



INUIT QAUJIMAJATUQANGIT OF
CLIMATE CHANGE
2005 IN NUNAVUT

LITERATURE REVIEW AND GAP ANALYSIS
OF INUIT QAUJIMAJATUQANGIT ON CLIMATE CHANGE IN THE
KITIKMEOT REGION, NUNAVUT

GOVERNMENT OF NUNAVUT
DEPARTMENT OF ENVIRONMENT
ENVIRONMENTAL PROTECTION DIVISION
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EXECUTIVE SUMMARY

Climate change is one of the most significant environmental issues facing Canada's northern territories. As many northerners are aware, concern has been growing during the last few decades that increasing concentrations of greenhouse gases in the atmosphere will change our global climate in ways that may be detrimental to our environment and subsequently, to our social and economic systems. Recognizing the value and utility in *Inuit Qaujimagatuqangit* (IQ) in understanding climate change phenomena, the Government of Nunavut, Department of Environment (DOE)- formerly known as the Department of Sustainable Development (DSD) - initiated a project to collect and document information on IQ on climate change across Nunavut. The first phase of this project was completed in the Kivalliq Region in 2001, and the second phase of the project for the Baffin Region was completed in early 2003. In order to obtain Nunavut-wide sampling of observations and experiences on climate change, DOE initiated a third phase of the project which was completed for the Kitikmeot Region.

For this report, a review was conducted of all relevant and available IQ of climate change information of the Kitikmeot Region available on the Internet, through library literature searches, and via northern experts. Next, an analysis of climate change impacts and adaptations was carried out.

The key finding of the literature review and analysis is that documented IQ of climate change is lacking. There are information gaps in all communities in the Kitikmeot Region.

It is strongly recommended that both elders and other community members have the opportunity to contribute their IQ to a local and regional understanding of climate change soon. Ultimately, this information will enhance a global awareness of climate change phenomena.



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Golder Associates and Meridian Geographic was contracted by the Department to complete the report for Kitikmeot Region.



1.0 BACKGROUND

Climate defines the Canadian Arctic and the resolute people who live within it. Compared to other regions of the earth, the Arctic is particularly susceptible to climate changes caused by human and natural causes. Here, a slight variation in temperature can generate both local and widespread effects that influence how much snow will fall, how cold winds will be, where plants and lichen will grow, or even whether a skidoo will start. For Nunavummiut who must survive this harsh climate, frequent weather observations continue to be a part of daily life. As a result, Inuit have much to contribute to our understanding of climate.

Despite the fact that climate has determined Inuit ways of living for generations, only a few written accounts detail Inuit knowledge, known locally as *Inuit Qaujimajatuqangit* (IQ), of prevailing weather patterns and their impact on the ecosystem. Further, “little of this information has reached the mainstream discourse on global climate change,” (Cohen 1997: 302). There is a need for Inuit observations of climate to be better documented so that they can be applied in northern decision-making.

IQ is more than just observations or knowledge, as commonly defined. Instead, IQ includes a finely tuned awareness of the ever-changing relationship between Inuit and *nuna* (the land), *hila* (the weather, wildlife, and the spiritual world). It is “what has always been known” or “what [Inuit] must of have to know” (Thorpe et al. 2001: 4). Whereas scientific observations may be based on instrumental documentation or on observations over a specific period of time, IQ represents an understanding that spans both temporal and spatial boundaries. Together, IQ and western scientific knowledge provide complementary ways of knowing.

While Inuit observations of climate change date back several millennia, the scientific record is just a few hundred years old. Arctic explorers made notes of incidental meteorological observations starting in the

1700s, but only in the last 50 years have systematic meteorological observations been recorded through weather station networks and field research. If we do not augment recent scientific data with historical IQ, there will continue to be significant gaps in our understanding of Arctic climate change.

Inuit Inuit Qaujimajatuqangit is an accumulated and evolving body of knowledge that comprises the intergenerational survival skills, beliefs, practices, wisdom and experiences of Inuit as people who demonstrate an acute awareness of dynamic interactions between themselves, lands and resources.

Climate change is one of the most significant environmental issues facing Canada’s northern territories. As many northerners are aware, concern has been growing during the last few decades that increasing concentrations of greenhouse gases in the atmosphere will change our global climate in ways that may be detrimental to our environment and subsequently, to our social and economic systems. Recognizing the value and utility in IQ in understanding climate change phenomena, the Government of Nunavut, Department of Environment (DOE) initiated a project to collect and document information on IQ on climate change across Nunavut. The first phase of this project was completed in the Kivalliq Region in 2001. The second phase in the Baffin Region finished in early 2003. In order to obtain Nunavut-wide sampling

of observations and experiences on climate change, DOE is continuing this work in the Kitikmeot Region (Figure 1).

Golder Associates Ltd. (Golder), in partnership with Meridian Consulting, was retained to assist DOE in meeting this objective by conducting a literature review and analysis of sources pertaining to IQ of climate change in the Kitikmeot Region. This report details the study objectives, methods and findings of this review and analysis.



Spring in Bay Chimo, 1999

2.0 STUDY OBJECTIVES

To identify the impacts and any current adaptation methods, DOE initiated work to document Nunavummiut observations and experiences with climate change. For the Kitikmeot Region, initial work required included:

- a review of all relevant and available IQ of climate change information for the Kitikmeot Region;
- an analysis of climate change impacts and adaptations in the Region; and
- the identification of communities where there are information gaps.



