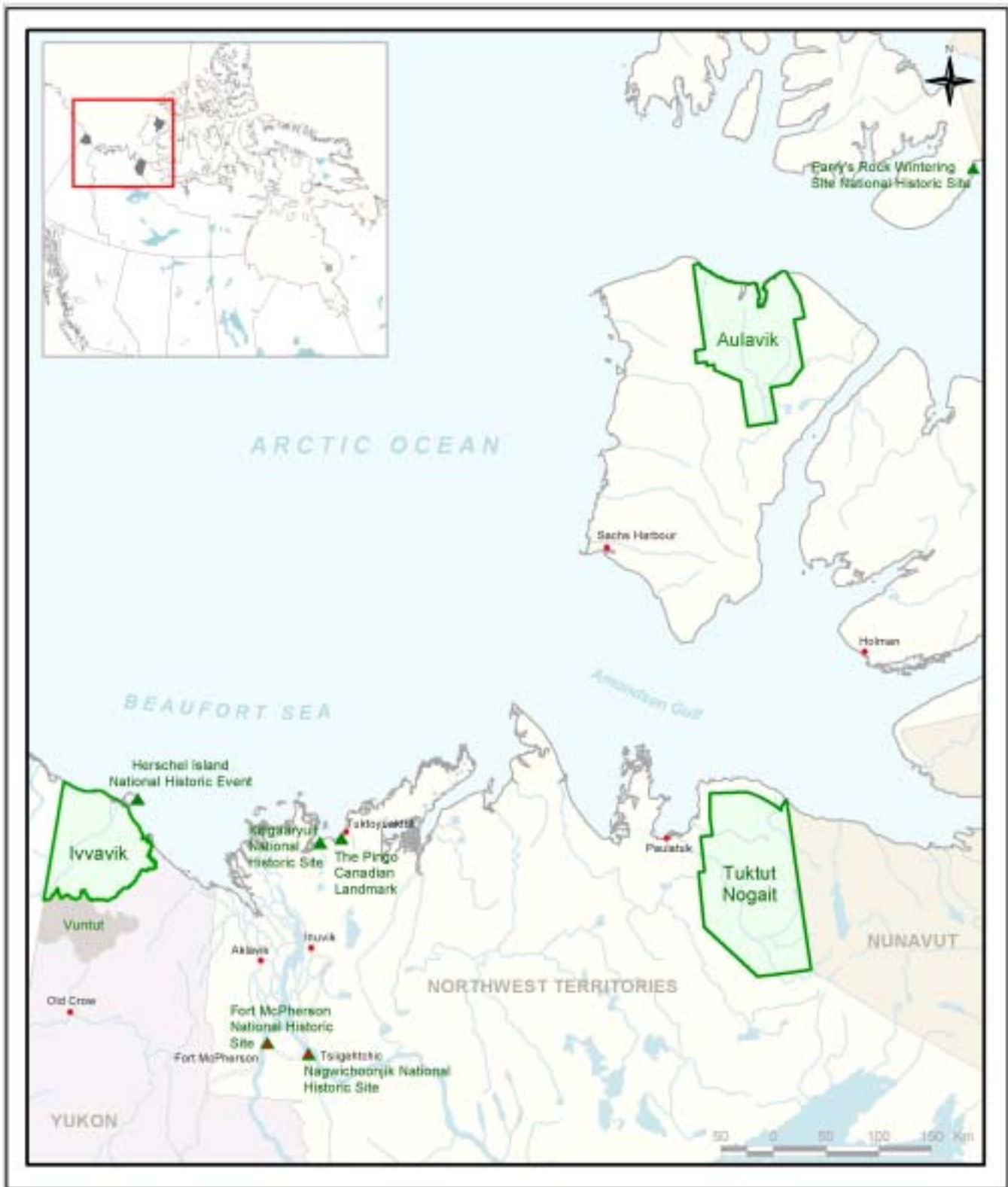


Figure 1: Parks Canada Agency Western Arctic Field Unit



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## 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). The IFA is legislated through the Western Arctic (Inuvialuit) Land Claim Settlement Act. 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 are 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.

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 Aulavik and Tuktoyaktuk national parks. These workshops provide Parks Canada Agency 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.

At the national level the Canada National Parks Act, Bill C-27, 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.

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## Structure of the Report

This report is divided into two sections. Section 1 contains summaries of research projects that were conducted in 2001. Section 2 contains summaries of 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.

Each project is summarised separately. Summaries 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 of Canada	Aulavik National Park of Canada	Tuktut Nogait National Park of Canada
<b>RESEARCH</b>			
Vegetation and Terrain Survey	X		
Niaqulik Archaeology Salvage Project	X		
Fuel Cache Assessment and Clean-Up	X		X
Dall's Sheep Survey	X		
Paleoenvironmental Reconstruction			X
Surficial Geology and Glacial History			X
Tuktut Nogait Oral History Project			X
Thomsen River Fish Study		X	
Stokes Point Contaminants Assessment	X		
Tuktut Nogait Cultural Resource Inventory			X
Sport Angler Survey	X	X	X
<b>MONITORING</b>			
<b>Wildlife</b>			
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 Muskox 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		
<b>Habitat</b>			
Satellite Monitoring of Plant Productivity	X	X	X
Pingo Monitoring		Location: The Pingo Canadian Landmark	
<b>Human Use</b>			
Firth River Campsite Monitoring	X		
Human Use Monitoring	X	X	X
<b>Climate Change</b>			
Weather and Permafrost Monitoring	X	X	X
River Water Flow Monitoring	X		X
Sea Temperature and Storm Surge Monitoring	X		
<b>Solid Waste</b>			
Komakuk Beach Clean-Up Monitoring	X		
<b>Long Range Transport of Pesticides</b>			
Water Quality Monitoring	X	X	X
<b>Cultural Resources</b>			
Firth River Cultural Resources Monitoring	X		
Ivvavik Coastal Cultural Resources Monitoring	X		
Aulavik Cultural Resources Monitoring		X	



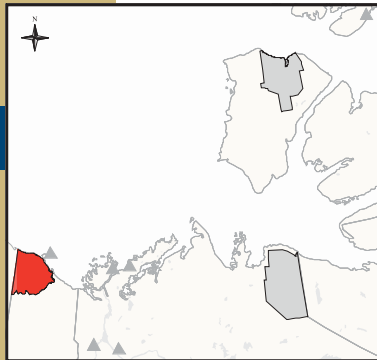
# Research





## Rationale

The vegetation and terrain survey was conducted to determine if the dramatic changes to the vegetation and permafrost activity observed on Herschel Island are taking place on the coastal plain of Ivvavik National Park. Changes to the vegetation and permafrost activity on Herschel Island, off the coast of Ivvavik National Park, have been observed in the past 15 years. The vegetation on the island has changed from tundra dominated by forbs and shrubs to tundra dominated by grasses. One native species of grass, *Arctagrostis latifolia*, is aggressively invading areas all over Herschel Island. In addition, the rate at which soil is turned over by the permafrost has decreased. Frost boils, which are areas of bare ground kept open by an active permafrost layer, are no longer active and are being invaded by plants. The changes in vegetation and terrain on Herschel Island suggest the living and non-living environment is responding to a change in the climate. These changes may have serious implications for the island's ecosystem.



## Research

### VEGETATION AND TERRAIN SURVEY

Catherine Kennedy, Yukon Territorial Government  
Scott Smith, Agriculture and Agri-food Canada

#### Objectives

- To collect data on the vegetation and terrain of the coastal plain of Ivvavik National Park.
- To determine if there have been changes in the vegetation and terrain on the coastal plain in the past 15 years.

#### Methods and Information Collected

- The survey was conducted along the coastal plain of Ivvavik National Park, from the Babbage River to the Canada/U.S. border.
- The survey was conducted from July 11-14, 2001.
- 32 sites were visited during the survey.
- The survey crew was transported between sites by helicopter.
- A description of each site was made. The description included the location of the site, depth to permafrost, elevation, aspect, slope, amount of bare soil, amount of invasion of bare soil by vegetation, the location of the slope with respect to the surrounding terrain and the soil characteristics.
- The species and relative abundance of vegetation was recorded at each site.



Catherine Kennedy checking the vegetation map.



Scott Smith measuring the depth to permafrost.



Ian McDonald recording data.

## Partners

- Yukon Territorial Government (project lead)
- Agriculture and Agri-Food Canada (project lead)

## Results

- It was clear when the sites were visited that certain types of terrain along the coastal plain in Ivvavik National Park are being invaded by *Arctagrostis latifolia* and other plant species such as arctic lupine. The most evident changes are taking place at sites with a large amount of bare soil.
- Information collected in 2001 will be compared with information collected in 1986 to determine if significant changes to the vegetation cover have taken place.
- Both *Arctagrostis latifolia* and arctic lupine are native to the Yukon coastal plain and may not be displacing other plant species, as the areas being invaded are mainly covered with bare soil. This change in vegetation may be a natural event or may be a reaction to climate change.
- Additional research is required to understand how these changes will affect the environment of the Yukon North Slope.

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Location of sites visited during the vegetation and terrain survey, Ivvavik National Park, 2001.



## Rationale

An inspection of cultural resources along the coast of Ivvavik National Park in 2000 revealed alarming changes to a cultural site at Niaqulik. In 1987 during a cultural resource inventory of the park, four sod houses were recorded along the shoreline at the site. By 1997 one of the houses had been washed away and the shoreline was 35 m away from another house. Monitoring stakes were established between the house and the shoreline to measure the rate of erosion of the shoreline. The house and stakes were later destroyed in a storm leaving two houses remaining at the site. It was predicted that one more coastal storm would wash away these two houses. As a result, Parks Canada decided to excavate the two remaining sod houses in 2001.



## Research NIAQULIK ARCHAEOLOGY SALVAGE PROJECT

### Objectives

- To collect cultural resource artifacts from the two remaining sod houses along the shoreline at Niaqulik.
- To provide interpretive and educational material to local communities.
- To provide experience in archaeological techniques for staff and students.

### Methods and Information Collected

- The two remaining sod houses at Niaqulik were excavated from July 5-24, 2001.
- The top 30 cm sod layer was removed from the sites.
- Dirt was removed from the houses and surrounding area using hand trowels and shovels.
- All artifacts were removed and sent to the Parks Canada Agency Service Centre in Winnipeg, Manitoba for cleaning and treatment.
- After excavation, the dirt and sod were replaced over the site.

### Partners

- Parks Canada Agency, Western Canada Service Centre



Lori Dueck and two students examining an artifact at Niaqulik.



Excavated sod houses at Niaqulik.

## Results

- The artifacts collected from the sod houses at Niaqulik include both traditional and post-contact material. The most significant artifacts found were fish hooks, a child's wooden puzzle pieces, a seal bladder bag, a bone handle knife, a brass bell and gun shells.
- A preliminary assessment of the artifacts indicates the houses may have been occupied from 1920 to 1960. Further analysis of the artifacts and an analysis of the oral history collected about the site will help to determine when the site was occupied.
- The artifacts collected will be cleaned, preserved and then returned to the Parks Canada Agency office in Inuvik.
- A display to present artifacts and other cultural resources from the site will be made for the communities of Aklavik and Inuvik.

## Contacts

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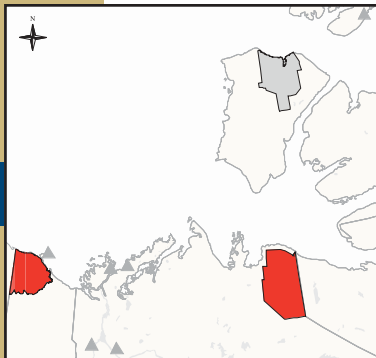
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## Rationale

Solid waste is listed as one of the top five stressors affecting the ecological integrity of Tuktut Nogait and Ivvavik national parks. Since the inception of Tuktut Nogait, 15 solid waste sites have been located within the park. In Ivvavik, 22 sites were identified for assessment and clean-up. Most of the solid waste is old fuel drums. These drums must be assessed for leaks before they are removed. Sites that are contaminated are then remediated. It is anticipated that some clean-up and remediation will be required in 2002 to complete this project.



## Research FUEL CACHE ASSESSMENT AND CLEAN-UP

### Objectives

- To locate, document and remove solid waste sites within Tuktut Nogait and Ivvavik national parks.
- To determine if sites have been contaminated.
- To remediate contaminated sites.

