

INUIT QAUJIMAJATUQANGIT OF
CLIMATE CHANGE
2005 IN NUNAVUT

A SAMPLE OF INUIT EXPERIENCES OF RECENT CLIMATE
AND ENVIRONMENTAL CHANGES IN
**CLYDE RIVER, POND INLET, RESOLUTE BAY,
GRISE FIORD, NUNAVUT**

GOVERNMENT OF NUNAVUT
DEPARTMENT OF ENVIRONMENT
ENVIRONMENTAL PROTECTION DIVISION
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EXECUTIVE SUMMARY

In 2001-2003, the Department of Environment (formerly the Dept. of Sustainable Development) Government of Nunavut, initiated a multi-phase project to gather information on climate change across Nunavut and completed a report on *Inuit Quajimajatuqangit* of Climate Change in Nunavut.

This report includes information collected from individuals in the communities of Clyde River, Pond Inlet, Resolute, and Grise Fiord in order to provide examples of experiences from the North Baffin region. Interviews were conducted in each community, in Inuktitut, using a semi-directed interview method. The interviews were transcribed into English and observations made by the participants were tabulated and analyzed for each community and also in comparison to the other communities.

Due to the result of small samplings and the brief information contained in the translations, no direct conclusions about Inuit observations of climate change can be made with the information collected. However, the study does conclude that Inuit observations produce valuable information to offer to any future studies of climate change. Inuit observations and knowledge of climate and environmental changes in Nunavut should be explored further with communities.

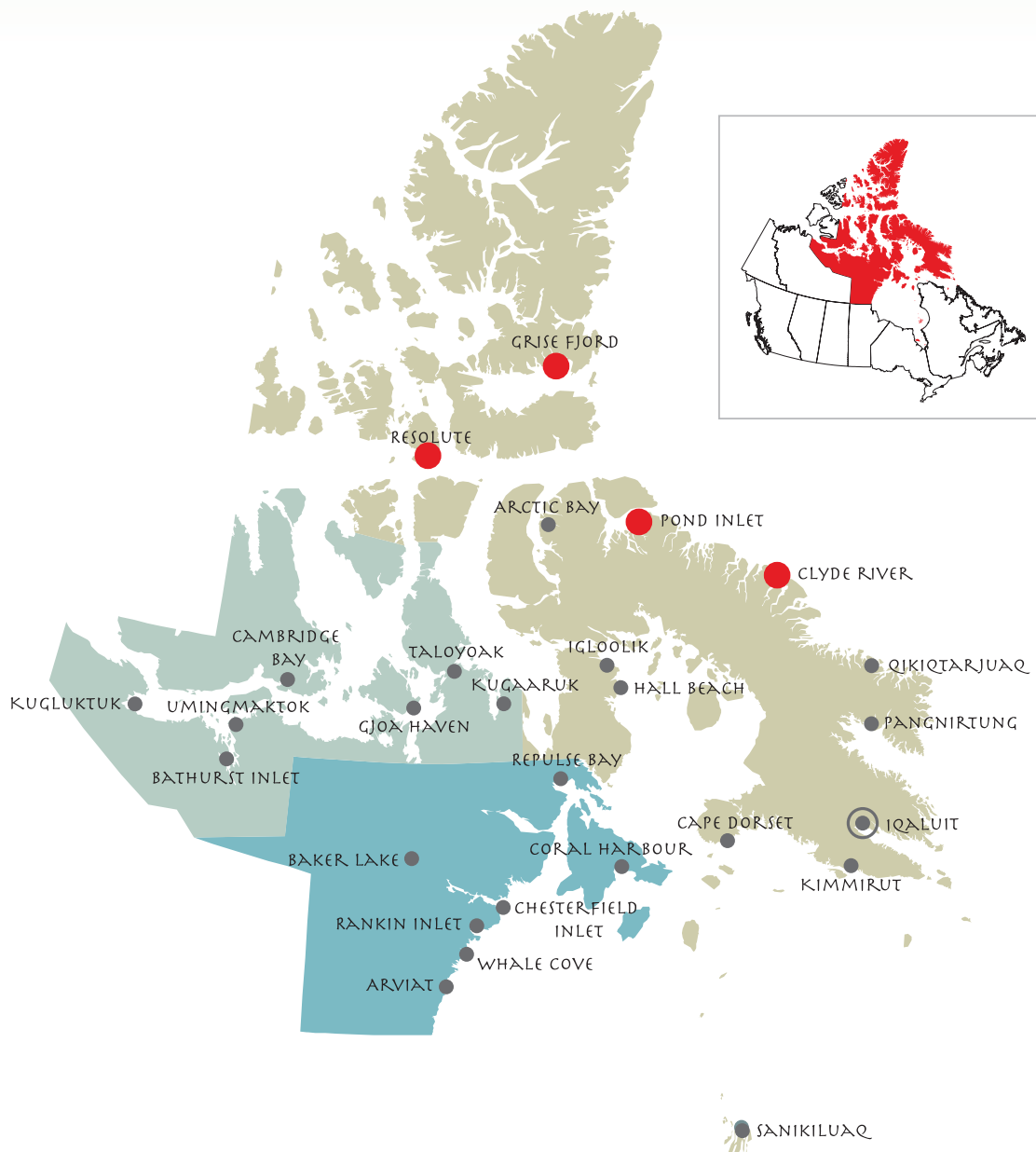
Through the scientific work done by others and through community research, it has become clear that the Arctic climate and environment is changing and it is important to understand that the recorded changes are not uniform between communities. In this report, there are particular observations regarding climate and environmental changes between the four communities that could be coincidental but there are noted phenomena observed by the majority of participants in the communities of Clyde River, Pond Inlet, Resolute and Grise Fiord. Generally, there is

indication in each of the communities that the weather is getting warmer; the wind has changed direction, the sea ice is breaking up earlier, there is less snow in general, more mosquitoes and larger plants.

The collection of Inuit Quajimajatuqangit for this report is reflected in a variety of specific terms and observations.

The Department is encouraged to continue the collection of observations of Inuit Quajimajatuqangit within Nunavut communities by developing a more collaborative and comprehensive approach with each community in Nunavut and by allowing the interview to focus on the key observations and concerns of individual communities.