Results from this work will be used to identify research and planning priorities in Nunavut and will also provide a link between what is being observed by Nunavummiut and how such findings have been recorded and interpreted scientifically.



Buster Kailik and Connie Nalvana, Kugluktuk, 2000.

3.0 STUDY METHODOLOGY

3.1 LITERATURE REVIEW

Numerous media sources were searched to collect IQ on climate change in the Kitikmeot Region of Nunavut. These included:

- *Internet:* The World Wide Web was used to access approximately 63 websites for federal and territorial governments, non-government organizations, academic institutions and climate change databases. Appendix I provides a list of the websites searched and comments on the search results.
- *Contacting Northern Experts:* Attempts were made to contact 58 colleagues and experts in climate change and/or IQ to uncover any relevant gray literature. People were contacted primarily through email although phone was used in some cases. Appendix II provides a list of people contacted, and summaries of the information they provided. In addition, an information request to northern experts was posted on the Canadian Climate Impacts and Adaptations Research Network website (www.taiga.net/c-ciarn-north) and the Canadian Polar Commission's Canadian Polar Information Network Forum website (www.polarcom.gc.ca).
- *Literature Searches:* A review of books, newspaper articles, news releases, journals, academic publications, conference presentations and proceedings, and non-published material was conducted. Although 57 sources were reviewed, only eight were relevant.

- *Libraries:* In order to access the literature, nine libraries were searched, the majority of which fell within the Internet search category. Appendix III provides a list of the libraries that were searched.

In searching the Internet, the following keywords were used in the various search engines:

- Nunavut
- Kitikmeot
- Climate change
- Climate impact
- Climate adaptation
- Inuit Qaujimajangit, Inuit Qaujimajatuqangit and IQ (to allow for spelling differences)
- Traditional ecological knowledge (and TEK)
- Indigenous ecological knowledge (and IEK)

Sources that contained IQ on climate change in the Kitikmeot Region of Nunavut were characterized by describing climate change features or aspects. The sources were further characterized by format and information type. This process is in keeping with the literature review and gap analysis programs initiated by the Northern Climate ExChange (www.taiga.net/nce). Indeed, results from this work can be integrated easily into this national and international climate change communication network.

3.2 GAP ANALYSIS

A review of the literature source tables was conducted and an attempt was made to identify gaps in IQ of climate change literature. Despite the systematic approach of assigning content categories to the literature, this approach was of little utility given that there were only eight sources to consider.

A more meaningful gap analysis approach was adopted to allow for the fact that so few resources were identified. This revised approach consisted of an evaluation of gaps in recorded IQ on climate change in the Kitikmeot accordingly to three ecologically distinct areas. The ecological divisions or eco-regions are Arctic Island (Flow Edge), and Arctic Island and Mainland as shown in Figure 2.

3.3 COMMUNITY CONSULTANT INTERVIEWS

To provide context to the findings from the literature review and gap analysis, attempts were made to interview consultants from communities in the Kitikmeot Region. In total, six local climate change experts were interviewed by phone for 30 minutes to 90 minutes each and asked to comment on the general findings of the report and their key concerns about climate change in their communities of Bathurst Inlet, Cambridge Bay, Kugluktuk, Kugaaruk and Taloyaok. Despite repeated efforts, it was not possible to reach community consultants in Gjoa Haven and Umingmaktuuk.



4.0 ANALYSIS AND DISCUSSION

Based on the literature review, eight sources were identified which contained IQ on climate change in the Kitikmeot Region of Nunavut. However, one of these sources (#6 in Table 1) is an excerpt from another source identified as one of the eight (#7 in Table 1). Four of these sources (#1, #2, #6, and #7 in Table 1) relate to the same research, The *Tuktu* and *Nogak* Project (TNP), although they differ slightly in the results reported and nature of the publication (e.g., academic versus popular medium). In total, the eight sources identified report on five distinct research initiatives.

With the exception of the proceedings from the NTI Elder's Conference on Climate Change (#4 in Table 1), none of these sources was research specific to climate change. For example, climate change information emerged as key research findings in the TNP although the work set out to answer questions about caribou and calving grounds for the Bathurst herd. Similarly, the IQ of polar bear reports (#3 and #8 in Table 1) contain key climate change material related to polar bears. The fact that people could not speak about wildlife without describing climate change impacts and adaptations is testament to the significance of this phenomena to people's daily lives.

The main communities represented by the identified sources of IQ on climate change include Cambridge Bay, Kugluktuk, Bathurst Inlet and Bay Chimo. Taloyoak, Kugaaruk, Gjoa Haven and King William Island were each represented once. However, community members often travel significant distances (e.g., between communities) and consequently may be reporting on a greater area than may otherwise be suggested. As earlier mentioned, IQ spans many spatial boundaries.

**What is the true value of knowledge?
That it makes our ignorance more precise.**

- Anne Michaels.



5.0 GAP ANALYSIS RESULTS

Key Result #1: There are very few sources of IQ of climate change for the Kitikmeot region.