### Methods and Information Collected

#### Site Assessment

- This work was contracted to Golder Associates in Burnaby, BC.
- All sites were visited using a helicopter.
- Each site was assessed for indications of contamination.
- Where indications of contamination existed, soil and ground water samples were collected.
- Samples were screened using a Petroflag field test kit to determine the level of contamination.
- Site characteristics were recorded including geology, groundwater characteristics, amount of debris, location, vegetation type and location of nearby plants or animals that may be receptors for contaminants.
- Based on the field screening, selected samples were sent to Aurora Laboratory Services for further analysis.
- Soil samples were analysed for light and heavy extractable petroleum hydrocarbons (EPH). Additional analysis for metals will be performed where required.
- Ground water samples were analysed for EPH and if indicated, benzene, toluene, ethylbenzene and xylene (BTEX).



Wayne Harris collecting soil samples from an old fuel cache in Tuktut Nogait National Park.

**Methods and Information  
Collected (continued)**

**Clean-up**

- Solid waste at sites that were not contaminated were removed where time permitted.
- Further site clean-up and remediation will be conducted in 2001.



**Recording data at an old fuel cache at Aspen Creek,  
Ivvavik National Park.**

**Results**

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**Tuktut Nogait National Park**

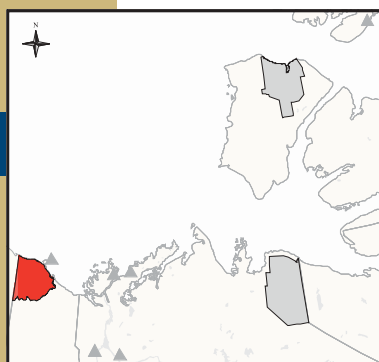
- Nine of the original 15 sites were visited. The remaining 6 sites could not be located and an additional 6 sites were discovered. In total, 15 sites were assessed for contamination.
- Three of these 15 sites were determined to be non-contaminated and the solid waste was moved to other sites.
- One of the 15 sites was scattered along the shore of a long lake and is now consolidated into three separate sites.
- A total of 14 sites remain to be cleaned-up. This waste will be removed to an appropriate waste disposal facility in 2002.
- Soil and groundwater samples are currently being analyzed.

**Ivvavik National Park**

- Twenty of the original 22 sites were visited. The remaining 2 sites were determined not to be potential sources of contamination. Two additional sites were discovered and assessed for contaminants.
- The solid waste at 14 of the 22 sites was not located and is assumed to have been cleaned-up during past clean-up programs.
- Solid waste at the 8 remaining sites was moved to Stokes Point and will be moved to an appropriate waste disposal facility in 2002.
- The need for remediation at these sites will depend on results of water and soil samples that are currently being analyzed.

## Rationale

Dall's sheep are an important part of the ecosystem in the northern Yukon, including Ivvavik National Park. Previous surveys of Dall's sheep were conducted in 1984 and 1986. These surveys determined the size of the sheep population and their summer range. New information about Dall's sheep is required to determine their current population size, to develop an understanding of their movements and winter range, and to determine the type and number of parasites in the population.



## Research

### DALL'S SHEEP SURVEY

#### Objectives

- To determine the size, age and sex composition, distribution and density of the Dall's sheep population in Ivvavik National Park.
- To identify winter range for Dall's sheep in Ivvavik National Park.
- To determine the type and number of parasites in Dall's sheep.

#### Methods and Information Collected

- Two helicopter surveys were flown for this study.
- One survey was conducted from June 28-30, 2001 to determine the population size, age and sex distribution and distribution of Dall's sheep.
- A second survey will be flown in March, 2002 to determine winter range for Dall's sheep.
- The first survey was conducted in the mountainous area between the Firth and Malcolm rivers.
- Total flying time for the first survey was 8.5 hours.
- The number of sheep, age class, sex and location was recorded.
- The number and location of other wildlife seen during the survey was also recorded.
- Sheep feces were collected for parasite analysis.



Dall's sheep in Ivvavik National Park.

#### Partners

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

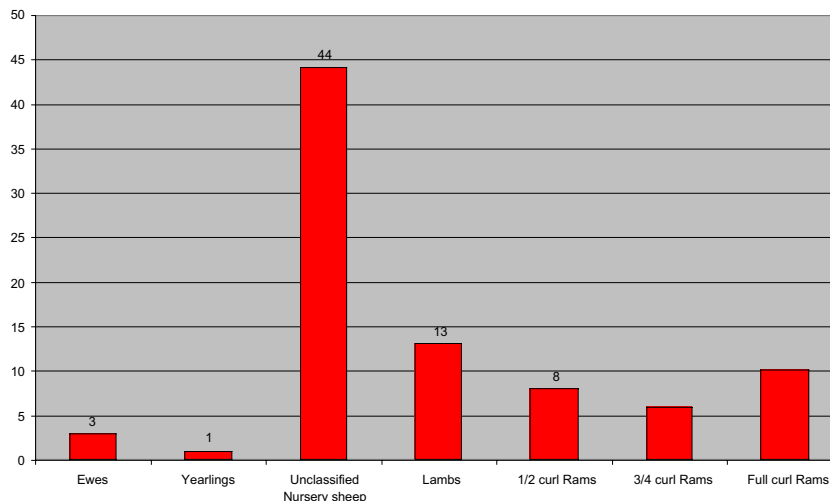


Jean Carey and Kevin Mitchener looking over maps before the sheep survey.

## Results

- 85 sheep were observed during the July survey in 2001. 48 were nursery sheep, 13 were lambs and 24 were rams.
- The ratio of lambs to nursery sheep was 27:100. This ratio indicates the sheep population is stable.
- The ratio of rams to nursery sheep was 50:100. This ratio is slightly lower than expected for a population of sheep that is not hunted.
- Sheep feces were collected during the survey and will be analysed for parasites by the Department of Resources, Wildlife and Economic Development.
- The majority of the sheep were seen north of Sheep Creek near the Firth River. There was little evidence that sheep were using other areas. Previous surveys have observed a significant number of sheep south of Sheep Creek. This indicates that sheep move throughout the study area, and may move between the Arctic National Wildlife Refuge and Ivvavik National Park.

Age class and sex of Dall's sheep in Ivvavik National Park, 2001



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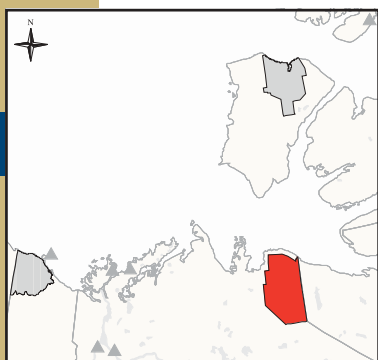
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## Rationale

Understanding the nature of periodic climate change is important for developing a model of the mechanisms that drive global climate change. The impact of these changes is often significant, and knowledge of the ecological and physical responses to these changes gives important information about the sensitivity of ecosystems to climatic variability. This is especially the case in the Canadian arctic where few detailed, long-term records exist to evaluate the scale of climate change. The Melville Hills, located in Tuktoyaktuk National Park, is one of the few areas that may have been unglaciated during the last ice age that occurred 13,000 to 23,000 years ago. Lakes in this area may be good sites for studying past climate conditions.



## PALEOENVIRONMENTAL RECONSTRUCTION

Scott Lamoureux, Queens University

### Objectives

- To obtain lake sediment records from sites in the Canadian arctic which were possibly unglaciated during the last ice age.
- To investigate if links exist between global climate change and ocean-atmospheric circulation patterns.
- To investigate the terrestrial effects of climate patterns detected in marine sediments.

### Methods and Information Collected

- Lake sediment samples were taken in the spring when the ice was still solid enough to travel on and the air temperatures were above freezing.
- Samples were collected by hammering a sediment corer into the lake bottom. A pulley system extracted the core from the lake bed.
- Lakes were chosen that had either closed basins or small enough catchments to exclude the possibility of river or creek sedimentation. Excessive sedimentation would overwhelm the paleoclimate signal.
- Samples will be analysed for organic and inorganic content, grain size, magnetic susceptibility and other bulk physical properties.
- Macrofossil analysis will be used to examine climatically induced changes in sand and moss particles.
- Dating the sediment will be done using multiple radiocarbon dates on terrestrial macrofossils found in the samples.



Taking lake sediment cores at lake #3.

## Results

- The following table contains the location of 4 lakes sampled and information on the sediment cores obtained from each lake.

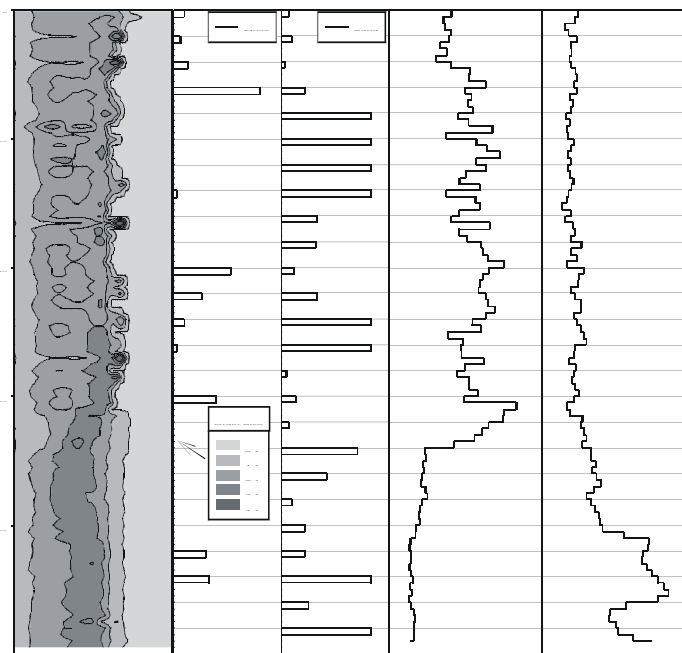
Lake Number	Location (Lat/Long)	Water Depth	Number of Cores	Length of Cores	Comments
1	69 16.00/121 21.39	3 m	2	30 cm	ended in heavy clay
2	69 13.68/121 16.36	2.3 m	0	-	bedrock present
3	69 04.86/121 25.75	2.6 m	4	50-100 cm	-
4	69 15.28/121 22.01	2.3 m	1	30 cm	ended in heavy clay

- Preliminary results have been analysed for Lake 3.
- The longest core was analysed for organic carbon, inorganic carbon and grain size at 1 cm intervals.
- Magnetic susceptibility was analysed at 2 mm intervals and sand and moss macrofossils have been counted at 4 cm intervals.
- Samples for pollen analysis were taken at 4 cm intervals and are currently being prepared for analysis.
- Samples from 12, 40 and 68 cm depth has been submitted for radio carbon dating.
- Preliminary assessment of the age of the core suggests that it is 10,000 years old and may extend as far back as 13,000 -15,000 years.
- Full results will be available in 2002.

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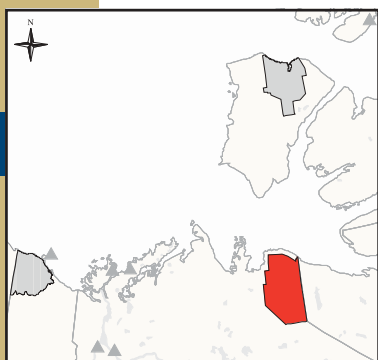


Preliminary results of grain size, sand and moss macrofossil counts and organic and inorganic carbon content from Lake 3.



## 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 investigate 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

- The project involves detailed air photo interpretation and site visits to specific areas to record surface information and collect rock, soil and organic material for further analysis.
- 185 sites were visited by helicopter and on foot.
- 80 soil and till samples were collected to determine grain-size composition, carbonate content and basic geochemistry.
- Wood and other organic material was collected for radiocarbon ageing.
- 8 bedrock samples were collected for exposure dating.
- Exposures showing multiple layers of unconsolidated Quaternary sediments were described and measured.
- 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.



Dolomite tor in the eastern Melville Hills.

### **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 10 sites.

### **Partners**

- Geological Survey of Canada (project lead)



**Circular kame common in the northeastern part of the park, probably formed in a well-like opening in a glacier.**

### **Results**

- A detailed interpretation of aerial photographs will be completed in 2002. A series of 1:50,000 scale surficial map will be constructed from the air photo interpretation work. This map will identify major terrain units organized in a legend according to geomorphological characteristics, age relationships and sediment profiles identified during 2001 fieldwork.
- The surficial geology information will be 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 (1:250,000) will be produced at the completion of the project. It is anticipated that a second field season will be required to complete the fieldwork.
- Data is scarce, but 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.
- Pebble counts, carbonate content analysis, geochemistry, grain size analysis, soil classification, cosmogenic dating and radiocarbon dating will be completed in 2002.

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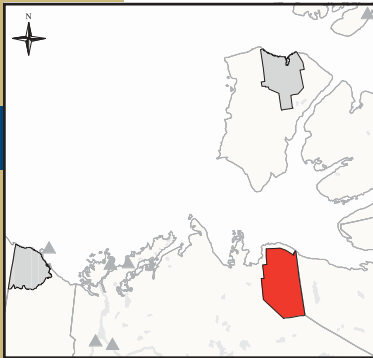
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## Rationale

Little is known about the past history of the land, and use of the land by Inuvialuit, within and around the 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.