NORTH BAFFIN PARTICIPATING COMMUNITIES



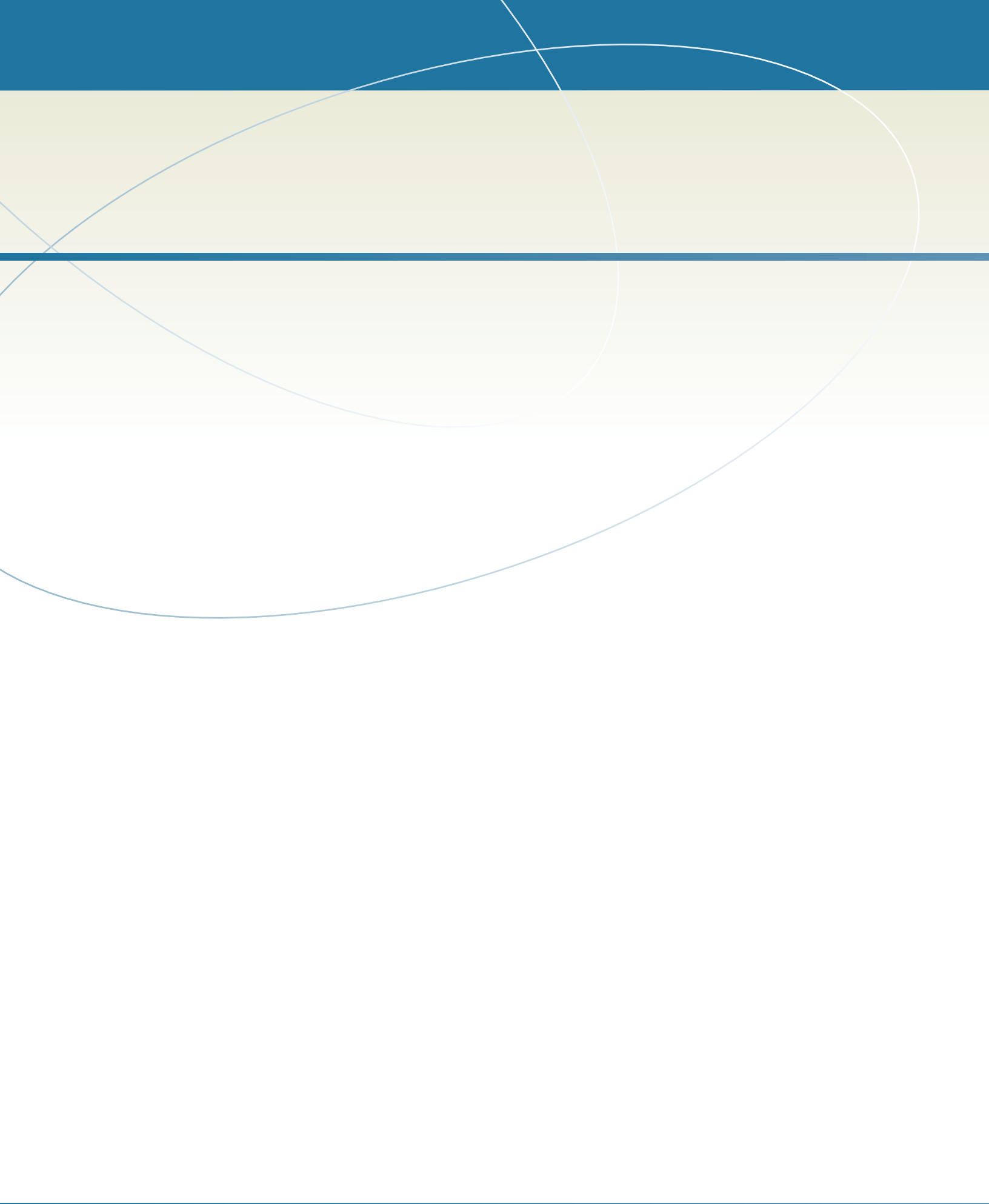


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Nikittuittuq Ltd., of Clyde River, with consultation from Shari Fox (University of Colorado at Boulder), was contracted by the Department to complete the report for North Baffin.

We would like to thank the interpreter, Joeline Sanguya, and the translators, Gary Aipellee for Clyde River; Susan Salluviniq for Resolute; Johnny Taukagak and Joeline Sanguya for Grise Fiord who also assisted in the arduous task of transcribing the interviews.



1.0 INTRODUCTION

In September 2001, the Government of Nunavut, through the Department of Environment's Environmental Protection Division, released the first of three regional reports on 'Inuit Knowledge of Climate Change'. The first report focused on the communities of Baker Lake and Arviat, presenting a sample of Inuit experiences from the Kivalliq region of Nunavut. This report is Part Two of the second in the series and provides examples of Inuit observations of recent climate and environmental changes from communities in the North Baffin regions (South Baffin report prepared as a separate document).

This series of reports was completed in order to further the planning, development and implementation of Nunavut's 'Climate Change Strategy'. This Strategy parallels Canada's 'National Implementation Strategy on Climate Change' and is guided by the following five themes:

- Encouraging Action
- Promoting Technology Development and Innovation
- Enhance Awareness and Understanding
- Government Leading by Example
- Investing in Knowledge and Building a Foundation

Under the theme 'Investing in Knowledge and Building a Foundation', the Department of Environment collected and documented *Inuit Qaujimajatuqangit* of climate change. The Arctic is a special case, because of its unique sensitivity, it is likely to experience impacts of climate change first, and potentially much more severely than other world regions.

Inuit have been noticing evidence of recent Arctic climate and environmental changes. Until recently, their knowledge has not been included in most studies of Arctic environmental and climate change.

Their long-time knowledge and experience on the land makes them excellent observers of the environment and interpreters of how it is changing. Further, they may be best suited to help understand the impacts these changes may have on Arctic ecosystems and people.

In order to identify a climate change Strategy for Nunavut, there was a need to build and strengthen our knowledgebase on climate change in the north. *Inuit Qaujimajatuqangit* is an important part of this effort. Inuit knowledge will supplement and enhance scientific research, as well as provide important context regarding how climate change is observed and experienced at the community level and how communities and individuals in Nunavut may best deal with present and potential impacts of climate change.



2.0 OBJECTIVES

The objective of this study was to record *Inuit Qaujimagatuqangit* of climate change in the North Baffin region, (Quttiktuq), communities of Clyde River, Pond Inlet, Resolute and Grise Fiord.

Specifically, the study was intended to collection information about:

- Whether or not climate change is occurring;
- First-hand experiences of climate change; and
- The impacts of climate change on Nunavummiut.

The personal experiences of climate change recorded for this report are meant to provide a sample of Inuit experiences of climate change in Nunavut to aid in the development of the Nunavut Climate Change Strategy. It is important to note that these are only samples and cannot be representative of entire communities or Nunavut as a whole.

3.0 INFORMATION COLLECTION AND METHODS

3.1 SEMI-DIRECTED INTERVIEWS – NORTH BAFFIN

The main method used for collecting Inuit knowledge and observations related to climate change was the semi-directed interview. This style of interviewing involves using an interview guide to help the interviewer move through certain topics. In some cases, a participant's answer can lead to discussions on other subjects – both within and outside the interview topic. In this report, we included only information related to climate and environmental change, however, the full transcripts found in the appendices show the complete dialogue.

3.2 LIMITATIONS TO REVIEW AND SUMMARY

There were some limitations to the collection of information for this report including:

Tape recorder malfunctions in Grise Fiord and Clyde River led to the need of taking notes by hand. This has led to abbreviated answers and discussion of the interviews was difficult. Associated with this is the inability to clarify the information by the participant.

Pond Inlet interviews are limited to nine. All taped interviews were originally translated into Inuktitut and then had to be re-translated into English. Several attempts have been made to have these translated into English by several translators, and in the end, three translators were involved. Therefore, Pond Inlet has been translated by three translators with different degrees of comprehension of the project.

3.3 LITERATURE REVIEW

A literature review for this report is found in Appendix A. Sources documented are only those that directly address Inuit knowledge of climate change. Other subjects (e.g. traditional ecological knowledge, environmental knowledge of other

groups, Arctic climate change, etc.) is beyond the scope of this report. While Inuit knowledge of climate change has only been investigated within the last decade, a number of useful studies have documented Inuit observations across the Canadian Arctic and/or discussed the present and potential impacts of climate change on Inuit activities and well-being.

3.4 GLOSSARY

Inuktitut terms for phenomena related to climate change were collected from interviews and identified within the body of the document along with their definitions. Events, processes and environmental characteristics related to environmental change were often described and associated with an Inuktitut term. A collection of these terms will be useful in the Department of Environment's Strategy for Climate Change as *Inuit Qaujimagatuqangit* is linked to scientific knowledge and discussions of climate change and its present and potential impacts occur in different areas of Nunavut – these terms may help Nunavummiut from different areas relate to observed changes in various communities.

| | |
|-------------------|---|
| <i>Aniuvat</i> | permanent snow patches |
| <i>Pukajaaq</i> | snow no longer has crystals |
| <i>Punnirujuk</i> | the snow and sea water mixes while it's freezing (similar to a lard like mix) |

4.0 INTERVIEWS

The semi-directed interviews were reviewed for first-hand observations of climate change indicators. Transcripts of each interview were read and each response was 'coded' by categorizing the information. For example, a response may contain information about changing wind patterns. This response would be categorized with the code, 'wind' and the specific information recorded. Specific information may also result in further coding, for example, 'changing wind direction'. Exact quotes

that contained information explaining an indicator were recorded and used in the Discussion Section (of each community) to illustrate individual observations and knowledge (organized by topic). Interviews were kept together in their original communities so that information with the same code could be grouped together. This helped to create the 'Observed Indicators' tables (Tables 1, 2, 3, 4 & 5). The topics (indicators) in the tables were created from the information contained in the interviews themselves.



5.0 NORTH BAFFIN

This North Baffin report includes observations from the communities of Clyde River, Pond Inlet, Resolute and Grise Fiord.

Each participant in the interviews had their own observations and experiences of climate and environmental changes in their community and in the areas they travel on the land. Taken together, there are some patterns that can be seen in the types of indicators that have been noticed. These patterns can be seen by reviewing and comparing the Observed Indicators Tables which show the numbers of people that had information to share about a particular topic. In this section, quotes are used to help illustrate the details of these topics and how some Inuit have dealt with the impacts of climate and environmental changes.

5.1 OBSERVATIONS

Table 1 is a compilation of all the data collection for all four communities in the North Baffin. Some of the topics may appear to be similarly phrased but have been reflected based on the comprehension of the translator. We have maintained the language of the translator as it is recognized that there is potential for subtle differences in the information the Interviewee has provided.