The main finding of the literature review is that IQ of climate change in the Kitikmeot Region is poorly documented. There are two sources that directly discuss IQ of climate change in the Kitikmeot Region. The first is the proceedings from the Elders' Conference on Climate Change based on the input of six elders from the Kitikmeot Region (#1 in Table 1). However, this document provides a series of incidental climate change concerns and observations across all of Nunavut and is not specific to the Kitikmeot Region. The second key reference explores the link between IQ of climate and caribou as identified through the TNP (#2 in Table 1). This source differs from the other project related publications in that it is an academic analysis. Otherwise, the sources are limited to a certain geographical area or environmental component, for example, the relationship between caribou and climate change or polar bears and climatic variables.

The remaining six sources cover climate change related to caribou, polar bears, fish and their respective habitats. The reference pertaining to a fisheries assessment in Kugluktuk (#5 in Table 1) discusses IQ of climate change related to fish behaviour, condition and habitat. Impacts and adaptations relate mainly to the Coppermine River. Sources related to the TNP included interviews that were comprehensive in their coverage of environmental changes that have affected the Bathurst caribou herd in the immediate vicinity of Bathurst Inlet (#1, #2, #6, #7 in Table 1). The Inuit Qaujimaningit Nanurnut study (#8 in Table 1) focused mainly on changes in the sea ice habitat of polar bears north of King William Island while the Traditional Knowledge Polar Bear Report (#3 in Table 1) summarizes biological information on polar bears, including changes in sea ice and weather. While containing valuable IQ, these sources do not comprehensively address climate change impacts and adaptations.



Spring break-up in Bathurst Inlet, 2000.



Travelling over the ice in the spring with machine an qamutik, Simpson Strait

Key Result 2: Statements made about environmental changes in one area cannot be used to generalize about the entire Kitikmeot Region.

This second key finding speaks to the necessary contextualization of IQ related to climate change. For instance, changes in the conditions of the tundra environment inland from Kugluktuk are not directly comparable to those inland from Kugaaruk. Kugluktuk residents live closer to the treeline and experience different wildlife species and considerably warmer climate than residents of Kugaaruk. For this reason, it was necessary to conduct the gap analysis according to three eco-regions (Figure 2), as outlined in the following sections.

5.1 ARCTIC ISLAND (FLOW EDGE) ECO-REGION

For the Arctic Island (Flow Edge) eco-region, none of the eight documents detailed IQ on climate change. However, there is an indication of climate change

observations being made in this region through the statements of Kugaaruk resident Jose Angutingurniq made at the Elder's Conference on Climate Change (NTI, 2001). Angutingurniq made the following observations:

- changes first noticed in the 1980s;
- changes in prevailing wind direction and snowdrift orientation;
- rivers low or dried up;
- areas of year round snow cover melt now melting in the summer;
- change in precipitation;
- the frozen top layer of snow normally seen in the spring due to gradual warming is not seen due to sudden warming and melting;
- early snowfall melts and causes late accumulation of snow;
- temperature does not get cold until December now;
- vegetation grows faster;

- new polynia developed in sea ice makes it dangerous to travel;
- there is now less fog; and
- winds are now unpredictable through the duration of a storm.

David Iqhiut (pers. comm. 2003), the community consultant from Taloyoak, agreed with Angutingurniq's observations about the development of a new polynia. He has not experienced this specific occurrence, but it is understandable due to what he has heard and observed concerning the reduction of sea ice in recent years. Another result of this change is that the flow edge is now located closer to shore. This is causing there to be more encounters between camping hunters and polar bears, as polar bear habitat is shrinking in the area. David recommends that the Elders be interviewed, as they have a wealth of knowledge about climate change.

Ema Qaggutaq (pers. comm. 2003) of Kugaaruk also concurred with the statements of Angutingurniq. Ema has observed that temperatures in the fall have

The environment is no longer the same and it has started to become a stranger to those of use who grew up in its embrace.

**– Frank Analok, Cambridge Bay
(NTI 2001).**

been milder in recent years, and in the springtime what used to be a gradual period of melting now tends to be abrupt. The statement made by Angutingurniq about the appearance of a new polynia was supported by Ema. He has not seen it personally, but he is avoiding the area based on the observations of the Elders. This polynia, or aukarniq, appeared for the first time approximately five years ago. Ema also made an observation during a flight around October 20th, 1992, when he saw that the middle of Pelly Bay was still open water. Normally



Jerry Arqviq building an iglu Larsen Sound, 2000.

this body of water would be frozen over by the middle of October. The harbour at Kugaaruk has also been freezing later. In the 1980s it used to freeze by the third week of July. One year in the mid-1980s it froze over in the third week of September.

On the topic of wildlife, Ema mentioned that two years ago a group of harp seals was seen near Kugaaruk for the first time in living memory. Beluga whales used to be more numerous than narwhal in the areas hunted by Kugaaruk hunters, but now the opposite is true – there are about eighty percent narwhals and twenty percent belugas. Ema felt that although this was a significant change, that it is not necessarily related to climate change. It may instead be due to long term migration patterns of these two species in the region. Two years ago Ema also saw a small bird of a species he had never before seen in his life.

Warmer temperatures in the summer have also been evident in the disappearance of known aniuviit or areas of snow that do not melt through the summer. In recent years these have been melting during the summer.