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## Research

### TUKTUT NOGAI ORAL HISTORY PROJECT

#### Objectives

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

#### 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 later transcribed.



Lena Ruben translating with Billy Ruben.

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## Results

- Elders possess extensive knowledge of the environment and past history of the park and surrounding area.
- They provided valuable information on cultural resource sites found in the park.
- Their knowledge has given insight into wildlife found in the area and their movements and changes over time.
- Recorded interviews are still in the process of being edited.
- More Elders will be interviewed in the future.



Cathy Cockney with Edward Ruben.

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## Rationale

The population characteristics and distribution of fish in the Thomsen River watershed of Aulavik National Park are poorly understood. Fish in the Thomsen River and its tributaries may be vulnerable to over fishing if fish populations are small and growth rates are slow. Information about the distribution, age, length, weight, growth rate and age at maturity of fish will assist with managing fish in the Thomsen River and its tributaries, and will improve our understanding of the natural resources of Aulavik National Park.



## Research

### THOMSEN RIVER FISH STUDY

#### Objectives

- To improve our understanding of the population characteristics and distribution of fish in the Thomsen River watershed.
- To collect baseline information on several fish species that might be used to measure changes brought on by increased fishing or climate changes.

#### Methods and Information Collected

- Fieldwork for the project was conducted in the summer of 2000 and 2001 in the Thomsen River watershed.
- Fish were sampled from June 25-July 24, 2000 between Green Cabin and Muskox River using an experimental gill net (2 to 5 1/2 inch mesh), 3 inch gill net, beach seine net and minnow traps.
- Fish were sampled from July 7-17, 2001 between Green Cabin and Castel Bay using an experimental gill net (2 to 5 1/2 inch mesh) and a backpack electro-fishing unit.
- Water temperature and habitat type were recorded for each sample site.
- Weight, fork length and total length were measured for each fish. For dead sampled fish, sex and maturity was determined, the presence of internal parasites noted, stomach samples collected and otoliths collected to age fish.
- Specimens of some fish species were retained for positive identification and further study.
- Fin rays were collected from a sample of arctic char (n=33) and lake trout (n=21) for future genetic analysis.



Electro-fishing in a small creek.

#### Partners

- Fisheries and Oceans Canada

## Results

	June 25-July 24, 2000 (19 days of fishing)	July 7-17, 2001 (9 days of fishing)
least cisco	46	80
lake trout	9	12
adult arctic char	14	19
juvenile arctic char	74	85
ninespine stickleback	95	44
fourhorn sculpin	0	2

Number and type of fish caught during the 2000 and 2001 survey.

- Least cisco were the most abundant fish captured followed by arctic char and lake trout.
- More fish were captured during a shorter time in 2001 than in 2000.
- Catch per unit effort remained low in 2001 as it took an average of 10 hours using a 160 foot net to catch one lake trout and almost 6 hours to catch one arctic char.
- Most of the fish caught were large, even though small mesh nets were used. The majority of these fish were also old suggesting that fish live a long time. Similar findings have been reported from Arctic lakes.
- This suggests that the Thomsen River cannot support intense fishing pressure.
- Most of the arctic char were caught upstream or near Green Cabin suggesting that char are moving upstream in order to spawn and overwinter.
- Most of the lake trout were caught 20 or more km downstream of Green Cabin. These slower and deeper areas of the river may provide overwintering habitat.

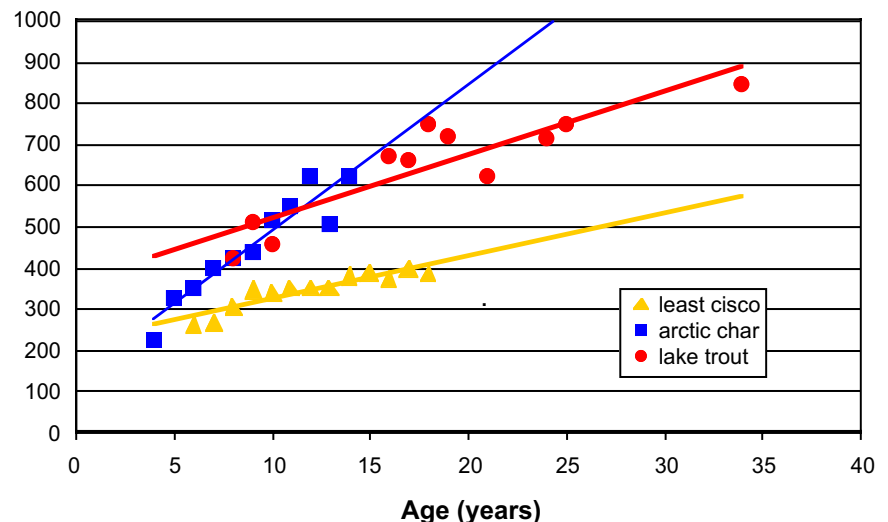
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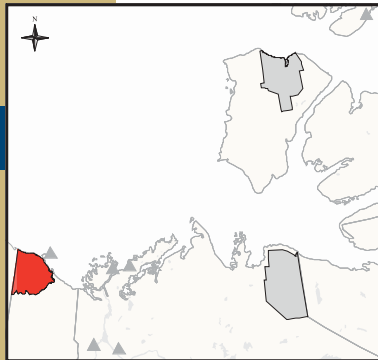
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Median length versus age for least cisco, arctic char and lake trout from the Thomsen River and its tributaries in Aulavik National Park, 2000-2001.

## Rationale

The Stokes Point Distant Early Warning (DEW) Line site was decommissioned and partially cleaned-up in the 1960s. An additional clean-up was conducted in 1992 when a North Warning Site was constructed at Stokes Point. Discussions with members of the Aklavik Hunters and Trappers Committee indicated that an old landfill adjacent to the site was not cleaned-up completely. A preliminary investigation at the site in 2000 indicated the presence of DDT, Petroleum Hydrocarbon and metal contaminants. A follow-up detailed soil and water sampling program was conducted in 2001. A strategy for cleaning-up the Stokes Point DEW Line site is being developed based on the results of this project.



## Research

### STOKES POINT CONTAMINANTS ASSESSMENT

#### Objectives

- To confirm the presence of contaminants found in 2001 at the Stokes Point DEW Line site.
- To determine how wide spread the contamination is.
- To describe the characteristics of the landfill.
- To develop a strategy for future clean-up operations at Stokes Point.

#### Methods and Information Collected

##### 2000 Program

- Fifteen soil or stream sediment samples and three water samples were collected from the landfill site. The samples were selected based on the highest probability of detecting contaminants in the soils.
- Water samples were analysed for metals and PCBs.
- Soil samples were analysed for metals, PCBs, chlorinated pesticides, light and heavy extractable petroleum hydrocarbons and petroleum hydrocarbons (PCHs).
- Analysis was performed by Analytical Services Ltd. in Vancouver, BC.

##### 2001 Program

- A 250 m baseline and grid was established over the entire landfill area.
- Ninety-six, 250 ml soil samples were collected and nine 2 litre water samples were collected in adjacent water courses.
- The soil samples were analysed using screening level field test kits (Petroflag and Immunoassay kits). All 96 samples were analysed for DDT and petroleum hydrocarbons (PCHs). Forty-seven samples were analysed for PCBs.
- The remaining samples are being stored for future metal analysis.



Site of old barrel dump in 1990 where contamination was detected in 2000.



## Results

### Results 2000

- Four of 6 soil samples analysed for chlorinated pesticides showed DDT concentrations in excess of Canadian Council of Ministers of the Environment (CCME) soil guidelines of 0.7 ppm. One of these samples contained in excess of 70.0 ppm total DDT. Very high concentrations of antimony were observed in the same four samples.
- All 15 samples were analysed for metals. One sample exhibited metal contamination with elevated concentrations of arsenic, cadmium, chromium, lead, nickel and zinc.
- Various constituents of petroleum hydrocarbons were detected in 7 of nine soils samples analysed.
- PCBs were not detected in either soil or water.
- The water samples collected did not contain elevated concentrations of metals. They were not analysed for chlorinated pesticides or petroleum hydrocarbons.

### Results 2001

- Analysis of soil samples provides semi-quantitative and qualitative results only. Concentrations are provided based upon a range determined by the calibrators. For DDT the calibrator ranges are 0.2, 1.0, and 10 ppm. For PCB the calibrator ranges are 1.0, 5.0, and 50.0 ppm. The field kits will detect a broad range of hydrocarbons up to 10,000 ppm.
- Two of 96 samples showed DDT concentrations between 0.2-1.0 ppm. Three samples showed detectable levels of DDT between 0.0-0.2 ppm. These samples are all close to the old landfill and the 2000 samples sites that contained DDT levels in excess of CCME guidelines of 0.7 ppm.
- Two of 47 samples analysed for PCB showed concentrations between 5.0-50.0 ppm. Four samples showed concentrations between 1.0-5.0 ppm. These sample sites are scattered throughout the sample area and suggest wide spread but possibly sporadic contamination in excess of CCME guidelines of 1.3 ppm.
- Six of 96 samples analysed for petroleum hydrocarbon constituents exhibited concentrations greater than 10,000 ppm. Eight samples showed concentrations between 1000-3000 ppm. All of these sites were concentrated around an old fuel barrel dump that was removed in 1992.
- Environment Canada in Burlington, Ontario is performing the water analysis.
- Analysis for metals will not be performed until funds are available.
- The concentrations of PCBs, DDTs and PCHs in soils from both the 2000 and 2001 sampling programs indicate the presence of contaminants associated with the old landfill. Many of the samples exceed Canadian CCME guidelines established for wildlands.
- Based on the results of this project, a strategy for cleaning-up the site will be developed.

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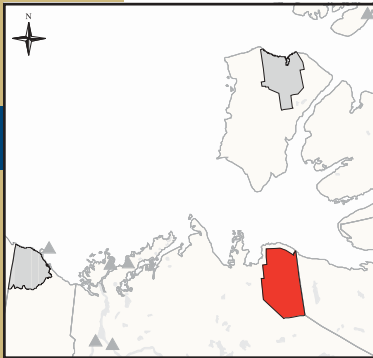
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## Rationale

In 1999 Parks Canada Agency began a three year project to inventory cultural sites in Tuklut Nogait National Park. The project was recommended by the Tuklut Nogait Management Board, who felt it was important to develop a better understanding of the history of the park. The information collected through this research will help with understanding how the area was used in the past and will contribute to an understanding of the cultural history of the Western Arctic. The project builds on similar cultural resource work that was conducted in the early 1990s.



## Research

### TUKLUT NOGAI CULTURAL RESOURCE INVENTORY

#### Objectives

- To find, record and assess the condition of cultural resources in Tuklut Nogait National Park.
- To assist with developing a cultural resource monitoring program for the park.
- To gather initial interpretations about the previous inhabitants and visitors to the area.

#### Methods and Information Collected

- The project was conducted from 1999 to 2001.
- Surveys were conducted with helicopter and on the ground.
- In 1999, helicopter surveys were conducted along the Hornaday and Brock Rivers. Locations close to these rivers were also examined, such as small and large tributaries, high isolated hills close to watercourses and parts of the Roscoe River. Ground surveys were conducted along the Hornaday River south of La Roncière Falls.
- In 2000, fieldwork concentrated on the north half of the park. Ground surveys were conducted along rivers, streams and around edges of lakes. A short helicopter survey was also completed.
- In 2001, a ground survey was conducted from July 4-16 along the upper Hornaday River from the south boundary of the park to the confluence of Cache Lake. A helicopter survey was conducted from July 17-21 to explore all of the areas in the park not examined in previous years.



Stone marker on the tundra.

**Methods and Information  
Collected(continued)**

- Cultural sites that were found during the surveys were photographed, sketched and described. Descriptions included the topography and condition of the site. Threats to the site were also recorded.
- Individual features at the site were described and measured. Fragments of quartz sandstone were collected for analysis.

**Years of  
Data**

- Previous cultural resource research was conducted in 1990 and 1991.
- 1999 - 2001.



**Food cache along the Hornaday River.**

**Results**

- Over 100 previously unrecorded sites were found and recorded in 2001. This brings the total of known cultural resource sites in Tuktu Nogait National Park to over 350.
- The types of sites encountered this year are similar to those recorded in previous years.
- Most of the cultural sites are temporary camps that were likely used for a few nights. Some sites are larger camps that may have been occupied seasonally over many generations. Site types include campsites, isolated markers, rock alignments, caribou drive lanes, food caches, isolated artifact finds, hunting blinds, kayak rests, hearths, graves and other unidentified features.
- Most of the sites are well buried and artifacts are not readily visible.
- The information collected so far suggests the land was occupied periodically, if not constantly, from Classic Thule times and perhaps earlier.