TABLE 1 - COMMUNITY COMPARISONS

| INDICATORS | CLYDE RIVER | POND INLET | RESOLUTE | GRISE FIORD |
|---|--|------------|----------|-------------|
| | #of participants that observed this phenomenon | | | |
| | n=10 | n=7 | n=10 | n=9 |
| Weather | | | | |
| More unpredictable than in the past | 5 | | | |
| Cold mist that used to be around the community is missing | 2 | | | |
| More lightning than in the past | | 1 | | |
| More variable than in the past | | 4 | | |
| Clouds change suddenly, cannot predict the weather | | | 2 | |
| Cannot predict the weather | | | 3 | |
| Weather changes suddenly | | | 1 | |
| Increased variability | | | 2 | 2 |
| Glaciers | | | | |
| Melting/receding/smaller | 3 | 5 | | 4 |
| Temperature | | | | |
| Warmer (overall) | 3 | 2 | 3 | 4 |
| Not getting warmer | 1 | | | |
| Winter not as cold | 1 | | | |

| INDICATORS | CLYDE RIVER | POND INLET | RESOLUTE | GRISE FIOR |
|--|--|------------|----------|------------|
| | #of participants that observed this phenomenon | | | |
| | n=10 | n=7 | n=10 | n=9 |
| Summers do not have as hot extremes | 1 | | | |
| Used to be more extreme cold | | 1 | | |
| Length of cold period is shorter | | 1 | | |
| Cooler (overall) | | | 1 | |
| Same (overall) | | | 1 | |
| Not as cold as in the last 10 years | | | 1 | |
| 1995 and 1996 were really warm, plants grew well | | | 1 | |
| Cold is not as severe | | | | 3 |
| Warmer weather that feels sharper or more direct | | | | 1 |
| Winds | | | | |
| Stronger | 2 | | | |
| More frequent | 1 | | | 1 |
| More winds | 1 | | | |
| More unpredictable than in the past | 1 | 1 | | |
| Prevailing wind slightly changed (no details) | 2 | | | |
| New winds | 1 | | | |
| Changed direction | | 2 | 3 | 4 |
| Unexpected high winds | | 1 | | |
| Winds are the same | | | 1 | |
| Windier than in the past | | | 2 | |
| No more windier season in winter | | | 1 | |
| Winds not blowing from the east (used to be north) | | | 4 | |
| Winds now come from south and east | | | 1 | |
| Usually blows from the northeast now | | | 1 | |
| Winds more from west and northeast now | | | 1 | |
| Winds are not as cold | | | 1 | |
| Winds are weaker | | | | 2 |
| Seasons | | | | |
| Most recent summer longer | 1 | | | |
| Spring used to be warmer | 1 | | | |
| No change in winter | 1 | | | |
| Warm spells in winter now | 1 | | | |
| Colder in winter last three years | 1 | | | |
| In fall, cold weather comes later | 1 | | | |
| Warmer in fall | 1 | | | |
| More snowfall in fall | 1 | | | |
| Seasons change suddenly | 2 | | | |

| INDICATORS | CLYDE RIVER | POND INLET | RESOLUTE | GRISE FIOR |
|---|--|------------|----------|------------|
| | #of participants that observed this phenomenon | | | |
| | n=10 | n=7 | n=10 | n=9 |
| In spring (June) no frozen crust on the surface anymore | 1 | | | |
| Spring hotter | | 1 | | 2 |
| Very cold days and shorter in winter than they used to be | | | 1 | |
| Summer longer but not warmer | | | 1 | |
| Summer cooler | | | 2 | |
| Summers longer | | | 2 | |
| Cloudier spring and summer | | | 1 | |
| Warmer in summer | | | 1 | 1 |
| Spring and summer have changed the most | | | 1 | |
| Summer cooler sooner | | | 1 | |
| Cold seasons are shorter | | | | 2 |
| Warmer temperatures are longer | | | | 1 |
| Sea ice | | | | |
| Breaks up earlier | 2 | 2 | 2 | 4 |
| Breaks up easier | 1 | | | |
| Break up more suddenly | 1 | | | |
| 2002 break up longer | | 1 | | |
| Later freeze up | 2 | | | 3 |
| Sea ice softer when formed | 2 | | | |
| Sea ice softer in spring | | 1 | | |
| Formation process and condition different | 2 | | | |
| Sea ice rougher when formed | 3 | | | |
| Cracks in sea ice not changed | 1 | | | 1 |
| Crack formation changed | 1 | | | |
| Some parts of sea ice have yellowish colour | 2 | | | |
| Weaker ocean current | 1 | | | |
| Sea water more dark brown | | 1 | | |
| Not as hard freezes softer | | 1 | | |
| Ice bottom softer than usual | | 1 | | |
| No open water in winter months due to water current | | 1 | | |
| Longer to form | | | 1 | |
| Ice forms on time | | | 3 | |
| Leaves all at once | | | 3 | |
| Ice is thinner | | | 8 | |
| Melts faster | | | 1 | |
| Polluted today | | | | 2 |
| Break up is faster | | | | 1 |

| INDICATORS | CLYDE RIVER | POND INLET | RESOLUTE | GRISE FIOR |
|---|--|------------|----------|------------|
| | #of participants that observed this phenomenon | | | |
| | n=10 | n=7 | n=10 | n=9 |
| Leads form in unusual areas | | | | 1 |
| Not as much flexible strength as in the past | | | | 1 |
| Floe edge | | | | |
| No floe edge anymore since ice leaves all at once | | | 2 | |
| Floe edge is the same | | | 2 | |
| Rain | | | | |
| More rain | 1 | | | 5 |
| Not changed | 2 | | | |
| More rain in summer, esp. last two years | | | 4 | |
| Rains more due to wind changes | | | 1 | |
| More mist and fog | | | 1 | |
| Snow | | | | |
| Less blizzards | 2 | | | |
| More blizzards | 1 | 1 | 1 | |
| Weaker blizzards | 1 | | | |
| Stronger blizzards | 1 | | | |
| No change in blizzards | 1 | | 3 | |
| Less snow (in general) | 5 | 2 | 3 | 7 |
| Less deep soft snow than in the past | 1 | | | |
| Less soft snow | 2 | | | |
| Late accumulation | 1 | | | |
| Earlier (in year) snow melt | 1 | | 1 | |
| Snow formation on surface not changed | 1 | | | |
| Snow is harder now | 3 | 1 | | |
| Snow harder in the 1960's | 1 | | | |
| Snow accumulates more on ice than land these days | 1 | | | |
| Break up process different | 1 | | | |
| Igloo building snow is gone | 1 | 2 | | |
| Snow is dirty | 1 | | | 1 |
| Permanent snow patches (aniuvat) melting | 1 | | | |
| Snow no longer has crystals (pukajaaq) | 1 | | | |
| Less blowing snow in winter compared to the past | | 1 | | |
| Less snow on sea ice | | | 1 | |
| Snow melts suddenly | | | 1 | |
| Snow is the same | | | 2 | |
| Less snow on the ground | | 3 | | 1 |
| Snow accumulates on the ground later in year | | | | 1 |

| INDICATORS | CLYDE RIVER | POND INLET | RESOLUTE | GRISE FIORD |
|---|--|------------|----------|-------------|
| | #of participants that observed this phenomenon | | | |
| | n=10 | n=7 | n=10 | n=9 |
| Don't see real blizzards like in the past | | | | 2 |
| Larger snowflakes | | | | 1 |
| Lakes and rivers | | | | |
| Rivers flow more | 2 | | | |
| No changes in lake ice | 1 | | | |
| Lake ice thinner | 5 | | | |
| Lake ice thicker | 1 | | | |
| Lake water dirty | 1 | | | |
| More erosion at rivers | 1 | | | |
| Lake ice melts sooner | | | 1 | |
| Lake ice melts faster | | | 1 | |
| Less water in streams | | | 2 | |
| Lake ice forming sooner | | | 1 | |
| Water levels same | | | 1 | |
| Water quality same | | | 3 | |
| Lake ice is the same | | | 5 | |
| Lake ice melts completely now | | | 1 | |
| Lake ice melts more now | | | 2 | |
| Longer for ice to leave the rivers and lakes | | | 1 | |
| Erosion from river happened more than 5 years ago | | | | 1 |
| Rivers not flowing as hard | | | | 4 |
| Lakes freeze later | | | | 1 |
| Tides | | | | |
| Tides lower | 1 | | | |
| Tides higher than usual | | 1 | | |
| Low tide lower and high tide higher | | | 1 | |
| High tide higher | | | | 1 |
| Low tide not as low | | | | 1 |
| Land and Permafrost | | | | |
| Land not changed | 1 | | | |
| Melted terrain seems deeper | 1 | | | |
| New soils in areas that previously did not have any | 1 | | | |
| More cracks in the earth | 1 | | | |
| Land freezes later | 1 | | | |
| Marshy areas are bigger | | | 3 | |
| Permafrost is melting | | | 1 | |
| Permafrost found deeper down | | | 1 | |