5.2 ARCTIC ISLAND ECO-REGION

Of the eight identified documents from the literature review, two documented IQ of climate change in the Arctic Island eco-region. These include a recent study of IQ of polar bears initiated by the Gjoa Haven Hunters and Trappers Organization (Keith et al. 2002) and a polar bear report based on the Naonayaotit Study conducted by Atatahak and Banci (2001) which both documented some observations¹.

For the Gjoa Haven study, several observations were made in the context of interviews that discussed environmental changes to the denning and feeding habitat of polar bears:

- the sea ice is freezing later and breaking up sooner than in the past;
- the sea ice is not reaching the thickness it once did;

- icebergs have disappeared from the ocean north of King William Island;
- multi-year ice has been drastically reduced;
- snow accumulation is later in the season and the yearly accumulation has declined;
- the snow pack has become harder;
- fresh water ice is freezing later and breaking up earlier;
- fresh water ice is not reaching the thickness it once did;
- the prevailing wind has shifted and the orientation of snowdrifts has changed; and
- water levels in rivers have gone down.

Although this study did not focus on IQ of climate change, several statements indicating climate change were recorded. These statements indicate the existence of extensive IQ on climate change in the communities whose land-use includes the central Kitikmeot area, specifically, Taloyoak, Gjoa Haven and Cambridge Bay.

The Traditional Knowledge Polar Bear Study (#3 of Table 1) covered an area including the eastern shore of Victoria Island to the western shore of the Boothia Peninsula. Changes in ice conditions over time and changes in bears were key topics of discussion. In particular, interviewees reported that ice conditions have deteriorated over time. Changes include:

- more rough ice;
- fewer icebergs;
- less multi-year ice;
- decreased ice thickness;
- decreases in bear numbers because of changes in ice conditions; and
- decline in small seals;

David Iqhiut (pers. comm. 2003), the community consultant for Taloyoak, concurred with many of the observations made in the both bear studies. He characterizes the weather as being weird due to the very mild temperatures that are being experienced.

¹ For both studies, there were 12 interviewees consulted.

He recommends that the Elders be interviewed about climate change indicators as they are very knowledgeable and can offer a time depth to their observations that he cannot. Just recently, in the month of March, there was a period of warm temperatures that was very unusual. These warm temperatures were normally not experienced until April or May. The Elders are saying that there will be an early spring in the Taloyoak area. David tries to make yearly boat trips to Prince of Wales Island at the northern end of Larsen Sound to hunt beluga whales. The Elders have told him that it would be normal to expect to encounter abundant chunks of multi-year ice during such a trip, but in recent years there has been very little ice in the summer. In the summer of 2001, for instance, there was almost no ice at all, just open water.

Tommy Kilaodluk (pers. comm., 2003), an elder from Cambridge Bay. Tommy was born on the land near Bathurst Inlet in 1935 and moved to Cambridge Bay in 1956. He continues to travel both on Victoria Island and on the mainland. During his lifetime he has noticed that some animals such as grizzly bears and caribou are moving their ranges further north. The elders say that these changes are 'not normal'.

Freshwater lake ice has also lessened in recent years. David says that the Elders are saying that right now the lake ice is thinner than it should be at this time of year. Part of the reason for this could be that there was more snow cover this year, which insulates the ice and causes slow ice growth. In comparison, Tommy said there was hardly any snow in 2002-03. However, like David, he has observed lake ice to be thinner than expected.



Ella Panegyuk of Bay Chimo, 1998.

According to David, species of animals that normally live further north where there is more sea ice are starting to come further south. Belugas are coming down the south side of the Boothia Peninsula close to Taloyoak. Remarkably, narwhals were sighted close to the community for the first time last year. David feels that the unusual movements of these whales can be explained by the lack of sea ice.

Warmer weather has brought berries to Victoria Island where there were not before, according to

5.3 MAINLAND ECO-REGION

For the Mainland, climate change work conducted to date is limited to the four sources related to the TNP and the one source detailing the Elder's Conference on Climate Change (NTI 2001).

Given that caribou were the focus of the TNP, this work cannot be considered comprehensive for IQ of climate change. However, climate change observations emerged through the interview process

We'll change if we can; if we have to.

- **Martha Akoluk, Bathurst Inlet**
(pers. comm. 2003).

simply because of profound environmental changes being experienced by Inuit in the last few decades. As a result, many of the TNP interviews spoke to IQ of climate change². Some emergent observations of climate in the last two decades compared with the three previous decades included:

- profound changes in climate, particularly since the 1980s;
- longer period of summer-like conditions (late fall freeze-up);
- sporadic freeze-thaw cycles in the spring;
- shorter period of winter-like conditions (early spring break-up);
- spring melt happens quickly and leads in the sea ice open much earlier;
- ice thinning (both lake and sea ice);
- not as much snow;
- lower water levels (lakes, rivers and ocean);
- temperatures not as cold in the winter;
- temperatures much warmer in the summer;
- shifts in caribou migrations;
- changes in flora (increase species diversity and abundance);
- changes in fauna (new bird species being seen, changes in ranges of grizzlies, polar bears, caribou, etc.); and
- changes in weather are more variable and unpredictable.