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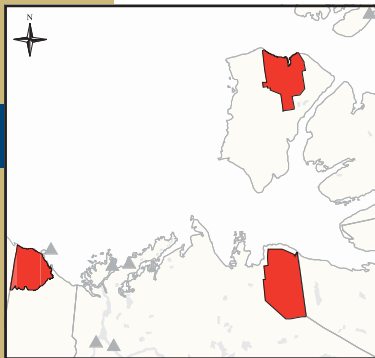
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## Rationale

For over a decade Inuvialuit have been providing subsistence fish catch information to the Inuvialuit Harvest Study. However, during this period there has been no comprehensive survey of recreational anglers fishing in the Inuvialuit Settlement Region (ISR). The annual sport angler survey provides resource co-managers with a more complete body of information to better manage our fish stocks for the Inuvialuit who depend on the fish as an important food source, and for the continued enjoyment of recreational anglers from the north and around the world.



## Research

### SPORT ANGLER SURVEY

Fisheries Joint Management Committee

## Objectives

- To determine the number, species and location of fish caught by sport anglers on Inuvialuit private and public lands, and in national parks within the ISR during the spring and summer fishing season.
- To develop more effective promotional and education programs to inform the public about the ISR private lands fishing registry.
- To promote awareness of the Fisheries Joint Management Committee and our mandate to recreational anglers.

## Methods and Information Collected

- The sport angler survey is conducted with an estimated 600 recreational anglers purchasing a licence or registering to fish in the ISR between April and September, 2001.
- Anglers surveyed include those issued:
  - a) Northwest Territories sport fishing licences by vendors within the Inuvik Region,
  - b) Northwest Territories sport fishing licences with an “ISR validation” by vendors from outside the Inuvik Region and
  - c) Parks Canada fishing permits to fish within National Parks in the ISR.
- Information is gathered from recreational anglers using a brief mail-out questionnaire that is self-completed and returned by mail.
- To increase angler participation, a reminder letter and a second questionnaire mailout is sent to non-responders. A prize draw incentive for participants is offered.



Arctic char fillets.

- Results from the 2000 angler survey were used to refine the study design and questionnaire for the 2001 survey.
- Fishing data to be gathered includes: total number of fish caught, number of fish retained, location, month, gear type used, angler preference for fish species, intent to ice fish in the ISR during the winter and use of fishing guides and outfitter services.

## Partners

- Fisheries Joint Management Committee (project lead)
- Fisheries and Oceans Canada
- Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development

## Results

- The sport angler survey was conducted in 2000 and 2001.
- Western Arctic Parks began participating in the survey in 2001.
- Results from 2001 will be reported in 2002.



Fishing on the Firth River.

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# 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 Tuktut Nogait national parks and the surrounding regions. Special attention is paid to observations of bears and wolves, as there is existing information for both species and because they are good indicators of environmental health.



## Wildlife WILDLIFE CARDS

### Objectives

- To monitor wildlife populations in Aulavik, Ivvavik and Tuktut Nogait national parks and surrounding regions using incidental wildlife observations.

### Methods and Information Collected

- Incidental observations of wildlife are recorded by species.
- 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 of incidental observations for each park and maps of these observations are produced.



Red fox pups.



Grizzly bear.



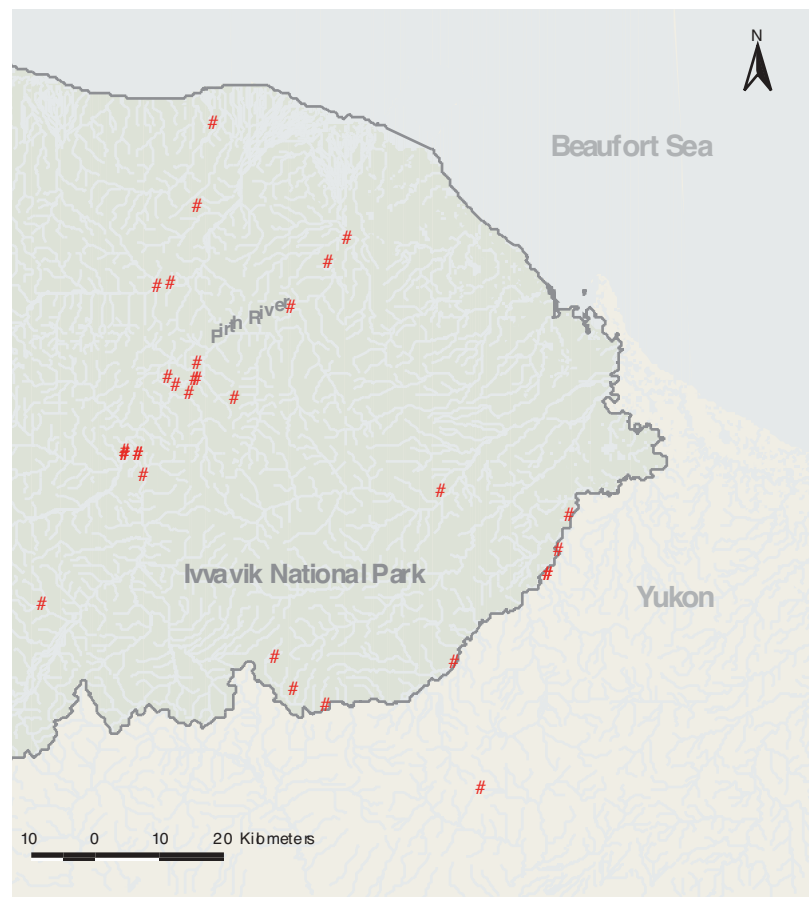
## Years of Data

- 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 1950s.

## Results

- 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 can be produced as they are required using the wildlife cards database.

**Wildlife Card wolf sightings in Ivvavik National Park, 1987-2001**



## Contacts

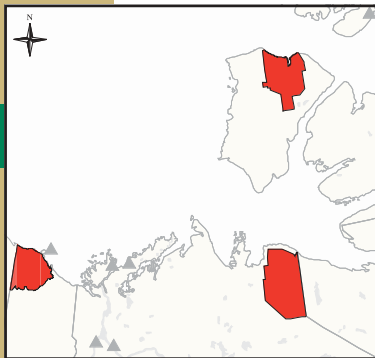
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## Rationale

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.



## NWT-NUNAVUT BIRD CHECKLIST SURVEY

Wildlife  
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

- Checklist survey forms are completed for Aulavik, Ivvavik and Tuktoyaktuk national parks.
- Checklists are also filled out for the Inuvik area in the winter.
- The number of birds of each species and evidence of breeding is recorded on the NWT-Nunavut Bird Checklist Survey form.
- Checklist survey forms 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 survey form (e.g. birding ability of the observer, survey location, habitat, presence of predators).



Red-throated loon.



Black-bellied plover.

## Results

- The NWT-Nunavut Bird Checklist Survey database was redesigned in 2001 to make it easier to update and more user-friendly. Within the next couple years the new database will be accessible on the internet.
- Some of the more unusual reports from the 2000 survey are: harlequin ducks spotted on the Horton River, white-crowned sparrow reported in Sach's Harbour, an early american robin sighting March 30<sup>th</sup> 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)

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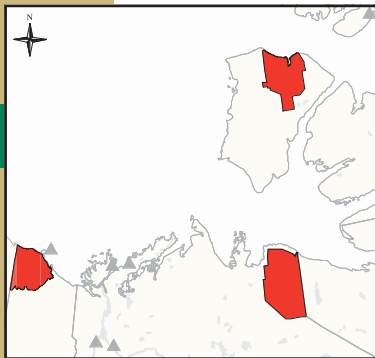
Arctic tern.



Northern Hawk owl.

## Rationale

Raptors, especially peregrine falcons, are often used as indicators of ecosystem health. Changes in prey abundance and the presence of pesticides can affect raptor populations. 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 coincides with the Canadian Peregrine Falcon Survey (CAPFS), 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 Tukturnogait national parks.
- To provide information about peregrine falcon populations in Aulavik, Ivvavik and Tukturnogait national parks to the Canadian Peregrine Falcon Survey.

### Methods and Information Collected

- The raptor survey is conducted every 5 years. The next survey will be conducted in 2005.

#### 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.

##### Tukturnogait 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 nest site on the Hornaday River.

**Methods and Information  
Collected (continued)**

**Years of  
Data**

**Partners**

**Results**



**Snowy owl nest with eggs and chicks.**

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**2001**

- 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 Agency raptor survey 2000.

**Ivvavik National Park**

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

**Tuktut Nogait National Park**

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

- Yukon College
- Yukon Territorial Government

**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.

## Rationale

Environmental problems in the wintering areas, breeding areas and migration routes of birds can affect the health of their populations. Breeding bird surveys are an effective way of detecting 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 that can be used to detect changes in bird populations in the park. Parks Canada Agency has adapted the breeding bird surveys used by the Canadian Wildlife Service and the Alaska Offroad Bird Survey for use as a pilot study in Ivvavik National Park. This pilot project will determine the effectiveness of this method for monitoring breeding bird populations in the park.



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.
- Birds are identified within a 50 m radius by sight and sound at each station. Observations at each station are made for 5 minutes.
- Only selected bird species are recorded for the survey. Additional species can be noted if the observer is certain of their identification.
- The species, sex and behaviour is recorded for each bird that is observed.
- 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.



Steve Travis recording data for the breeding bird survey.



Margaret Lake area.



Sheep Creek area.

## Years of Data

- Canadian Wildlife Breeding Bird Survey-1997
- Alaskan Offroad Bird Survey-1998
- Ivvavik National Park Breeding Bird Survey-1999 to 2001

## Results

- Breeding bird surveys were conducted at Margaret Lake on June 12-13, 2001 and at Sheep Creek on June 17-18, 2001.
- Seven new species were recorded in the 2001 survey: bank swallow, boreal chickadee, horned lark, yellow warbler, willow ptarmigan, rough-legged hawk and common goldeneye. All of these species have been identified in the park, however bank swallow and common goldeneye have not previously been recorded in the breeding season
- Counts for the northern hawk owl, lesser yellowlegs, varied thrush, redpoll and white-crowned sparrow were the highest recorded in the five year life of the survey.
- A new database for the survey was developed in 2001.

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## Rationale

Lemmings are an important part of arctic ecosystems. They are an important source of food for predators such as arctic fox, wolves, ermine and raptors. Lemmings can also affect soil and vegetation. Lemming populations can grow and decline regularly, 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 changes in the abundance of collared lemmings and brown lemmings in study plots in Aulavik National Park.

### Methods and Information Collected

- 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.

### Years of Data

- 1999 to 2001



Brown lemming.



Lemming nests.

## Results

- Lemming plots were surveyed on July 2, 2001.
- A small decrease in lemming nest counts from 2000 to 2001 corresponds with the observations of lemmings in Aulavik National Park. People reported seeing fewer lemmings in Aulavik this year compared to last year.
- Lemming counts are variable depending on the timing of the survey. The amount of snow cover on the ground covering the nests varies from year to year depending on the timing of spring melt. Once exposed, the nests can be blown away by the wind. It is therefore difficult to determine the best time to conduct the survey.
- The lemming monitoring program is being reviewed this year.

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

Number of lemming nests counted at five sample plots from 1999 to 2001, Aulavik National Park, Banks Island.

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## 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. Incidental observations of moose have been recorded during surveys of other wildlife species, but this information is not sufficient to determine population density or trends. The survey is conducted to determine abundance, sex and age composition, and distribution of moose. This information provides a baseline for future surveys that will allow Parks Canada Agency 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 conduct moose surveys in the Babbage River watershed every five years to track changes in moose abundance, population characteristics and distribution.

### 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.
- A detailed description of the methods is presented in the Yukon Territorial Government, Department of Renewable Resources report status and seasonal distribution of moose in the Northern Richardson Mountains (Smits, C.M.M. 1991. Unpublished Report TR-91-2, Yukon Department of Renewable Resources, Whitehorse. 64 pp).
- Age and sex of moose, location and habitat type where moose were observed are recorded.



Moose in Ivvavik National Park.