| INDICATORS | CLYDE RIVER | POND INLET | RESOLUTE | GRISE FIOR |
|---|--|------------|----------|------------|
| | #of participants that observed this phenomenon | | | |
| | n=10 | n=7 | n=10 | n=9 |
| Some areas eroding | | | 1 | |
| Land drier and dustier | | | | 1 |
| Wildlife | | | | |
| Animal locations not changed | 1 | | | |
| Fish not changed | 3 | | | |
| Fish thinner in some places | 1 | | | |
| More fish in some places | 1 | | | |
| Char are unusually big recently | | 1 | 1 | |
| Fish are the same | | | 3 | |
| Less char | | 1 | | |
| More fish | | 1 | | |
| Less seals than in recent summer | 1 | | | |
| Less seals (depends on the area) | 1 | | | |
| Seals skinnier | 1 | | | |
| Unusual seals | 1 | | | |
| Less seals | | 1 | | |
| Unusual birds seen | 2 | 1 | 5 | |
| Less small birds | 1 | | | |
| Less geese in 2002 | 1 | | | |
| More geese | 2 | | | |
| More snowgeese | | 1 | | |
| Owls gone | | 1 | | |
| More ravens | | 1 | | |
| No ravens in late 60's now they stay all year | | | 1 | |
| More dovebies on islands | 1 | | | |
| More tattigajuat (type of bird) | | 1 | | |
| Red-breasted mekansers and sandhill cranes are gone | 1 | | | |
| Now see sandhill cranes | | | | 1 |
| Arctic terns no longer nest nearby | | | | 2 |
| More rabbits in winter | | | 1 | |
| Hares fatter in past | 3 | | | |
| Hares fatter now | | 1 | | |
| Grazing animals are fatter | 1 | | | |
| Ptarmigan, hare, caribou are not changed | 1 | | | |
| More defects in animals | 1 | | | |
| Unusual animal sightings – wolverine | | | 2 | |
| No caribou now | | | 2 | |

| INDICATORS | CLYDE RIVER | POND INLET | RESOLUTE | GRISE FIOR |
|--|--|------------|----------|------------|
| | #of participants that observed this phenomenon | | | |
| | n=10 | n=7 | n=10 | n=9 |
| Polar bear routes lightly different due to more water from ice | | | 2 | |
| Polar bears appearing earlier | | | | 1 |
| Polar bears have less fat | | | | 1 |
| Animals that depend on plant life seem to be fatter than before. eg. Last 3-4 years musk-oxen | | | 1 | |
| Migrating whales decreased in pod sizes and skinnier | | | | 1 |
| Marine mammals less blubber | | | | 1 |
| Insects | | | | |
| More mosquitoes | 5 | | 2 | 5 |
| Mosquitoes arrive earlier | 1 | | | |
| Mosquitoes smaller | 1 | | | |
| More flies | 1 | | 4 | |
| Less bees | 1 | | | |
| Unusual insects not normally seen | | | 1 | |
| More butterflies | | | | 1 |
| Insects are the same | | | | 1 |
| More bees | | | | 1 |
| Vegetation | | | | |
| Plants not changed | 4 | | | 1 |
| Plants grow bigger | 2 | | 2 | 1 |
| New plants | 2 | | | |
| Mountain sorrels and purple saxofrage grow later | 1 | | | |
| More cotton grass | | 1 | | |
| More moss | | | 3 | |
| New plant have appeared since 1950's | | | 1 | |
| Crowberries growing more than blueberries now | | | | 1 |
| Plants grow earlier and die earlier in summer | | | | 1 |
| Sun and Sky | | | | |
| Sun hotter | 1 | | | |
| Sky not as blue as past | 1 | | | 1 |
| Brighter | | | 1 | |
| Sunburn occurring | | | 1 | |
| 8 years ago last time sun shone with "hot" hitting effect | | | | 1 |
| Sun too hot | | | | 1 |
| Haze makes air not as clear today | | | | 1 |
| Thunder | | | | |
| Close by in 2001 | | | 2 | |

5.2 CLYDE RIVER (KAANGIQLUGAAPIK)

Clyde River is a community located on the eastern shores of Baffin Island, tucked into Patricia Bay, located just inside the mouth of Clyde Inlet. It is a marine community, abundant in marine life and surrounded by numerous fiords. Local residents believe that the weather patterns are influenced by the Barnes Ice Cap, a remnant of the Laurentide Ice Shield.

TABLE 2 - OBSERVED INDICATORS FOR CLYDE RIVER

| INDICATORS (CLYDE RIVER) | #OF PARTICIPANTS WHO OBSERVED THIS PHENOMENON (N=10) |
|---|--|
| Weather | |
| More unpredictable than in past | 5 |
| Cold mist that used to be around the community is missing | 2 |
| Glaciers | |
| Melting/receding/smaller | 3 |
| Temperature | |
| Warmer (overall) | 3 |
| Not getting warmer | 1 |
| Winters not as cold | 1 |
| Summers do not have as hot extremes | 1 |
| Winds | |
| Stronger | 2 |
| More frequent | 1 |
| More winds | 1 |
| More unpredictable than in past | 1 |
| Prevailing wind slightly changed (no detail) | 2 |
| New winds | 1 |
| Seasons | |
| Most recent summer longer | 1 |
| Spring used to be warmer | 1 |
| No change in winter | 1 |
| Warms spells in winter now | 1 |
| Colder in winter last 3 years | 1 |
| In fall, cold weather comes later | 1 |
| Warmer in fall | 1 |
| More snowfall in fall | 1 |
| Seasons change suddenly | 2 |
| In spring (June) no frozen crust on surface of snow anymore | 1 |

| INDICATORS (CLYDE RIVER) | #OF PARTICIPANTS WHO OBSERVED THIS PHENOMENON (N=10) |
|---|--|
| Sea ice | |
| Break up earlier | 2 |
| Breaks up easier | 1 |
| Breaks up more suddenly | 1 |
| Later freeze up | 2 |
| Sea ice softer when formed | 2 |
| Formation process and condition different | 2 |
| Sea ice rougher when formed | 3 |
| Cracks in sea ice not changed | 1 |
| Crack formation changed | |
| Some parts of sea ice have yellowish colour | 1 |
| Not as thick | 2 |
| Weaker ocean current | 1 |
| Rain | |
| More rain | 1 |
| Not changed | 2 |
| Snow | |
| Less blizzards | 2 |
| More blizzards | 1 |
| Weaker blizzards | 1 |
| Stronger blizzards | 1 |
| No change in blizzards | 1 |
| Less snow (general) | 5 |
| Less deep soft snow than past | |
| Less soft snow | 2 |
| Late accumulation | 1 |
| Earlier (in year) snow melt | 1 |
| Snow formation on surfaces not changed | 1 |
| Snow is harder now | 3 |
| Snow harder in the 1960's | 1 |
| Snow accumulates more on ice than land these days | 1 |
| Break up process different | 1 |
| Igloo building snow gone | 1 |
| Snow is dirty | 1 |
| Permanent snow patches (aniuvat) melting | 1 |
| Snow no longer has crystals called 'pukajaaq' | 1 |
| Lakes and Rivers | |
| Rivers flow more | 2 |
| No change in lake ice | 1 |
| Lake ice thinner | 5 |
| Lake ice thicker | 1 |
| Lake water dirty | 1 |

| INDICATORS (CLYDE RIVER) | #OF PARTICIPANTS WHO OBSERVED THIS PHENOMENON (N=10) |
|--|--|
| More erosion at rivers | 1 |
| Land and Permafrost | |
| Land not changed | 1 |
| Melted terrain seems deeper | 1 |
| New soil in areas that previously did not have any | 1 |
| More cracks in the earth | 1 |
| Land freezes later | 1 |
| Wildlife | |
| Animal locations not changed | 1 |
| Fish not changed | 3 |
| Fish thinner in some places | 1 |
| More fish in some places | 1 |
| Less seals in recent summer | 1 |
| Less seals (depends on area) | 1 |
| Seals skinnier | 1 |
| Unusual seals | 1 |
| Unusual birds seen | 2 |
| Less small birds | 1 |
| Less geese in 2002 | 1 |
| More geese | 2 |
| Hares fatter in past | 3 |
| Ptarmigan fatter in past | 1 |
| Grazing animals are fatter | 1 |
| Red-breasted mergansers and sandhill cranes gone | 1 |
| Ptarmigan, hare, caribou not changed | 1 |
| More dovekeys on islands | 1 |
| More defects in animals | 1 |
| Vegetation | |
| Plants not changed | 4 |
| Grow bigger | 2 |
| New plants | 2 |
| Mountain sorrels and purple saxofrage grow later | 1 |
| Sun and sky | |
| Sun hotter | 1 |
| Sky not as blue as past | 1 |
| Insects | |
| More Mosquitoes | 5 |
| More mosquitoes arrive earlier | 1 |
| Mosquitoes smaller | 1 |
| More flies | 1 |
| Less bees | 1 |
| Tides | |
| Tides lower | 1 |

5.2.1 DISCUSSIONS

As can be seen in the Indicators Table for Clyde River (above), people interviewed for this report had a wide variety of observers of climate and environmental changes. Indeed there are not many topics that stand out – i.e., none of the topics had more than five out of 10 people commenting.