A member of the Tuktu and Nogak Project Board and active participant in IQ, heritage and cultural efforts across Nunavut, Tommy Kilaodluk (pers. comm. 2003) has concerns about the profound changes in climate that he has observed since the 1960s. Winters these days are much warmer. In December 2002, it rained on the mainland and along the southern coast of Victoria Island. In February 2003, he observed moist fog in the same areas. Tommy commented that this is the first time in his life that he has observed such abnormal phenomena. Nowadays the weather is not as cool, crisp and clear during the winter which makes people feel scared to go out on the land for fear of getting stranded in a 'whiteout'.

Another key concern held by Tommy is IQ of how animals have been affected by climate change is documented. Tommy has always been an active hunter and changes in caribou meat during the last few decades have him worried for the future. Caribou meat today is dark red, almost bruised, and the animals are skinny and weak compared to the 1960s.

Hunter Bobby Algona (pers. comm. 2003) of Kugluktuk is similarly "worried" about the health of the animals, particularly caribou which are having difficulty accessing the tundra due to a layer of ice that forms during frequent freeze-thaw-freeze cycles in the spring. Increased frequency of rain has caused ice.

In addition to climate change impacts, Tommy also notes the importance of how animals may adapt to a changing environment. He stated that Inuit and animals both have to learn to adapt to change. Tommy and Bobby's concerns about the animals are based in Inuit *pitquhiit*, or cultural rules, whereby people must respect and honour all animals.

Martha Akoluk (pers. comm.) of Bathurst Inlet commented that winds are getting stronger and storms seem to be more frequent. Bobby reported the same observation, noting that winds have become so strong that he recalls seeing a tornado while camping south of Kugluktuk last summer.

² Of the 27 interviewees who spoke of climate, 11 observed that temperatures have been generally increasing in the last two decades

**Never know how weather is going to be.
So unpredictable nowadays.**

**– Bobby Algona, Kugluktuk
(pers. comm. 2003).**

When asked whether changes in the weather were worrisome, Tommy commented that while weather is more uncertain and unpredictable these days, *hila* will continue to change and so people have to “go along with the weather”. He is confident that people will adapt, but that this process will not be easy for Inuit who have long depended on their observations of weather for survival. Bobby and Martha similarly commented that changes in weather were worrisome, but that people were already adapting by changing the means and timing of their travels. While people and animals have always adapted, the rate of change experienced today is unprecedented in human memory.



Jack Alonak of Kugluktuk, 1999.

6.0 CONCLUSIONS

The findings suggest that there has never been a more urgent time to conduct detailed IQ studies of climate change in the Kitikmeot Region. There is a particular urgency for three key reasons:

- There is a lack of documented IQ of climate change for the Kitikmeot Region. While other IQ studies have referred to climate change impacts and adaptations, there is a need for a study that focuses on these key issues.
- Many elders who were born and raised on the land and who hold IQ spanning decades have already passed away³. With this comes the loss of critical knowledge of climate change that will contribute to a more comprehensive understanding of climate change trends, impacts and adaptations.
- Inuit have noticed that the climate is changing at an unprecedented rate. Such a shift in the rate of climate change makes weather unpredictable and variations in weather phenomena profound.

An analysis of existing IQ of climate change across the Kitikmeot Region points to several similarities in observations. For each of the three eco-regions, the following phenomena have been observed:

- temperatures are getting warmer;
- ice is changing (is thinner; rougher);
- freeze-up comes later and spring-melt comes earlier;
- weather is unpredictable and variable;
- water levels are changing;

- animals and their habitats are being affected; and
- vegetation is growing faster.

Great caution must be applied when considering these similar observations. They cannot be assumed to be comprehensive or statistically meaningful given that they are based on such small numbers, and in many cases, they represent a comment made by a single individual rather than a collective group and may have been collected as part of another study. However, these comments are useful in demonstrating that climate change is indeed occurring and that much work needs to be conducted across the entire Kitikmeot Region in order to understand better the nature of climate change and climate change impacts and adaptations.

Comments from participants in the NTI Elder's conference (2001) must be considered in light of the fact that people's input was very limited due to the number of participants, and it was also determined somewhat by the topics discussed by others. However, the small sample of observations shared indicate that there is a wealth of IQ related to climate change that may be drawn out through systematic interviews.

³ Since the beginning of the TNP in 1996, over one third of the elders who co-authored Thunder on the Tundra have passed away.

7.0 RECOMMENDATIONS

It is strongly recommended that both elders and other community members have the opportunity to contribute their IQ to a local and regional understanding of climate change soon. Ultimately, this information will enhance a global awareness of climate change phenomena.

During a workshop held in Kangiqsujuaq in January of 2002, Elders spoke about their changing role as 'village counselors' owing to the fact that weather has become more unpredictable (Nelson 2002). People used to take pride in their abilities to predict weather but with such uncertainty today, Elders say that they cannot give advice with any level of comfort. Instead, their role has changed to that of observers. Efforts must be made to empower Elders in this changed role within Inuit society.

At the 2001 conference on climate change (NTI 2001), Kitikmeot Inuit made several small scale recommendations to aid in adapting to climate change. However, there has been very little documentation of what climate change events and impacts are being observed across the Kitikmeot Region as a whole. With a more detailed research agenda, more information about how adaptations may be realized could be documented and potential mitigative strategies could be developed.