## Years of Data

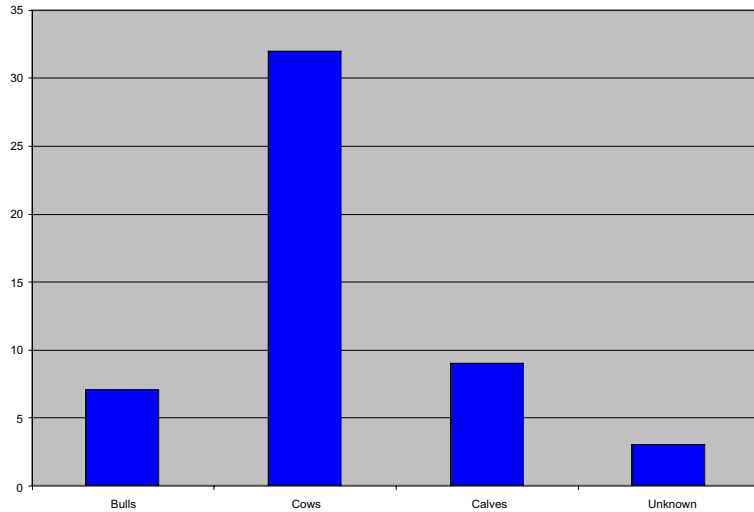
- 2000

## Partners

- Yukon Territorial Government

## Results

- The 2000 survey was conducted on April 16 with a Bell 206B Jet Ranger helicopter by three observers and a pilot.
- 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, Babbage River, Ivvavik National Park, 2000.

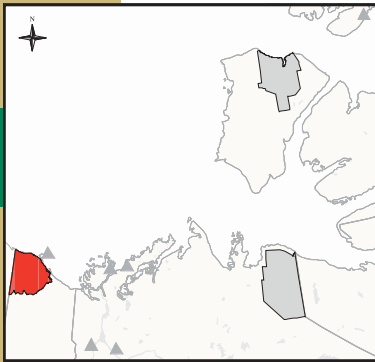
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## Rationale

Muskoxen were reintroduced to Alaska in the late 1960s and early 1970s. The population eventually expanded its range to the Yukon North Slope, including Ivvavik National Park. Muskoxen surveys have been conducted since 1986 on the Yukon North Slope 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. Inuvialuit have expressed a desire to exercise their traditional rights to begin harvesting muskoxen once again. Information collected through population monitoring is required to learn more about the ecology of muskoxen and to ensure that subsistence harvests are sustainable.



Wildlife

## YUKON NORTH SLOPE MUSKOX POPULATION MONITORING

### Objectives

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

### Methods and Information Collected

- Muskoxen monitoring activities are conducted on the Yukon North Slope, including Ivvavik National Park of Canada.
- Population surveys focus on areas with appropriate muskoxen habitat. These areas include Firth, Babbage, Malcolm, Tulugak and the Trail rivers.
- Parasite research has been conducted in the Richardson Mountains in the Northwest Territories. Muskoxen in the Richardson Mountains are part of the Yukon North Slope population.
- Muskoxen population size and characteristics are determined through aerial surveys conducted in the spring or summer.
- Muskoxen distribution and movement is determined by tracking muskoxen with satellite radio collars and through aerial surveys.
- Information about muskoxen behaviour is collected by observing muskoxen and recording their activity.
- Specific research projects are conducted to determine the presence and species of parasites in Yukon North Slope muskoxen.



Classifying muskoxen 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 3 year study of muskoxen distribution and movement was initiated in 1999.
- Parasite research was conducted in 2000.

## Partners

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

## Results

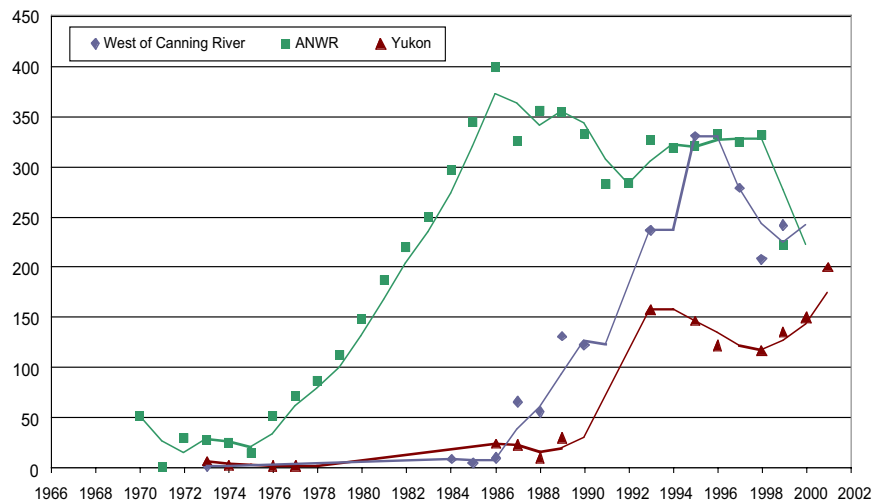
- The muskoxen population on the Yukon North Slope was surveyed from April 5-7, 2001 to assess pre-calving and over winter survival.
- Another survey was conducted from July 14-20, 2001 to assess calf productivity and survival.
- From the July survey the population is estimated at 199 animals. 168 of these animals were located in Ivvavik National Park.
- There were 30 calves per 100 three year and older cows. The ratio of calves to cows was 72:100 in 1999 and 56:100 in 2000.
- Data indicates an increase in the Yukon North Slope muskoxen population since 1986. Collecting additional information about muskoxen movements, habitat preferences, competition with caribou and parasites and diseases is recommended.

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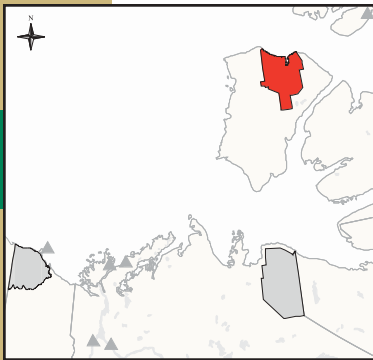
North Slope Muskoxen Population Estimates



Population estimates for muskoxen on the Yukon and Alaskan North Slopes, 1970-2001.  
Source: Yukon Territorial Government, U.S. Fish and Wildlife Service. ANWR=Arctic National Wildlife Refuge

## 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 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. Parks Canada Agency is a partner in this project, contributing funds and other resources.



Wildlife

## BANKS ISLAND PEARY CARIBOU MONITORING

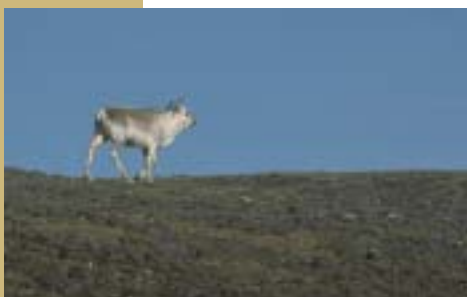
Department of Resources, Wildlife and Economic Development

### 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.
- Snow depth, density and hardness are measured in caribou wintering range and adjacent to caribou feeding sites.
- Urine samples from caribou are collected and analysed to determine animal body condition.



Peary caribou on Banks Island.

**Methods and Information  
Collected (continued)**

**Years of  
Data**

**Partners**

**Results**

- Satellite collars were placed on 10 adult female caribou in 1999.
- Fecal and fourth stomach samples are analysed to assess parasite infection.
- Caribou population surveys have been conducted on Banks Island every 3-4 years since 1982.
- Classification surveys have been conducted annually 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 in 2000 and 2001.
- 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 1999.

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

- Banks Island was surveyed from July 7-15, 2001 using a strip transect survey flown at 20% coverage. The population is estimated at 1195 non-calf adults.
- A composition survey was completed on July 23, 2001. Results show 67 calves per 100 two year and older cows.
- Fecal samples were collected during winter 2001 to determine infection levels of gastro-intestinal parasites.
- Samples of the fourth stomach were collected from harvested animals during fall 2001 to determine the number and species of parasites present.
- Urine samples were collected in April 2001 to assess body condition.
- From the population estimate it appears the population is recovering. DRWED plans to evaluate their monitoring program this winter.

**Contacts**

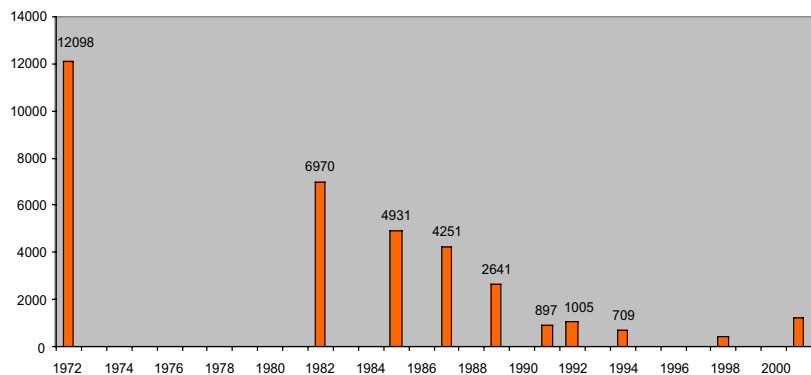
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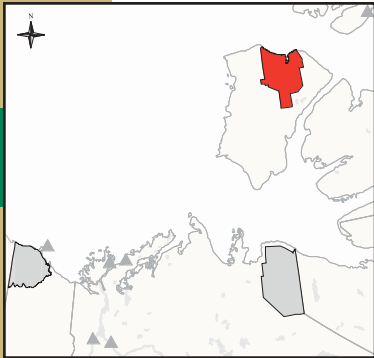
**Banks Island Caribou Population Estimates  
1972-2001**



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. Parks Canada Agency is a partner in this project, contributing funds and other resources towards the project.



Wildlife

## BANKS ISLAND MUSKOX 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. This number is divided by the previous years estimate of the number of calves present per 100 2-year-old or older females.



Muskox.



**Methods and Information  
Collected (continued)**

- Snow depth, density and hardness are measured in high density muskoxen areas and adjacent to muskoxen feeding sites.
- Urine 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**

- Whole island population surveys of muskoxen have 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.
- Parasite levels have been assessed in 2000 and 2001.

**Partners**

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

**Results**

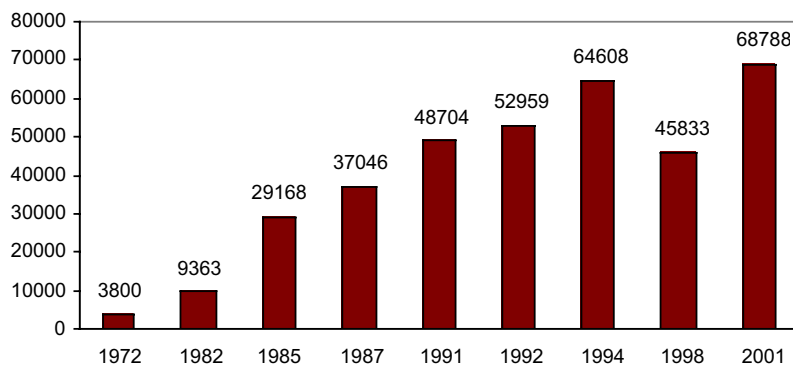
- Banks Island was surveyed from July 7-15, 2001 using a strip transect survey flown at 20% coverage. The population is estimated at 68,788 non-calf adults.
- A composition survey was completed on July 22-23, 2001. The results show 41 calves per 100 2-year-old or older cows.
- Urine samples were collected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

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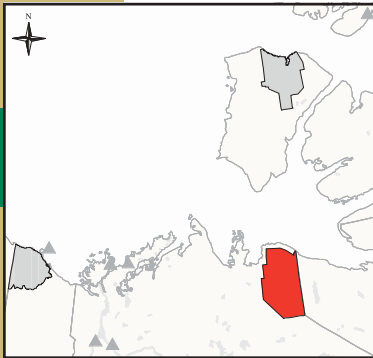
**Banks Island Muskox Population Estimates,  
1972-2001**



Population estimates for 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. This basic population information is required to track the health of the herds. 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 Agency 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. Classifications are conducted from the air for small groups of caribou.
- 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



Bluenose-West caribou.

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**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.

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

**Years of  
Data**

- Productivity and age and sex composition surveys were conducted in 2000 and 2001.
- Population surveys of the Cape Bathurst and Bluenose West caribou herds were conducted in 1986, 1987 and 1992.
- One productivity survey was conducted before 2000. This survey was conducted in 1981. Eight surveys to determine recruitment of caribou calves were conducted between 1983 and 1994. One age and sex composition survey was conducted 1978.
- Parasite were assessed in 2001.

**Partners**

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

**Results**

- A winter range survey was conducted in March 2001. Results show a low over winter survival of calves.
- A survey to determine productivity was conducted in the Bluenose-West calving area from June 23-26, 2001. An earlier attempt was made to complete the survey, but cows had not finished calving. Calving appeared to be 2 weeks late this year for the second year in a row. Results show 54 calves for 100 two-year-old or older cows.
- Tissue samples were collected and analysed for contaminants from harvested animals in 2001. Results are being analysed.
- Fecal samples were collected during winter 2001 to determine infection levels of gastro-intestinal parasites.
- Fourth stomach samples were collected from harvested animals during 2001 to determine the number and species of parasites present.
- A fall composition survey was not completed due to lack of funds.