A few topics had five out of 10 people identifying the following changes:

- increased weather variability
- less snow
- thinner lake ice
- more mosquitoes

Although on the topic of sea ice no more than two people cited the same observation, sea ice change in general was a subject addressed by many participants and the Indicators Table for Clyde River shows a variety of different opinions. For example, some interesting comments were made regarding changes in sea ice processes:

“The condition today seems like its completely frozen but it’s very soft. It’s not that slippery anymore because it’s not completely frozen. The colour of cracks on ice are whiter these days where areas it used to be more bluish colour. The way ice forms is different maybe because some ice moves around, the conditions of the ice is different, more difficult to pass. Back then it used to be slippery to our sleds making it easy to use for our sleds.” (Joanasia Apak, 2002).

“The other changes I’ve seen is in the condition of the ice we have today. It’s not the same as it was before. Some part has always been rough, but the condition we get these days have more like holes on the ice causing lots of water on the ice in some parts and not much in some parts because of the holes in the ice in different areas, but it’s not dangerous to go through it.” (Peter Paneak, 2002).

“The snow and sea water mixes while it’s freezing and we call it “punnirujuk” (similar to lard like mix) and that is why it deteriorates so much easily now. The kind of mix will accumulate down wind blocked by the land.” (Alooloo Kautaq, 2002).



Although observations of changes from the Clyde River interviews do not show clear signs of particular changes making impacts on the community, this collection of interviews does raise some interesting issues that should be kept in mind as IQ studies continue to look at climate change in Nunavut communities.

First, the Clyde interviews get across that context matters when observations of climate and environmental change are considered. For example, Peter Paneak and Joanasie Apak both make the point that place matters when discussing changes. Snow and ice conditions depend on local topographies and microclimates. This is especially a significant consideration in the Clyde River region where fjords and mountains can create very different environmental conditions within one region. This may play a part in why the indicators of climate and environmental change are so varied in the Clyde interviews. Clyde residents travel a vast area outside of the community and camp and hunt in many different fjords and landscapes in the region. Depending on where they travel and camp, their observations will reflect the local climate.

Second, some of the Clyde interviews note that some of the changes have happened in the past and some of the climate and environmental changes go in cycles. It will be important to sort these kinds of changes out from unprecedented changes. Many Inuit note that climate and environmental conditions are ‘always different’ – what is actually a ‘change’ instead of ‘variability’ should be distinguished.

Finally, Peter Paneak noted that in his opinion the climate had not changed, but the sea ice had. This affirms the need to distinguish climate and environmental changes and look for, if any, connections between the two. Since both types of change came up in the interviews. They are included in our reports.

5.3 POND INLET (MITTIMATALIK)

Pond Inlet is a glaciated, marine community located on the north shores of Baffin Island, with views of Bylot Island. It is located on Pond Inlet, a body of water that connects to Lancaster Sound.

The population of the community is over 1100 people and marine life has played an important role in the past and present history of Pond Inlet.

TABLE 3 - OBSERVED INDICATORS FOR POND INLET

| INDICATORS (POND INLET) | # OF PARTICIPANTS WHO OBSERVED THIS PHENOMENON (N=7) |
|---|--|
| Glaciers | |
| Melting or shrinking | 5 |
| Sea ice | |
| Sea water more dark brown | 1 |
| Not as hard, freezes softer | 1 |
| Sea ice softer in spring | 1 |
| Ice bottom softer than usual | 1 |
| 2002 break up longer | 1 |
| Ice break up sooner | 2 |
| No open water in winter months due to weather current | 1 |
| Snow | |
| Less snow on ground | 3 |
| Less blowing snow in winter compared to past | 1 |

| INDICATORS (POND INLET) | # OF PARTICIPANTS WHO OBSERVED THIS PHENOMENON (N=7) |
|--|--|
| Snow no longer good for igloo building | 2 |
| Snow is harder | 1 |
| Temperature | |
| Used to be more extreme cold | 1 |
| Length of cold periods is shorter | 1 |
| Warmer overall | 2 |
| Weather | |
| More lightning than in past | 1 |
| Weather more variable than in past | 4 |
| Wind | |
| Changed direction | 2 |
| Winds more unpredictable | 1 |
| Unexpected high winds | 1 |
| Blizzards | |
| More blizzards | 1 |
| Wildlife | |
| More snow geese | 1 |
| Unusual birds sighted | 1 |
| Char are usually big recently | 1 |
| More fish | 1 |
| Less seals | 1 |
| Hares fatter | 1 |
| Less loons | 1 |
| Owls gone | 1 |
| More ravens | 1 |
| More 'tattigajuat' (type of bird) | 1 |
| Less char | 1 |
| Insects | |
| More flies | 1 |
| Rivers | |
| Flow sooner | 1 |
| Freeze faster | 1 |
| Melt faster | 1 |
| Do not freeze through | 1 |
| Creeks dry up in summer | 1 |
| Vegetation | |
| More cotton grass | 1 |
| Berries fatter | 1 |
| Seasons | |
| Spring hotter | 1 |
| Winter same | 1 |
| Overall climate drier | 1 |

| INDICATORS (POND INLET) | # OF PARTICIPANTS WHO OBSERVED THIS PHENOMENON (N=7) |
|-----------------------------|--|
| Timing of seasons off | 1 |
| Tides | |
| High tide higher than usual | 2 |
| Sun | |
| Stronger | 2 |

5.3.1 DISCUSSION

In the Pond Inlet interviews, there are two observations that stand out – weather variability and melting glaciers.

The Pond residents who discussed changes in weather variability noted that they have difficulty predicting the weather, compared to the past. In most cases, these people grew up learning how to predict the weather and practiced this skill most of their lives. Although many people recognize that the weather is always different from year to year, it seems that in recent years, their prediction skills are not working and residents are taking notice.

“What I learned before is very different now. The weather is totally different now. It would look like it’s getting colder and mistier, but the weather is now warmer but gets really cold during the winter season and that’s what I notice today... We used to observe the weather all the time, but now we don’t do it as often as we did before. For instance, the clouds have different strengths of wind and today the clouds move much faster than before. That’s what I’ve noticed. We predict the cloud movements but does something else, it’s very different now. What that happens, it’s really hard to predict the weather and cannot be trusted.” (Gamilie Kilukishak, Pond Inlet)

“Today the weather is unpredictable. Yesterday it seems it was going to be beautiful day, it got cloudy fast I was confused. Back then it wouldn’t gotten like that.” (Alain (no second name provided), Pond Inlet)

Melting glaciers around the Pond Inlet area are noticeable to many people interviewed for this report. The glaciers have exposed a lot of ‘new’ land which is causing problems for traveling and also changing the local environment (e.g. new or more vegetation can grow).

“There used to be a place where there were sirmit (frozen river) that reaches the sea. This is how we named places and when we talked about where we were we would describe the land like the Nuvurjuk and Sirmilik. Sirmilik is a glacier. That’s how we talked about where we were and that’s how we know them. Similik used to go to the sea and has melted; it’s not in the sea anymore.” (Gamilie Kilukishak, Pond Inlet)

Other changes that were noticed by Pond interviewees concern snow. A few different observations were documented. Like the glacier changes which impact travel, snow changes can affect skidoo routes.

“Today when we have to travel on ice and land there is not enough snow anymore, even in winter and spring. In the area where we have to travel there are too many rocks exposed. Caused by too many blizzards, which exposed the rocks.” (Alain, Pond Inlet)

Finally, some interesting comments were made by one Pond resident in regards to changes in the sun. Like residents in other Nunavut communities, Terese (no second name provided) has noticed a change in the strength of the sun. This, in combination with a drier climate, has caused some difficulty in skin preparation.

“There’s no dramatically change, but in winter the hides, when you bring them inside the house, than they were moisture built up. Today, they are very dry. Even when you stretch them they are not the same as it used to be. The climate seems too dry. Even sealskin is harder to manage and we keep seal skin outside to make them whiter starting in March. Not today. We have to do that in February and they are not as white as they should and they are really dry. Back then, we used to travel by qimuksiq. I remember we used to travel far. We had to prepare our hides in April. The sun is too hot by then and damages the skins. Today it is different. Last summer I’ve also noticed a long worm crawling that I’ve never seen before.