In order to fill this information gap, it is recommended that the DOE initiate a comprehensive collection of IQ on climate change in the Kitikmeot Region according to the three eco-regions presented. In order to be representative of the IQ of climate change held in the region, such a study would have to sample all Kitikmeot communities. Due to the historical land use patterns of the Inuit groups now living in various Kitikmeot communities, IQ contributed from any one community may not necessarily be applicable to more than one of the three ecological divisions – Mainland, Arctic Island,

and Arctic Island (flow edge). Current and future adaptation to observed climate change can also be discussed as part of this study.

It is recommended that any effort to document IQ of climate change in the Kitikmeot Region should be in keeping with a process that respects IQ. According to the elders, such a process would include interviews that are transcribed in both English and Inuinnaqtun and later verified by being read aloud back to the interviewees. Once approved, the transcripts could be used in a report about IQ of climate change. This report would then have to be signed off by an elected review body consisting of representatives from each of the Kitikmeot communities. This respectful process of conducting community-based research is what Kitikmeot elders have developed and now expect based on precedent setting studies undertaken by the Kitikmeot Heritage Society and the TNP.

It is imperative that any study be conducted in an expedient manner so to respect the imperative of documenting IQ so that it can contribute to an understanding of climate change immediately, and can be recorded before Inuit elders pass on and take their expertise with them. Indeed, their legacy can – and should – survive through IQ.

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- Thorpe, Natasha, Naikak Hakongak, Sandra Eyegetok and the Kitikmeot Elders. 2001. *Thunder on the Tundra: Inuit Qaujimajatuqangit of the Bathurst Caribou*. Vancouver: Douglas & McIntyre.
- Thorpe, Natasha, Naikak Hakongak, Sandra Eyegetok and the Kitikmeot Elders. 2002. Nowadays it is Not the Same: Inuit Qaujimajatuqangit, Climate and Caribou in the Kitikmeot Region of Nunavut, Canada. *In The Earth is Faster Now: Indigenous Observations of Arctic Environmental Change*. Igor Krupnik and Dyanna Jolly, eds Washington Arctic Research Consortium of the United States (ARCUS): 200-240.

9.0 PERSONAL COMMUNICATION

Akoluk, Martha. March 21, 2003. Resident of Bathurst Inlet, NU. Phone interview via Yellowknife, NT with Natasha Thorpe.

Algona, Bobby. March 31, 2003. Resident of Kugluktuk, NU. Phone interview from Kugluktuk, NU with Natasha Thorpe.

Iquit, David. March 12, 2003. Resident of Taloyoak, NU. Phone interview from Taloyoak, NU with Darren Keith.

Kilaodluk, Tommy. March 18, 2003. Resident of Cambridge Bay, NU. Personal interview in Yellowknife, NT with Natasha Thorpe.

Qaqqutaq, Ema. March 12, 2003. Resident of Kugaaruk, NU. Phone interview from Kugaaruk, NU with Darren Keith.



Break-up in Bathurst Inlet, 1999.

TABLE 1 LITERATURE REVIEW SUMMARY

No.	REFERENCE TITLE	AUTHOR(S)	PUBLISHER	DATE	FORMAT	TYPE OF INFORMATION	SPATIAL EXTENT/ RELEVANT COMMUNITIES	NUMBER OF IQ CONSULTANTS	
1	Thunder on the Tundra: Inuit Qaujimagatuqangit of the Bathurst Caribou	Thorpe, Natasha; Hakongak, Naikak; Eyegetok, Sandra; Kitikmeot Elders	Douglas & McIntyre	2001	Book	Interviews	Bathurst Inlet, Bay Chimo, Cambridge Bay, Kugluktuk	37	
2	"Nowadays it is Not the Same: Inuit Qaujimagatuqangit, Climate and Caribou in the Kitikmeot Region of Nunavut, Canada" in The Earth is Faster Now: Indigenous Observations of Arctic Environmental Change (Chapter 6)	Thorpe, Natasha; Hakongak, Naikak; Eyegetok, Sandra; Kitikmeot Elders	Arctic Research Consortium of the United States (ARCUS)	2002	Book	Interviews	Bathurst Inlet, Bay Chimo, Cambridge Bay, Kugluktuk	27	
3	Traditional Knowledge of Polar Bear Report	Atatahak, Gerry; Banci, Vivian		2001	Report	Interviews		12	

CATEGORY	SUBCATEGORY	OTHER TOPICS	OVERLAP WITH OR LINKS TO OTHER STUDIES	WEBSITE	KEY CONTACT	COMMENTS
Wildlife	caribou, wolf, grizzly Bear	Community-Based Research Methods	Naonayaotit Study	www3.telus.net/tuktu and www.wkss.nt.ca	Sandra Eyegetok (seyegetok@gov.nu.ca), Naikak Hakongak (naikak@polarnet.ca); Natasha Thorpe (nthorpe@golder.com); or utpbooks@utpress.utoronto.ca	
Vegetation	willow, alder etc.					
Weather	predictability, temperature, fall freeze-up, spring-melt					
Human activity	boating, hunting, travelling, camping					
Birds	robins, yellow songbird					
Large wildlife	polar bears, grizzly bears, caribou					
Invertebrates	Insects					
Vegetation	willows, alder, shrubs, shoots					
Sea ice	thickness					
Freshwater	water levels					
Marine	sea levels					
Fires	forest					
Climate	climate change, impacts		Naonayaotit Study	"Gerry Atatahak, Researcher Traditional Knowledge, PO Box 276, Kugluktuk, NU X0B 0E0 or Vivian Banci, 21557 Campbell Avenue, Maple Ridge, BC V2X 3V6		