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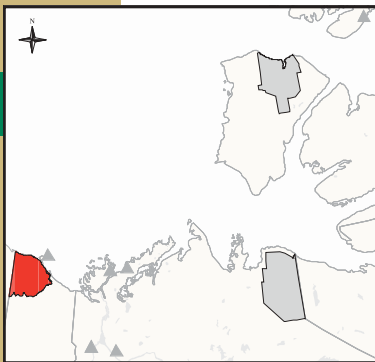
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## Rationale

The Porcupine caribou herd is a large population of barren-ground caribou in the northern Yukon, Alaska and Northwest Territories. In 2001 the size of the herd was estimated at 123,000 caribou. The herd is an important part of the arctic ecosystem and resource for aboriginal people. 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 Yukon Territorial Government, the Canadian Wildlife Service, the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service. Parks Canada Agency is a partner in this project, contributing funds and other resources towards the project.



## Wildlife PORCUPINE CARIBOU HERD MONITORING

Yukon Territorial Government, 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, female mortality, distribution and movements of the Porcupine caribou herd.

### Methods and Information Collected

- 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 calving grounds. The photocensus is usually conducted in the Arctic National Wildlife Refuge in Alaska.
- 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.
- A calving survey is conducted by locating satellite and radio collared caribou in early June. The number of cows with calves and pregnant cows are counted.
- Radio and satellite collared cows are located and observed periodically until the end of June to determine birth rates and survival rates.
- Female mortality rates are estimated from death rates of satellite collared female caribou.
- Satellite collars are used to determine the distribution and movements of the herd.



Don Russell observing caribou on the Yukon North Slope.

## Years of Data

- Herd size data has been collected since 1972.
- Calf mortality data, cow calf ratios and birth rates have been collected since 1983.
- Winter range data has been collected since 1992.

## Partners

- Alaska Department of Fish and Game (project lead)
- U.S. Fish and Wildlife Service (project lead)
- Yukon Territorial Government, Renewable Resources (project lead)
- Canadian Wildlife Service (project lead)

## Results

- A photocensus was completed in Alaska on July 3, 2001. This photocensus estimated 123,000 caribou in the herd.
- A composition survey was not completed in 2001 due to poor weather.
- Birth and survival rates for 2001 are based on collared cows.
- In March 2001, 10 bulls and 33 cows were equipped with radio collars.
- Snow depth and density was measured in March 2001 at 8 stations along the Dempster Highway to aid in monitoring winter range conditions.
- A check station was operated on the Dempster Highway during the fall 2001 to monitor harvest levels.
- 360 samples were collected from harvested animals in September 2001 to assess body condition

Year	Birth Rate (%)	June Calf Survival (%)	July Calf/Cow (per 100)	March Calf/Cow (per 100)	Population Estimate
1972					100,000
1977					105,000
1979					110,000
1983					135,000
1987	78		55		165,000
1988	84		62		
1989	78		58	43	178,000
1990	82		74		
1991	72	89	58	22	
1992	86	74	49	33	160,000
1993	68	83	45	32	
1994	90	93	70	40	152,000
1995	69	92	59	41	
1996	89	91	72	46	
1997	75	90	57	38	
1998	83	94	68	27	129,000
1999	84	86	70	56	
2000	71	63	44		
2001	81	61		28	123,000

Birth rates, calf survival, calf to cow ratios and population estimates for the Porcupine Caribou Herd, 1972-2001. Source: Porcupine Caribou Management Board, Alaska Department of Fish and Game.

## Contacts

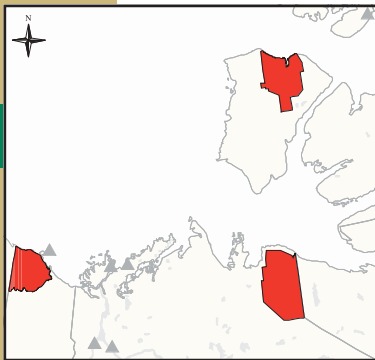
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## Rationale

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 Agency uses Advanced Very High Resolution Radiometer (AVHRR) satellite images to monitor landscapes. Of special interest to Parks Canada Agency 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 provide information about plant productivity, peak times of vegetation growth and snow cover, which can be used to monitor long term changes in the park environment.



## SATELLITE MONITORING OF PLANT PRODUCTIVITY

### Objectives

- To monitor plant productivity, the timing of plant growth and the extent of snow cover in Aulavik, Ivvavik and Tuktoyaktuk National Parks.

### Methods and Information Collected

- Satellite monitoring of plant productivity is conducted for the Western Arctic Field Unit in Aulavik, Ivvavik and Tuktoyaktuk National Parks. This is part of a larger program that is conducted in 11 National Parks.
- Satellite images are taken from April to October each year. The images are created by combining the best images taken over a 10-day period.
- Information from the composite images are used to determine primary productivity, the timing of plant growth and the extent of snow cover.
- Analysis of satellite images is conducted by the Parks Canada Western Canada Service Centre in Winnipeg.
- A series of ground sample sites were selected in different vegetation types in each park. These sites are used for analysing productivity information measured from the satellite images.



Arctic willow.

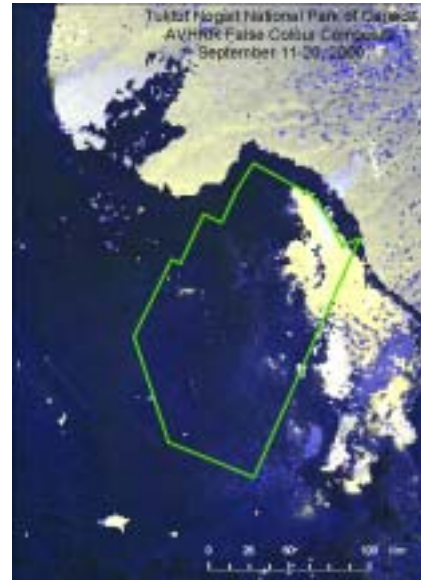
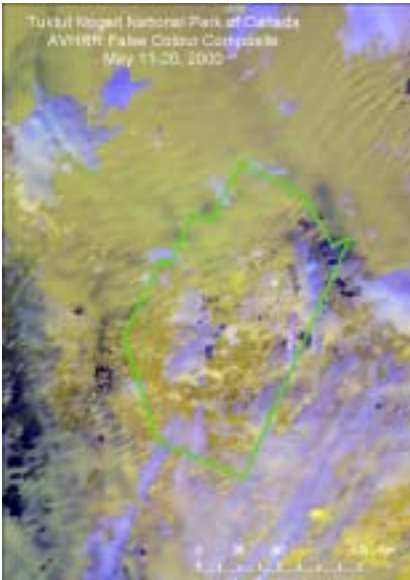
### Years of Data

- 1998-ongoing

### Partners

- Parks Canada Agency - Western Canada Service Centre (Winnipeg)





AVHRR satellite monitoring in Tuktut Nogait National Park.

## Results

- Data from 1999 to 2001 for Ivvavik and Tuktut Nogait national parks, and from 1998 to 2001 for Aulavik National Park, were analysed to determine if there are changes in NDVI.
- NDVI was found to be different in the spring of these three years. These changes may be due to a later start in the growing season since 1998.
- NDVI at the peak of growing seasons and midsummer did not change from year to year. The stability of NDVI values in midsummer may make this period a good indicator of long term changes in vegetation growth.
- The timing of vegetation growth for 1998 and 1999 for all three parks is indicated in the table below.

	Ivvavik		Aulavik		Tuktut Nogait	
	1998	1999	1998	1999	1998	1999
Spring Thaw	May 16	May 16	June 6	June 16	Na	June 6
Peak of Growth	July 16	July 16	July 16	Aug 6	Na	Aug 6
Winter Freeze-up	Sept 6	Sept 26	Aug 16	Sept 16	Na	Oct 6

\* 1998-1999 estimated dates based on a temperature value >10,000

- In 2000 the methods for analysing the timing of plant growth changed to measure growing season onset and end.

	Ivvavik	Aulavik	Tuktut Nogait
Growing Season Onset	June 6	June 26	June 26
Peak of Growth	July 26	July 26	July 26
Growing Season End	Sept 16	Sept 16	Sept 16

\* 2000 estimated dates based on NDVI value of 0.09

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## Rationale

Pingos are a permafrost feature represented by the Pingo Canadian Landmark near Tuktoyaktuk. The Western Arctic Field Unit manages the Landmark in cooperation with the Inuvialuit Land Administration, Hamlet of Tuktoyaktuk, Tuktoyaktuk Hunters and Trappers Committee and Tuktoyaktuk Community Corporation. 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 it 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 monitor natural and human caused changes to the vegetation on pingos in the Pingo Canadian Landmark.

### Methods and Information Collected

- Monitoring is conducted at Split and Ibyuk pingos in the Pingo Canadian Landmark. The Landmark is adjacent to the community of Tuktoyaktuk.
- Vegetation at Split and Ibyuk pingo was identified and mapped in 1999. Soil type and the topography of the pingos were also mapped. Photos were taken to document erosion and human use of the pingos.

### Years of Data

- Initial fieldwork was conducted in 1999

### Partners

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



Ibyuk pingo in the Pingo Canadian Landmark.



Split pingo in the Canadian Pingo Landmark.

## Results

- The initial investigation of Split and Ibyuk pingos indicate that Split Pingo is in very good condition and Ibyuk Pingo is showing signs of erosion. This erosion is being caused by natural processes and human use.
- Vegetation identification and mapping indicate that the number of species present and the timing of growth changes with aspect and substrate. There are more species of plants at the base of the pingos than at the top. The crater of the pingos have a vegetation community that is different from the base and the slope of the pingo.
- A monitoring program for the Pingo Canadian Landmark needs to be developed with the Pingo Working Committee.

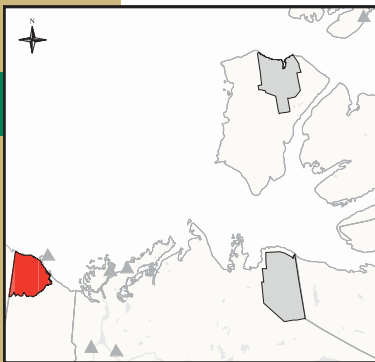
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## Rationale

In Ivvavik National Park, approximately 80 percent of park visitors travel along the Firth River and use some of the 35 identified campsites along the river. A number of these sites are used repeatedly each summer and 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. Campsites along the Firth River are monitored annually to identify human caused impacts, to determine if any wildlife threats exist, to identify sensitive species in the area, to determine if the site should be closed and to identify sites that need to be 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 twice each season, once in the spring and once in the fall.
- Spring monitoring occurs before the first visitor river trips. 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 focused on identifying impacts resulting from visitation during the past summer. This involves comparing the composition and density of the vegetation at the campsite with the surrounding area, determining the presence and extent of bare soil, bank erosion, trails and root exposure caused by human use of the site, identifying



Vegetation monitoring plot.

**Methods and Information  
Collected (continued)**

damage to vegetation in the surrounding area and identifying any human 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 to ask park visitors which campsites they used. This information is used by Parks Canada Agency to identify which campsites are likely to be most impacted by human use.



**Campsite at Caribou fence rapid.**

**Years of  
Data**

- 1997-ongoing

**Results**

- Campsites were monitored in the spring from June 16-23, 2001 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 July 17, 2001 as wolves did not appear to be using the den this year.
- Muskeg Creek campsite remained closed this year due to nesting peregrine falcons in the nearby cliffs.
- The campsite at Caribou stick fence remained closed this year to allow plant regeneration.
- Campsites were monitored again from August 20-28, 2001. Caribou Stick Fence and Margaret Lake West campsites were surveyed in detail for vegetation regrowth.
- The vegetation regrowth at Caribou Stick Fence and Margaret Lake West is progressing well. Caribou stick fence site will remain closed until the vegetation has completely recovered.
- Human waste and garbage was found stuffed in ground squirrel holes at the Margaret Lake airstrip. The waste was collected and carried out by park staff.