When it is sunny day it is like south. Those are the things I’ve noticed the most.” (Terese, Pond Inlet)

5.4 RESOLUTE (QAUSUITTUQ)

In the regional geography, Resolute is considered a high Arctic community and it has only been settled since 1953 when the Canadian Government moved some families from Northern Quebec. The population is approximately 175. Most of the activity in the community is as a result of the location of the community. The community is a jumping off point for expeditions to the North Pole and Ellsmere Island.

TABLE 4 - OBSERVED INDICATORS FOR RESOLUTE

| INDICATORS (RESOLUTE) | #OF PARTICIPANTS WHO OBSERVED THIS PHENOMENON (N=10) |
|--|--|
| Weather | |
| Clouds change suddenly, can’t use to predict the weather | 2 |
| Can’t predict the weather | 3 |
| Weather changes suddenly | 1 |
| Increased variability | 2 |
| Rain | |
| More rain in summer, esp. last 2 summers | 4 |
| Rains more due to wind change | 1 |
| More mist and fog | 1 |
| Wind | |
| Winds are same | 1 |
| Windier than in past | 2 |
| No more windy season in winter | 1 |
| Winds changed direction | 3 |
| Winds now blowing from east (used to be north according to 3 people) | 4 |
| Winds now come more from south and east | 1 |
| Usually blows from northeast now | 1 |
| Winds more from west and northeast now | 1 |
| Winds not as cold | 1 |
| Temperature | |
| Cooler (overall) | 1 |
| Warmer (overall) | 3 |

| INDICATORS (RESOLUTE) | #OF PARTICIPANTS WHO OBSERVED THIS PHENOMENON (N=10) |
|---|--|
| Same (overall) | 1 |
| Not as cold in last 10 years | 1 |
| 1995 and 1996 really warm plants grew well | 1 |
| Seasons | |
| Very cold days are shorter than they used to be in winter | 1 |
| Summer longer but not warmer | 1 |
| Summer cooler | 2 |
| Summers longer | 2 |
| Cloudier spring and summer | 1 |
| Warmer in summer | 1 |
| Spring and summer changed te most | 1 |
| Summer cooler sooner | 1 |
| Thunder | |
| Close by in 2001 | 2 |
| Lakes and Rivers | |
| Lakes ice melts sooner | 1 |
| Lake ice melts faster | 1 |
| Less water in streams | 2 |
| Lake ice forming sooner | 1 |
| Water levels same | 1 |
| Water quality same | 3 |
| Lake ice same | 5 |
| Lake ice thinner lately | 1 |
| Lake ice still as thick | 5 |
| Lake ice melts completely now | 1 |
| Lake ice melts more now | 2 |
| Longer for ice to go out of lakes and rivers | 1 |
| Vegetation | |
| More moss | 3 |
| Plants that never used to grow are growing since 1950's | 1 |
| Plants that used to be small are bigger and more | 2 |
| Land and Permafrost | |
| Marshy areas are bigger | 3 |
| Permafrost is melting | 1 |
| Permafrost is the same | 1 |
| Permafrost thawed out more than when first settled | 2 |
| Permafrost found deeper down | 1 |
| Some areas eroding | 1 |
| Tides | |
| Low tide lower, high tide higher | 1 |
| Wildlife | |

| INDICATORS (RESOLUTE) | #OF PARTICIPANTS WHO OBSERVED THIS PHENOMENON (N=10) |
|---|--|
| Unusual bird sightings | 5 |
| More insects, particularly little flies | 1 |
| More mosquitoes | 2 |
| Houseflies, none in past | 3 |
| Unusual insects nor normally seen | 1 |
| Unusual animals sightings – wolverine | 2 |
| No caribou now | 2 |
| Fish same | 3 |
| Fish bigger | 1 |
| Polar bear routes slightly different due to more water from ice | 2 |
| More rabbits in winter | 1 |
| No ravens in late 1960's, now stay all year | 1 |
| Animals that depend on plant life seem to be fatter than before, e.g. musk-oxen in last 3-4 years | 1 |
| Sea ice | |
| Longer to form | 1 |
| Ice forms on time | 3 |
| Leaves all at once | 3 |
| Leaves sooner | 2 |
| Thinner | 8 |
| Melts faster | 1 |
| Floe edge | |
| No floe edge anymore since ice leaves all at once | 2 |
| Floe edge same | 2 |
| Snow | |
| Less snow than in past | 3 |
| Less snow on sea ice | 1 |
| More snowstorms | 1 |
| Snowstorms are same | 3 |
| Snow melts sooner | 1 |
| Snow melts suddenly | 1 |
| Snow is same | 2 |
| Sun | |
| Brighter | 1 |
| Sunburns occurring | 1 |

5.4.1 DISCUSSION

In the Resolute interviews there are two indicators of change that stand out, weather variability and thinner sea ice.

Resolute seem to be consistent with many other communities in Nunavut who are observing increased weather variability. In Resolute, this was expressed in a number of different ways, but most interviewees mentioned this observation in some fashion (see Indicators Chart for Resolute). The unpredictability of the weather in recent years was explained by several people.

“The only thing I can say something about is the clouds. Seems like what they predict is good weather, but they lie now. When I didn’t have any weather information, I was working for a large boat and the sky was my only weather informant, but the weather forecast by nature does not give true information anymore. The weather does not clear up right away like before. When the weather is bad and it seems as though the weather will clear up, when the good weather clouds are visible, it does not clear up anymore. That is how it is now.” (David Ooingoot Kalluk, 2002)

“It is warmer than the time when we were relocated here. It is like that but right now when the weather warms up it gets cold suddenly and that is one of the changes too. In the older days when it got warm, it would be warm for quite a number of days or weeks. It used to stay warm for quite a while. Also when it got colder it stayed cold long but right now seems like it will warm up but it will get warm probably for one day and then it gets cold already. And also it seems as if it will stay cold then it gets warm again. That is how it is now. That is how the climate change has affected the environment this whole year.” (Simeonie Amagoalik, 2002)

Also, like other Nunavut communities, Resolute is finding that increased weather variability has an impact on local activities such as camping and travel.

“It is the wind that has changed the most. Hunters usually say now that the wind is coming from that direction. The weather will now get better or tomorrow the weather will get better, but is it very hard to predict now. The hunters are confused now about the weather now. The change also is the direction of the wind. It has changed and this is also confusing for the hunters as well. The winds do not come their normal directions anymore.” (Zipporah Ootooq Kalluk, 2002)

“When we are going to travel and because the weather seems as though it will be so according to the knowledge that has been passed on to us from our parents, but the weather will change suddenly. We have had to cancel our trips because of the sudden change to the weather. The travel plans all of a sudden have had to be cancelled because of the weather. Seems like it is hard to believe what the clouds are predicting although what has been taught us by our parents are true, but it is the weather that changes suddenly.” (Mary Kalluk, 2002)

Like the recent unpredictability of the weather, thinning sea ice is also causing travel and hunting problems for Resolute residents.

“When I was traveling by dog team in June where I used to go to but right now the places where I used to camp could not be camped on anymore because it is too dangerous. It gets too thick first now. For that reason our hunting area is not very good to go to now. There usually is plenty of bearded seals there and I usually go there in the spring time to do my bearded seal hunting. That area cannot be traveled on now in the spring time. The ice forms on time, but we cannot go on it due to east winds keeping ice thinner and due to not as cold temperatures.” (David Ooingoot Kalluk, 2002)

“...we can travel on the sea on a shorter time in the spring now because of the thaw.” (Allie Salluviniq, 2002)

“The ice becoming thinner than it used to be seems to be affected the most by the climate change. Like I used to go egg hunting, but now it

is too dangerous to travel by the ice so I cannot go to the places that I used to go to. I think that it is mainly the ice on the sea that has affected me the most. I don't go egg hunting anymore and we would be able to cross to Somerset by ice. We used to be able to hunt wales and walrus in the spring because they were in front of our community. Now, when the ice is going, it all goes at the same time to the south of us. We would like to go hunting, but the ice leaving early has been a problem now. The mammals are trying to go to the other side, passing by us. Now the mammals go to the other side right away without stopping here as they used to because all the ice goes now. They would have stayed around here if the ice did not go away all at once...The ice is thinner than before even people who are in tourism business who would like to pull buildings on the ice through Lancaster Sound cannot do so for the last two years, they cannot move the buildings because we have heard that the ice is too thin now." (Simeonie Amagoalik, 2002)

The ice changes have also caused some difficulties for polar bears too according to Tony Manik.