CATEGORY	SUBCATEGORY	OTHER TOPICS	OVERLAP WITH OR LINKS TO OTHER STUDIES	WEBSITE	KEY CONTACT	COMMENTS
Sea ice	thickness, icebergs, multi-year ice, annual ice, old ice, new ice					
Large wildlife	polar bears					
Climate	climate change, impacts, adaptations					
Land features	erosion, soil					
Permafrost						
Weather	predictability, snow, precipitation, temperature, fall freeze-up, wind, snowdrift, spring melt					
Sea ice	thickness, multi-year ice, icebergs, polynyas, ice fog					
Large wildlife	caribou, musk oxen, foreign species (deer)					
Small wildlife	foxes					
Freshwater	water levels, creeks, streams, rivers, lakes, sedimentation/silt					
Marine	sea levels					
Fires	forest					
IQ	loss of application					
Vegetation	growth					
Invertebrates	insects, foreign species (dragonflies, wasps)					
Fish	arctic char, foreign species (capelin)					
Birds	nesting, geese, ravens, common eiders, red phalaropes, snow bunting, lapland longspurs, foreign species (white pelicans)					
Marine mammals	other seals, foreign species (sea lions)					

No.	REFERENCE TITLE	AUTHOR(S)	PUBLISHER	DATE	FORMAT	TYPE OF INFORMATION	SPATIAL EXTENT/ RELEVANT COMMUNITIES	NUMBER OF IQ CONSULTANTS	
5	Fisheries Assessment of the Proposed Marine Docking Facility at Kugluktuk, Nunavut	O'Neil, Jim; Campbell, Jim; Thorpe, Natasha	Golder Associates Ltd	2002	Report	Interviews	Kugluktuk	5	
6	Arctic Flora & Fauna: Status and Conservation (p.101)	Huntington, Henry	Edita Plc	2001	Book	Interviews	Cambridge Bay	2	
7	Contributions of Inuit Ecological Knowledge to Understanding the Impacts of Climate Change on the Bathurst Caribou Herd in the Kitikmeot Region, Nunavut	Thorpe, Natasha	Simon Fraser University	2000	Thesis	Semi-structured and semi-directed interviews	Kitikmeot Region: Cambridge Bay	27	

CATEGORY	SUBCATEGORY	OTHER TOPICS	OVERLAP WITH OR LINKS TO OTHER STUDIES	WEBSITE	KEY CONTACT	COMMENTS
Economy	char fishery					
Traditional environmental indicators	snow buntings, birds, prevailing wind direction, clouds					
Human activity	recreation					
Marine	coast, sealevels				Natasha Thorpe nthorpe@golder.com	Includes link to the Coppermine River - Canadian heritage Rivers System Background Report (Laird and Associates, 2002) which contained composite information from interviews with Kugluktuk Elders, some of whom discussed climate change. The transcripts are not available at this time.
Land features	erosion					
Freshwater	waterlevels, sedimentation/silt					
Fish	arctic char					
Weather	temperature, spring melt					
Large wildlife	caribou			www.rem.sfu.ca/pdf/nlthorpe.pdf	Natasha Thorpe nthorpe@golder.com	Excerpts from Tuktuk and Nogak Project
Weather	precipitation, temperature					
Weather	temperature, unpredictable			www.rem.sfu.ca/pdf/nlthorpe.pdf	Natasha Thorpe nthorpe@golder.com	Information from this thesis is included in Thunder on the Tundra
Sea ice	spring melt, fall freeze-up, thickness					
Human activity	boating, travelling, hunting, camping, fishing					
Birds	geese, arrival/ departure time, foreign species					
Invertebrates	insects					
Climate	change, impacts, adaptations					
Small wildlife	foreign species					

No.	REFERENCE TITLE	AUTHOR(S)	PUBLISHER	DATE	FORMAT	TYPE OF INFORMATION	SPATIAL EXTENT/ RELEVANT COMMUNITIES	NUMBER OF IQ CONSULTANTS	
8	IQ of Polar Bears - Inuit Qaujimaningit Nanurnut	Keith, Darren		2002	Report	Interviews	Kitikmeot Region: Gjoa Haven, King William Island	12	
"	Report not yet released.								

CATEGORY	SUBCATEGORY	OTHER TOPICS	OVERLAP WITH OR LINKS TO OTHER STUDIES	WEBSITE	KEY CONTACT	COMMENTS
Large wildlife	grizzly bears, polar bears					
Vegetation	growth, willows, alder					
Marine	sea levels					
Freshwater	water levels, lakes, rivers					
Traditional environmental indicators	loss of application					
Fires	forest					
Sea ice	spring melt, fall freeze-up, thickness, icebergs, multi-year ice, old ice, new ice				"Darren Keith darren@theedge.ca	
Weather	temperature, snow, snow drift, winds					
Large wildlife	polar bears					
Climate	impacts, adaptations					
Freshwater	freshwater ice, water levels					
Human activity	fishing					
Invertebrates	foreign species					