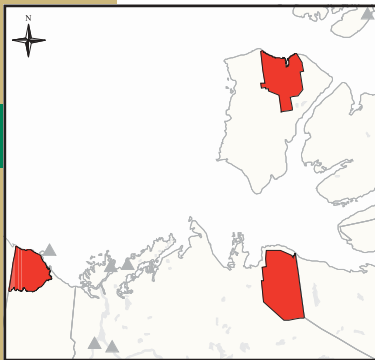
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## Rationale

Understanding the extent and nature of 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 Agency staff who use the park, when and where they visit and the types of activities they conduct. This information is used by Parks Canada Agency 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

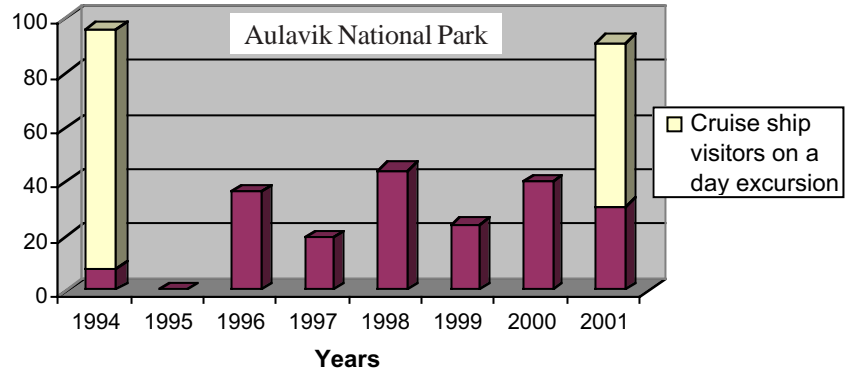
##### Aulavik National Park

- 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.



Canoeing the Thomsen River in Aulavik National Park.

**Results (continued)**

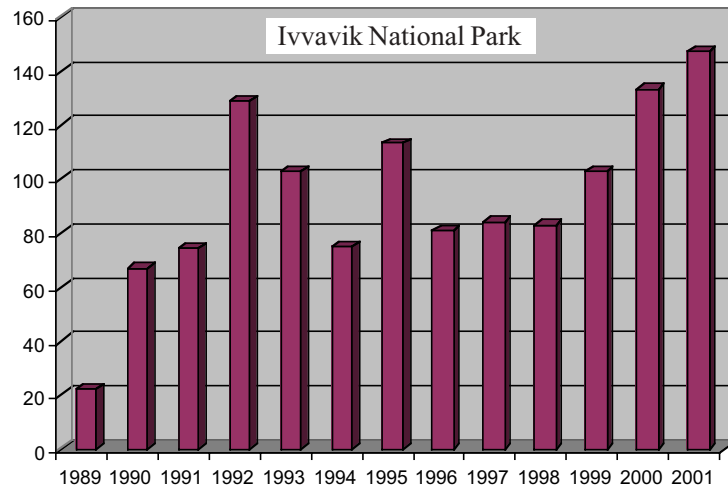


**Ivvavik National Park**

- The number of visitors to Ivvavik National Park in 2001 was the highest since the park was created in 1988. The number of visitors has been increasing for the last 3 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.



**Rafting the Firth River in Ivvavik National Park.**





Camping in Tuktut Nogait National Park.

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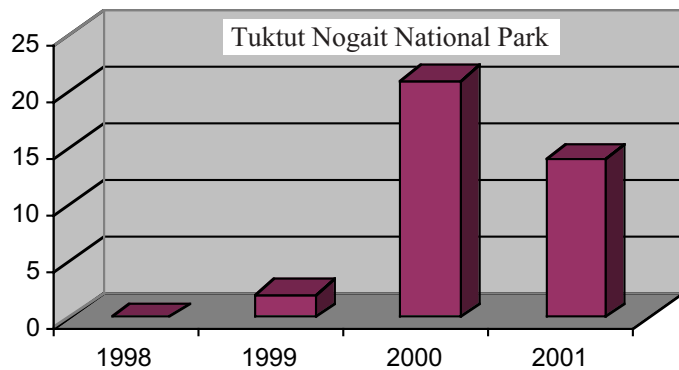
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## Tuktut Nogait National Park

- It is difficult to speculate about trends in visitor numbers to Tuktut Nogait National Park as the park is relatively new and unknown. The noticeable increase in visitors in 2000 and 2001 suggests the popularity of the park is growing.
- 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 161 visits to Aulavik, Ivvavik and Tuktut Nogait national parks in 2001. A variety of resource management, public safety, law enforcement and education and interpretation activities were conducted during these visits.

Park	Year	Staff/Researchers	Students	Total User Days
Aulavik	2000	28	21	549
	2001	61	0	316
Ivvavik	2000	62	8	329
	2001	66	11	630
Tuktut Nogait	2000	19	0	337
	2001	34	0	234

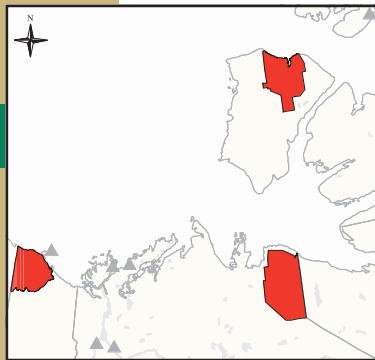
Parks Canada staff, researcher and student visits to Aulavik, Ivvavik and Tuktut Nogait national parks, 2000 and 2001.





## Rationale

In the past 100 years the average temperature of the earth has increased by 0.3 to 0.6°C. 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.
- 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 vapor pressure
- UV-B radiometer is recorded at one station in each park.
- Active layer temperature is measured with thermistors at 10 cm depth in the ground.
- 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, and permafrost and active layer temperature, are taken every 5 seconds. Snow depth, barometric pressure and 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.

### Methods and Information Collected



Weather station at Polar Bear Cabin in Aulavik National Park.

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

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

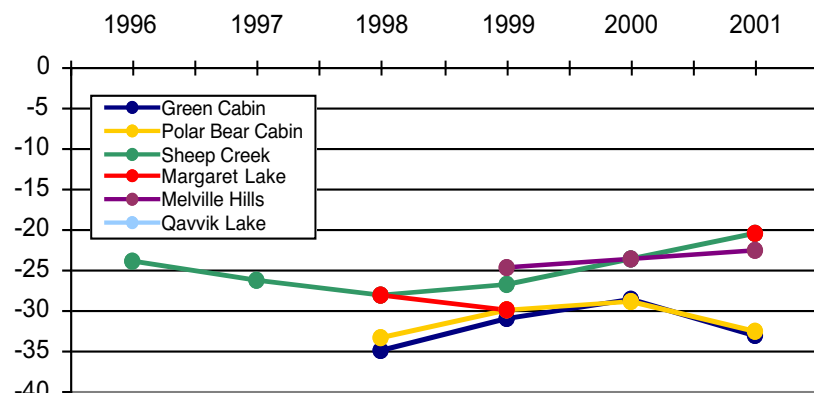
## Years of Data

- 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 at Sheep Creek in Ivvavik National Park in 2001. Similar probes will be installed at the 3 remaining weather stations.

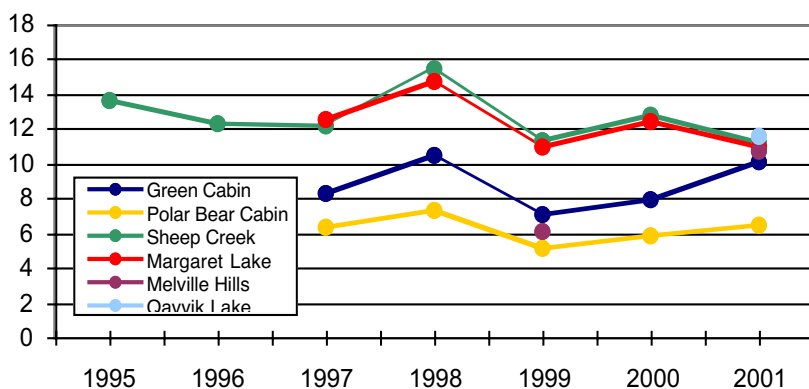
## Partners

- Environment Canada, Atmospheric Environment Service

## Results



Mean January temperature at weather stations in Aulavik, Ivvavik and Tuktut Nogait national parks, 1996-2001.



Mean July temperature at weather stations in Aulavik, Ivvavik and Tuktut Nogait national parks, 1995-2001.

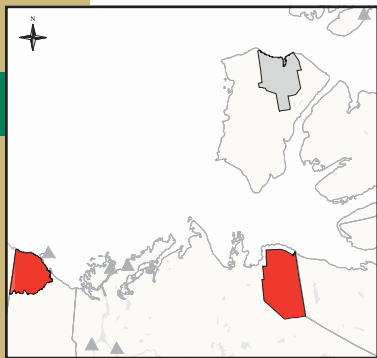
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## Rationale

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 Tukturnogait National Park to determine current water cycles and to identify long-term changes to these cycles. Information about water flow is also valuable for understanding how Arctic ecosystems function. On the Hornaday River, river flow information is 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 Tukturnogait National Park.
- To examine the relationship between river water flow, fish habitat and fish productivity.
- 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 Tukturnogait 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.



The Hornaday River in Tukturnogait National Park.

### Years of Data

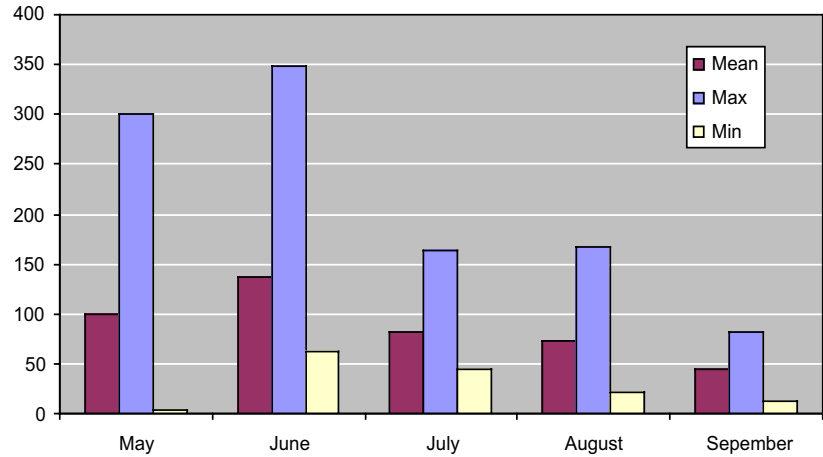
- Firth River station from 1972-1994 and since 1997
- Hornaday River station since 1998

### Partners

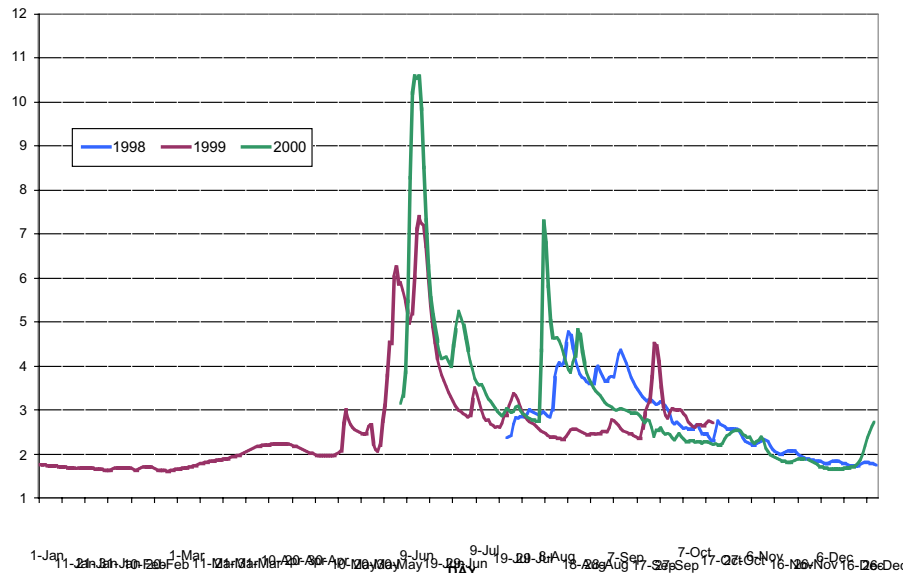
- Environment Canada
- Fisheries and Oceans Canada

## Results

Mean monthly discharge for the Firth River, YK  
1972-2000



HORNADAY RIVER WATER LEVELS  
1998-1999-2000



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## Rationale

Climate change may increase the frequency and strength of coastal storms. Natural Resources Canada (NRCan) has started a sea temperature and storm surge monitoring program to collect information about the effect of storms on water levels and water temperature. Parks Canada is participating in this monitoring program as a partner. 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. This is currently a pilot project that will determine the effectiveness of the equipment and project design to monitor sea temperature and water levels. 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 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 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 Ivvavik coast at Shingle Point, Stokes Point, Workboat Passage, Nunaluk Spit and Komakuk Beach. The probes are set out in June or July and retrieved in August or September.