"What is noticeable is that the bears that did not come here when I first moved here do come close by now and also go to the dumps. There are even some that do come to the community. They were not like that at one time. I personally think that it is because the ice does not form now when it used to, because of the water when bears should be roaming on the ice. They go by the beach and do come more so now than before because of lack of ice. As soon as there is ice, the bears leave." (Tony Manik, 2002)

Other observations of changes in wildlife are quite varied and range from unusual bird sightings (most common observation of interviewees regarding wildlife) to unusual insects (see Indicators Table for these and more).

5.5 GRISE FIORD (AUJITTUUQ)

Grise Fiord is Canada's northernmost settlement and is located in a picturesque glaciated region. A similar history to Resolute, the community has only been settled since 1953 when the Canadian Government relocated families from Northern Quebec.

TABLE 5 - OBSERVED INDICATORS FOR GRISE FIORD

| INDICATORS (GRISE FIORD) | #OF PEOPLE WHO OBSERVED THIS PHENOMENON (N=9) |
|--|---|
| Weather | |
| Increased variability/unpredictability | 2 |
| Ice Caps (glaciers) | |
| Melting or smaller | 4 |
| Temperatures | |
| Warmer (overall) | 4 |
| Warmer weather that feels 'sharper or more direct' | 1 |
| Cold is not as severe | 3 |
| Rain | |
| More rain than in the past | 5 |
| Insects | |
| More mosquitoes | 5 |
| More butterflies | 1 |
| Insects are same | 1 |

| INDICATORS (GRISE FJORD) | #OF PEOPLE WHO OBSERVED THIS PHENOMENON (N=9) |
|--|---|
| More bees | 1 |
| Winds | |
| Changed direction | 4 |
| More frequent winds | 1 |
| Winds are weaker | 2 |
| Sea ice | |
| Polluted today | 2 |
| Sea ice leaves sooner | 4 |
| Break up is faster | 1 |
| Forms/freezes up later | 3 |
| Leads form in unusual areas | 1 |
| Rougher when forms | 1 |
| Not as much flexible strength as in the past | 1 |
| Land and Permafrost | |
| Land drier and dustier | 1 |
| Tides | |
| High tide higher | 1 |
| Low tide not as low | 1 |
| Lakes and Rivers | |
| Erosion from rivers happened more 5 years ago | 1 |
| Rivers not flowing as hard | 4 |
| Lakes freeze later | 1 |
| Lake ice thinner | 2 |
| Lake ice thickness not changed | 2 |
| Vegetation | |
| Crow berries growing more than blueberries now | 1 |
| Plants grow earlier and die earlier in summer | 1 |
| Plants grow larger | 1 |
| Plants not changed (no new) | 1 |
| Seasons | |
| Spring warmer | 2 |
| Cold seasons shorter | 2 |
| Warmer temperatures longer | 1 |
| Warmer summers | 1 |
| Snow | |
| Less snow (general comments) | 7 |
| Less snow on the ground | 2 |
| Snow accumulates on ground later in year | 2 |
| Don't see real blizzards like in past | 3 |
| Snow dirtier | 2 |
| Larger snowflakes | 2 |
| Sun and Sky | |

| INDICATORS (GRISE FIORD) | #OF PEOPLE WHO OBSERVED THIS PHENOMENON (N=9) |
|---|---|
| 8 years ago last time sun shone with 'hot hitting effect' | 2 |
| Sun too hot | 2 |
| Sky not as blue as in past | 2 |
| Haze makes air not as clear today | 2 |
| Wildlife | |
| Polar bears appearing earlier | 1 |
| Polar bears have less fat | 1 |
| Now see some sandhill cranes | 1 |
| Arctic terns no longer nest nearby | 2 |
| Migrating whales decreased in pod size and skinnier | 1 |
| More geese than in past | 1 |
| Marine mammals less blubber | 1 |

5.5.1 DISCUSSION

In interviews from participants in Grise Fiord, there is one observation that stands out more than the rest – less snow. This is a general category as it was not always clear exactly in what way there was less snow. For example, some participants did observe that there was less snow accumulating on the ground in recent years, while others made reference to snowfall and blizzards. Further investigation could reveal why 'less snow' seems to be such a significant observation.

"Today there is less snow for sure since 1972."
 (Larry Audlaluk, Grise Fiord, 2002)

After observations of 'less snow', there were a number of indicators that had at least four of the nine participants contributing observations – more rain in the past, more mosquitoes, changes in ice caps, warmer temperatures overall, changes in wind direction, sea ice leaves sooner, and rivers do not flow as hard as they used to.

Due to difficulties with recording equipment in Grise Fiord, transcripts were made from notes taken by Joëlie Sanguya during interviews. As a result, some of the descriptions and explanations could not be recorded. Here are some explanations that were available, however, from the above observations.

Ice caps:

Of the participants, several have observed that ice caps/glaciers in the Grise Fiord areas are melting and/or shrinking in size. Travel routes on the ice are now impeded by rocks and land making usual trails unusable.

"In 1990's the ice caps really start to melt which make rock more visible. Certainly, the ice caps are melting on Devon Island. The trail we used to go to Eureka is also melting and many rocks are on the surface now." (Seeglook Akeeagok, Grise Fiord, 2002)

"Ice caps are not the same anymore. We used to travel on ice caps for there were no other routes to travel. Ice caps have drastically changed. Now they are so much lower from melting and we come across more rock where our trail used to be. More rocks are appearing. In mid 1960's, it was just ice. Our original trail is not there anymore. We still do go up onto the ice caps, but now there are too many rocks where people used to travel. We see much smaller amount of ice caps today where it used to be just white. You see more of the land than the ice caps nowadays." (Imooshie Natarajuk, Grise Fiord, 2002)

Temperature:

Participants also suggested that the climate was warmer. In some cases, it was mentioned that it

seemed warmer throughout the year, while others indicated seasonal warming. For example, spring and summer are warmer or warmer temperatures seemed to last longer. A warming was described other ways such as 'the cold is not as severe' or that warmer weather feels 'sharper or more direct'. Cold seasons also seem to have warmed according to one observer.

"Kerosene in cold weather used to get thick, now it doesn't anymore...The temperature has changed drastically. The cold seasons are now shorter. Warmer temperatures are longer today." (Jaypatee Akeeagok, Grise Fiord, 2002)

Winds:

It is unclear as to what changes exactly participants in Grise Fiord have noticed about winds. Interestingly, several people interviewed decided to discuss changes in wind direction, but the observations were often contradictory. Also, some participants observed winds were weaker while others noted they were stronger. It seems, though, that the topic of wind changes was of importance to the interviewees and further investigation could help clarify any changes.

"The wind directions have changed. The wind used to come from the direction of the north, now it comes from the east. The wind from the north used to be strong. For many years now, we (haven't) had any frightening winds that may go up to seventies and eighties." (Kavakow Kiguktak, Grise Fiord, 2002)

"The prevailing wind doesn't seem to have changed very much although we got stronger winds from the east. We used to get strong winds at times. Now, we sometimes get (wind) without warning as though even when the wind isn't supposed to come." (Imooshie Nutarajuk, Grise Fiord, 2002)

"In some years, we sometimes get wind in summer time. The wind nowadays comes from all directions. We used to get more wind from the east and from the northwest." (Larry Audlaluk, Grise Fiord, 2002)

Sea Ice:

In North Baffin communities, there is a reliance on sea ice for travel and hunting so observations of any changes are important to address. In Grise Fiord, four of the nine participants noted that the ice leaves or breaks up sooner and three of the nine stated that freeze up is later.

Two people mentioned that sea ice seems to be polluted in the area. This was the first time we heard this observation in North Baffin, except for one person in Clyde River who mentioned that some parts of the sea ice seem yellowish in colour.

"I wish that what fell onto the sea ice and onto puddles could be studied. It feels greasy." (Jaypatee Akeeagok, Grise Fiord, 2002)

"The sea ice is not the same as before. It looks as though some smoke of pollution has settled onto it. The down wind of puddles on the have collected that dirt." (Imooshie Nutarajuk, Grise Fiord, 2002)

Rivers:

In discussions of lakes and rivers, the most common observation (four of nine) among participants was that rivers do not flow as hard as they did in the past. It was unclear what participants thought might explain though although a few did mention that since ice caps were diminishing so much there might not be as much melt water to feed the rivers.

"What used to be stronger rivers are more like streams today. Larger rivers are now just rivers now. The flow has decreased." (Annie Manumi Audlaluk, Grise Fiord, 2002)

6.0 DRAWING CONNECTIONS

After each interview was reviewed and coded, and interviews from each community were organized by category of indicator, it was interesting to look at differences and commonalities of observations and experiences between communities.