Legend

- Nunavut
- Kitikmeot Region

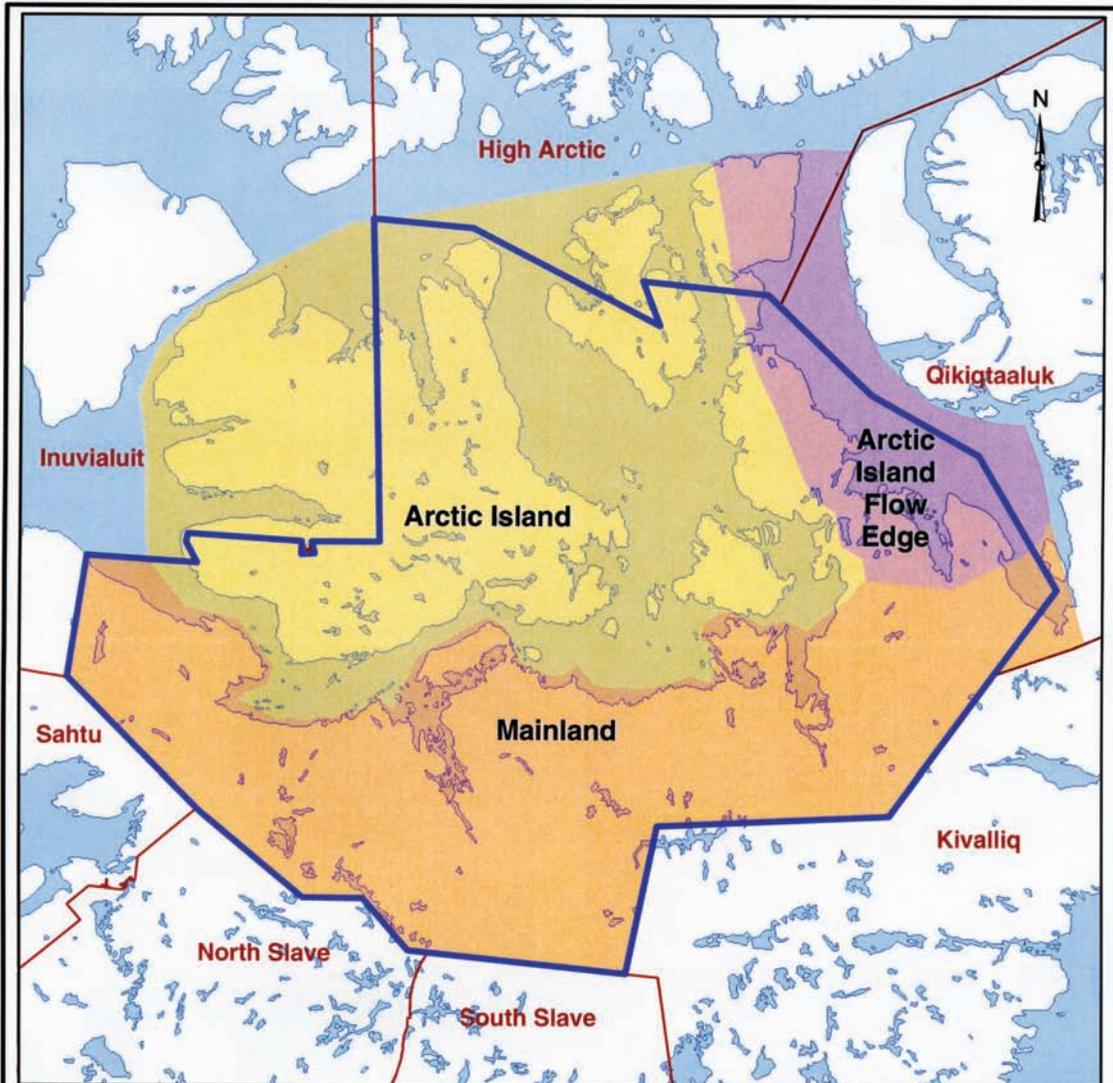


REFERENCE

Digital map data from National Topographic Data Base (NTDB 1:7,500,000 scale) Datum NAD 83
 Projection: UTM Zone 16

PROJECT			
Inuit Qaujimagangit of Climate Change			
TITLE			
Location of the Kitikmeot Region within Nunavut			
PROJECT No. 03-1414-005		SCALE AS SHOWN	REV. 0
DESIGN	ACS	14 Mar. 2003	Figure 1
GIS	ACS	14 Mar. 2003	
CHECK	ACS	14 Mar. 2003	
REVIEW			





Legend

- Arctic Island
- Arctic Island Flow Edge
- Mainland
- Kitikmeot Region

250 0 250
Scale 1:8,000,000 Kilometres

REFERENCE

Digital map data from National Topographic Data Base (NTDB 1:7,500,000 scale) Datum NAD 83
Projection: UTM Zone 12

PROJECT			
Inuit Qaujimagangit of Climate Change			
TITLE			
Suggested Kitikmeot Ecological Divisions			
PROJECT No. 03-1414-005		SCALE AS SHOWN	REV. 0
DESIGN	ACS	14 Mar. 2003	Figure 2
GIS	ACS	14 Mar. 2003	
CHECK	ACS	14 Mar. 2003	
REVIEW			
 Golder Associates Yellowknife, Northwest Territories			