### Years of Data

- 2000 and 2001

### Partners

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

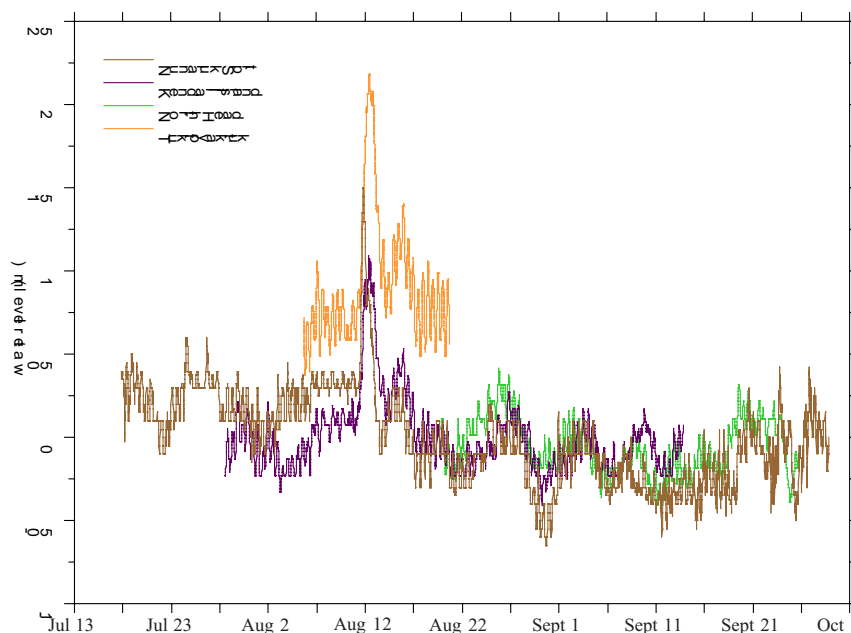


Sea temperature and storm surge probe.

## Results

### 2000

- In 2000, probes were set at Shingle Point, Stokes Point, Nunaluk Spit, Komakuk Beach, Philips Bay, Kendall Island, North Head, Tuktoyaktuk Harbour, Midshelf and at 4 locations in Alaska.
- The probes recorded a water surge associated with a storm on August 10-14, 2000.
- The storm showed differences in the timing and height of water surges at various locations. The surges were later, higher and longer in the west.
- In the absence of permanent tide gauges, the storm surge probe is a suitable tool for monitoring summer and early fall water levels along the Beaufort Sea shoreline



One hour running means of storm surge probe data at Nunaluk Spit, Kendall Island, North Head and Tuktoyaktuk sites in 2000.

### 2001

- In 2001 probes were set at Shingle Point, Stokes Point, Workboat Passage, Nunaluk Spit, Komakuk Beach, East Channel, Shallow Bay, Tuktoyaktuk Harbour and 5 locations in Alaska.
- Probes were set out by Parks Canada Agency at 5 locations in 2001 and retrieved at 3 of the 5 locations.

Location	Date Set	Depth	Date Retrieved
Shingle Point	July 15, 200	190cm	probe lost
Stokes Point	July 19, 2001	250cm	Sept 5, 2001
Workboat Passage	July 19, 2001	195cm	probe lost
Nanaluk Spit	July 19, 2001	220cm	Sept 5, 2001
Komakuk Beach	Aug 16, 2001	255cm	Sept 5, 2001

- Data collected in 2001 will be reported in 2002.

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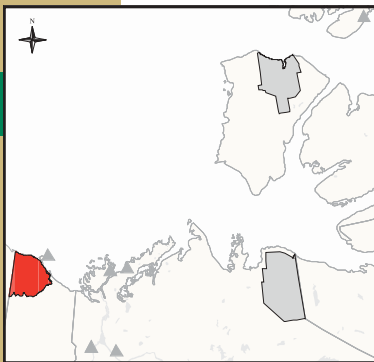
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## Rationale

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 will become part of Ivvavik National Park after a clean-up was conducted 1999 and 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 hydrocarbon spill monitoring program will be developed by the Department of National Defence (DND) in cooperation with the Inuvialuit Land Administration (ILA) and Parks Canada Agency. In addition to this monitoring program, Parks Canada Agency photographed the site in the summer of 2001 to document the revegetation of the clean-up area.



## Solid waste

### KOMAKUK BEACH CLEAN-UP MONITORING

#### Objectives

- To document the rate and extent of vegetation growth at the clean-up site.
- To develop and implement a landfill and fuel spill monitoring program for the site.

#### Methods and Information Collected

- Komakuk Beach is located on the Yukon North Slope at 69° 35' 53" N; 140° 11' 00" W.
- In 2001, photopoints were established at 6 different sites in the clean-up area to monitor the regrowth of vegetation.
- Thirty-eight photographs were taken.



Photopoint established to monitor the regrowth of vegetation at Komakuk Beach.

## Years of Data

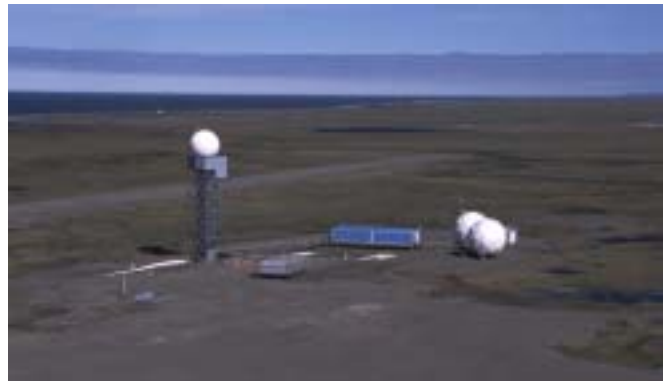
- 1999 - 2001

## Partners

- Department of National Defence
- Inuvialuit Land Administration



Komakuk Beach in 1999.



Komakuk Beach in 2001.

## Results

- Photographs of the site will be used to determine the extent and rate of vegetation growth at the site. A report describing how the site was photographed will be produced.
- A monitoring program for the landfills and fuel spill area are currently being developed by Parks Canada Agency, the Department of National Defence and the Inuvialuit Land Administration.

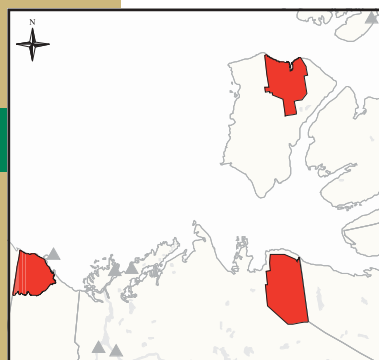
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## Rationale

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 Tukturnogait 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 of Aulavik National Park, the Firth River of Ivvavik National Park and the Hornaday River of Tukturnogait National Park.
- To determine if water quality changes over time in Aulavik, Ivvavik and Tukturnogait 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 from the Hornaday River at the water survey site and the delta.
- 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 of 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 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.



Ilan McDonald taking a water sample.

## Years of Data

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

## Partners

- Environment Canada
- Fisheries and Oceans Canada



Water sampling bottles.



Instruments used to measure water quality.

## Results

- The Firth River was sampled in June, July and September, 2001 at the water survey site.
- The Thomsen River was sampled in June and August, 2001 at Green Cabin.
- The Hornaday River was sampled twice in June and once in September, 2001 at the water survey site. The Hornaday delta site was only sampled once in June and once in September. The number of sites that are sampled on the Hornaday River was cut down this year from six to two due to lack of funding.
- 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

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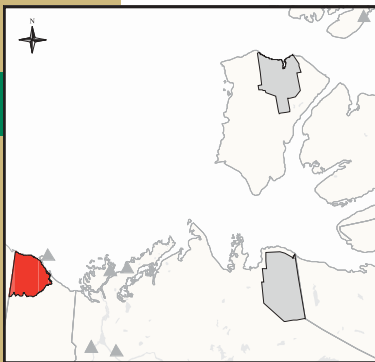
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## Rationale

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 impacts. 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 changes to cultural sites along the Firth River.
- To develop actions to protect these cultural sites where they are required.

#### 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. Photo-points were established at each site and ground stakes are used to measure rates of soil erosion.
- Photographs and measurements of soil erosion will be used to determine if the sites have changed.



Rock concentration and a stone plate.

## Years of Data

- 1995 - original site surveys
- 1999 and 2000



Remains of a Thule cobble house.



Remains of a prospectors camp.

## 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 2001 the monitoring protocol was updated.

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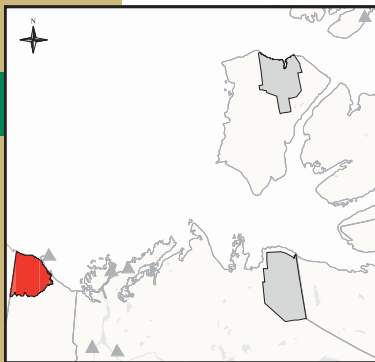


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## Rationale

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 the possible impact of erosion on coastal sites, to monitor the impact of erosion on these sites and to recommend actions to protect these sites and their artifacts.

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## Cultural resources

### IVVAVIK COAST CULTURAL RESOURCES MONITORING

#### Objectives

- To assess the impact of erosion on cultural resources along the coast of Ivvavik National Park.
- To develop a monitoring strategy for sites at risk to erosion.
- 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 2002.
- 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 condition of the site in 2000 was described. This description was compared with descriptions from 1987 and 1997.
- Threats to the sites and their artifacts were identified.
- Photographs were taken of the main features of each site. These photographs were compared with existing pictures of the site to determine if any changes had taken place.
- Measurements were taken at sites most threatened by erosion. These measurements will be used to determine how quickly the site is eroding.



**Methods and Information  
Collected (continued)**

Site Number	Traditional Name/Location	Site Coordinates
30Y48 (82Y)	Niaqulik	69° 14' 58" N/138° 29' 15" W
30Y61 (85Y)	Qargialuk	69° 29' 06" N/139° 05' 10" W
30Y64 (83Y)	(Paul Kayotuk's place)	69° 27' 56" N/139° 04' 06" W
30Y64 (84Y)	(Wilson Suplu, Charlie Gordon/ Daniel Kapuk's place)	69° 27' 50" N/139° 03' 45" W
30Y90 (69Y)	Nunaaluk Spit	69° 34' 40" N/139° 33' 50" W
30Y78 (68Y)	Nunaaluk village, Shinikruaq	69° 36' 02" N/139° 47' 11" W
30Y96	Clarence Lagoon	69° 37' 54" N/140° 50' 50" W
30Y97 (74Y)	Hudson Bay post, Clarence Lagoon	69° 36' 59" N/140° 45' 34" W
30Y113 (76Y)	Clarence Lagoon	69° 56' 34" N/140° 48' 55" W
30Y59	Roland Bay	60° 23' 13" N/138° 53' 15" W
30Y57 (36Y)	Umiak site	69° 21' 40" N/138° 48' 10" W
30Y56 (91Y)	Near Stokes Point DEW Line station	69° 20' 25" N/138° 45' 10" W

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



A windbreak on the coast.

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**Years of  
Data**

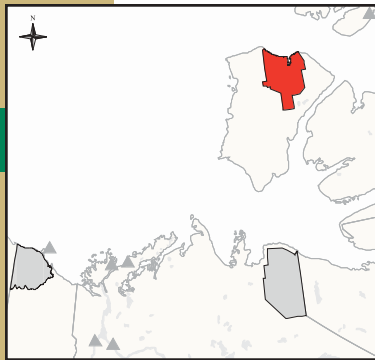
- 1987 and 1997
- 12 sites monitored in 2000

**Results**

- Many of the 12 sites are subject to some erosion.
- Four of the sites were damaged during a storm on August 10, 2000.
- A decision was made to monitor the sites every 2 years in order to provide frequent updates about their condition.
- Decisions about attempting to prevent 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 (see Niaqulik Archaeology Salvage Project on page 15). 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 actions that can be taken to protect 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 actions 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.
- Five 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.



Head Hill 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 3 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 by walking along transects.

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



Counting grey sandstone fragments at Nasogaluak cultural site.

**Results**

**Nasogaluak Cultural Site:**

- The site was visited on June 26, 2001.
- Photographs indicate that there have not been any identifiable changes to the site since 1997.
- Measurements indicate that items at the site have not been moved.
- The technique of counting grey quartz sandstone artifacts within a designated plot needs to be reviewed.

**M'Clure's Cache Cultural Site:**

- The site was not monitored in 2001.
- Counts of barrel parts have been inconsistent between years and needs 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 July 14, 2001.
- A caribou antler was moved to a different location in the site in the past 5 years. The artifact may have been moved so that it was in a better position to be photographed.
- The technique of counting muskoxen skulls in a known area needs refinement.

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**ANNUAL REPORT OF**

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**RESEARCH AND**

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**MONITORING**

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**IN NATIONAL PARKS**

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**2001**

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