Although through scientific and community research it has become clear that the Arctic climate and environment is changing, it is important to understand that the changes are not uniform across the North. Different communities are experiencing, and will experience in the future, different impacts. Because of this research on a per-community basis is required in order to understand how impacts are being observed and experience in that community, how community members interact with those changes, what resources are available for each community to deal with impacts, and what impacts are seen in need of immediate attention or further research.

We recognize that a limited number of surveys in the four communities cannot thoroughly represent the North Baffin region. Indeed, any connections may be coincidental. However, since the collection of *Inuit Qaujimagatuqangit* on this subject is a gradual undertaking, we present this initial North Baffin summary as one step in this process and suggest that further studies add their information to that presented here.

In the North Baffin communities included in this report, observations of climate and environmental changes were highly varied. There was not one observation that was shared by the majority of interviewees in all four communities. However, increased weather variability and unpredictability was observed in three communities (Clyde River, Pond Inlet, and Resolute). Like other Nunavut communities (e.g. see South Baffin report) residents in these communities are unable to predict the weather like they did in the past. Weather indicators today confuse experienced hunters who have been

able to predict the weather in the past. This has caused problems for people traveling on the land and in Resolute, some groups have cancelled their travel plans out of concern for unpredictable weather conditions.

In two communities (Clyde River and Grise Fiord) residents interviewed reported less snow. In both cases, it was not always clear if observers meant less snow on the ground or less snow falling. More research is needed to investigate these observations. Both Clyde River and Grise Fiord also reported more mosquitoes than in the past.

Finally, both Grise Fiord and Resolute had several participants who reported changes in wind. These observations mainly pertained to changes in wind direction, but more research is needed to determine the details of these changes.

We suggest further research to improve the collection of observations and IQ tied to those observations.

7.0 RECOMMENDATIONS

As a result of small sampling, no conclusions can be made with the information that has been collected. However, the observations collected in this report illustrate the fact that Inuit have valuable information to offer to any future studies and have valuable observations to contribute to any future work in climate change.

Inuit have lived in direct contact with the environment and have developed a vocabulary to describe each natural occurrence. Inuit have been encouraged from a very young age to observe the changes in their environment. As a child they are encouraged to get dressed and go outside to observe the environment by using their senses and these skills of observation have become part of their everyday life.

The Department is encouraged to continue the collection of observations of *Inuit Qaujimajatuqangit* within Nunavut communities by developing a more collaborative approach with each community in Nunavut. It is recommended that a Steering Committee be established within each community which would be composed of those members of the community that have direct knowledge of the land and climate, similar to the criteria established for this cursory study. Through such a community-based collaborative approach, more observations like those presented here could be collected and monitored as Nunavut continues to implement its Climate Change Strategy.

The departmental work with the Steering Committee would include the development of a community questionnaire, that are specific to the issues identified in a community at the commencement of the project and reviewing the results of the questionnaires with the community. The next level of discussions has to be within the community as a whole. A collaborative approach to data collection will ensure that a larger sampling is obtained so that the department can better identify impacts, research needs and adaptation strategies related to climate and environmental change in Nunavut communities.

APPENDIX A

LITERATURE REVIEW

This report presents a sample of Inuit observations of, and experiences with, environmental impacts of climate change. The information presented is taken from a collection of interviews conducted for this particular report in 2002. While we did not analyze these interviews in the context of other similar studies; it is useful to provide a brief review of what other literature is available on this subject.

For the purposes of this report, we only cite literature that deals directly with Inuit knowledge and/or observations of climate and environmental changes. While there is a vast amount of literature that addresses Inuit culture, climate change and indigenous knowledge more broadly, a review of this work is beyond the scope of this report.

Though extensive scientific research of Arctic climate change has been underway since the early 1990s, there is relatively little research on how Arctic indigenous peoples have observed or experienced climate and environmental changes. However, in the last few years, a number of studies have been working with Inuit communities to document their knowledge, and Inuit themselves have been active in trying to bring attention to their concerns over recent climate and environmental changes.

The following list provides references and resources that directly address Inuit knowledge of climate and environmental change in Nunavut. A brief annotation after each reference provides an outline of topics and communities covered in the reference:

Northern Climate ExChange (ongoing). Database of Climate Change Information – Sources for Northern Canada. <http://yukon,taiga.net/infosources/>

- Searchable database (by place or topic) including literature that addresses indigenous knowledge of climate and environmental change in Nunavut and Northern provinces.

Elders' Conference on Climate Change, March 29-31, 2001, Cambridge Bay, Nunavut. <http://www.polarnet.ca/nlilands/pdfdoc/elders.pdf>.

- Minutes from the meeting, including summaries and full transcripts of elders' comments. Meeting included elders from 14 different communities in Nunavut.

Fenge, T. (2001). "The Inuit and climate change." Isuma winter: 79-85.

- Discusses policy and political implications for dealing with climate change – discusses role of the Inuit Circumpolar Conference.

Fox, s. (1996). The Potential Impacts of Arctic Climate Change on Inuit/Wildlife Relationships: A Case Study of Igloodik, NT and the Atlantic Walrus (*Odobenus rosmarus rosmarus*). Department of Geography, Faculty of Environmental Studies. Waterloo, University of Waterloo.

- Observations from Igloodik hunters and elders on climate and environmental changes, particularly in reference to walrus. Overview of walrus ecology and walrus hunting; implications of climate change

Fox, S. (1998). *Inuit Knowledge of Climate and Climate Change*. Department of Geography, Faculty of Environmental Studies. Waterloo, University of Waterloo.

- Observations of climate and environmental change from Igloodik and Iqaluit hunters and elders, including how communities and hunters deal with impacts.

Fox, S. (2000). *Arctic Climate Change: Observations of Inuit in the Eastern Canadian Arctic*. Boulder, Colorado, Arctic Climatology Project, Environmental Working Group Arctic Meteorology and Climate Atlas, F. Fetterer and V. Radionov (eds.). Boulder, CO: National Snow and Ice Data Center, CD-ROM.

- Observations of climate and environmental change from Igloodik and Iqaluit hunters and elders, including how communities and hunters deal with impacts.

Krupnik, I. and D. e. Jolly (2002). *The Earth is Faster Now: Indigenous Observations of Arctic Environmental Changes*: Fairbanks, Arctic Research Consortium of the United States.

- Chapters are descriptions of various projects looking at Arctic indigenous observations of climate and environmental change – includes project methodologies and results. For Nunavut, look for chapters by Fox (ch. 1 – Igloodik, Iqaluit, Baker Lake, and Clyde River); Thorpe et al. (ch. 6 – Kitikmeot Region), also see other informative chapters on projects in Nunavik and Labrador, Sachs Harbour and the Inuvialuit Settlement Region, and Alaska.

McDonald, M., L. Arragutainaq, et al. (1997). *Voices from the Bay : Traditional Ecological Knowledge of Inuit and Cree in the James Bay Bioregion*. Ottawa, Canadian Arctic Resources Committee and Environmental Committee of the Municipality of Sanikiluaq.

- Inuit and Cree knowledge of environmental, weather and climate processes and changes in regions of Hudson and James Bays. Also discussion of development in these regions. Helpful maps and graphics.

Reidlinger, D. and F. Berkes (2001). *Contributions of traditional knowledge to understanding climate change in the Canadian Arctic*. Polar Record 37(203): 315-328.

- Discussion of conceptual approach to linking scientific and traditional knowledge of climate change. Indigenous observations of changes from Sachs Harbour.

Reidlinger, D., S. Fox, et al. (2001). *Inuit and Inuvialuit Knowledge of Climate Change in the Northwest Territories and Nunavut*. Native Voices in Research: Northern and Native Studies. J. Oakes and R. Riewe. Winnipeg, Native Studies Press, University of Manitoba.

- Comparative look at indigenous observations of, and experiences with, climate and environmental changes across Eastern, Central and Western Canadian Arctic.

Thorpe, N. (2000). *Contributions on Inuit Ecological Knowledge to the Understanding of Climate Change on the Bathurst Caribou Herd in the Kitikmeot Region, Nunavut. School of Resource and Environmental management.* Vancouver, Simon Fraser University.

- Observations of climate and environmental change in the Kitikmeot region with special focus on impacts and implications for caribou.

Thorpe, N., N. Hakongak, et al. (2001). *Thunder on the Tundra : Inuit Qaujimajatuqangit of the Bathurst caribou.* Vancouver, Generation Printing.

- Includes chapter, “Caribou and our Warming Climate” (p. 157) on elders’ observations of climate change impacts on caribou.