

Inuvialuit and Nanuq

A Polar Bear Traditional Knowledge Study



INUVALUIT SETTLEMENT REGION

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Dedication

This report is dedicated to the memory of Inuvialuit Traditional Knowledge Holders who participated in the study but who passed away before its completion. They are Geddes Wolki of Sachs Harbour, George Okheena of Ulukhaktok and Charlie Ruben of Paulatuk. It is also dedicated to future generations of Inuvialuit, as a record of their ancestors' knowledge of and relationship with nanuq.

Foreword

Inuvialuit have been hunting polar bears — nanuq — in Canada’s Western Arctic for generations and for as long as memory serves. Sharing of information, knowledge and understanding of nanuq from one generation to the next, based on experience, is the very foundation of Inuvialuit traditional knowledge. Inuvialuit hunters have witnessed changes firsthand — some slow, others rapid — to the same environmental conditions that they share with polar bears and with seals, an important prey species of polar bears. Especially since the 1980s, Inuvialuit have seen changes in climate, weather, sea state, sea ice and snow. Inuvialuit hunters have experienced directly, and learned from one another, how polar bears, seals and other wildlife have responded to these changes, just as Inuvialuit hunters themselves have responded to these changes.

What Inuvialuit have not seen before the last decade, however, is an unprecedented level of international attention, debate and campaigning about the future of polar bears and the conservation efforts that are required to secure a future in which polar bears remain healthy and abundant. Absent from much of this discussion, notably in southern Canada and in most other parts of the world, has been attention to the traditional knowledge of the Inuvialuit and other Inuit hunters and the contributions that this special kind of knowledge could make to understanding the current status of Canada’s polar bear populations and the case and prospects for their conservation.

The Inuvialuit Polar Bear Traditional Knowledge Study addresses this failing as it applies to what we know about polar bears in the Western Arctic and the Beaufort Sea region. Its contribution occurs at a time when recent research has often, unfortunately, given rise to polarizing arguments, speculation and predictions, and even misinformation, about the long-term trend for polar bear survival.

The International Union for the Conservation of Nature (IUCN) has suggested that, “the greatest challenge to conservation of Polar Bears is ecological change in the Arctic resulting from climatic warming” (Press Release, 15th Working Meeting of the IUCN/SSC Polar Bear Specialist Group). The Beaufort Sea region represents an arctic and global “hot spot” for impacts due to climate change. There are changes occurring in sea ice coverage and characteristics, break-up and freeze-up, seasonal weather patterns, and altered habitat. These are observable and are highly variable, year-to-year in some instances and with discernible trends in others. However, it does not follow, as some have suggested, that these changes are inevitably catastrophic for polar bears and that their decline and outright extinction are a foregone conclusion.

First and foremost the Inuvialuit Polar Bear Traditional Knowledge Study documents what Inuvialuit hunters know about polar bears: their relative health and abundance, habitat preferences and dependencies, movement patterns, denning behaviour, interaction with other animals (especially prey species such as seals), and how they are responding to changing environmental conditions, especially sea ice, as a result of a changing climate. The study documents the knowledge of more than 70 Inuvialuit polar bear hunters, drawing on a lifetime of direct experience with polar bears and on what has been passed on to them by their ancestors. Many have seen hundreds of bears over their lives, in different conditions and seasons, on land and on ice. Together, Inuvialuit traditional knowledge of polar bears documented in this study covers an area of approximately 290,000 square kilometres — an area larger than Great Britain.

This report, *Inuvialuit and Nanuq: A Polar Bear Traditional Knowledge Study*, is the product of the several hundred hours of interviews and discussions with these traditional knowledge holders that have been compiled in a searchable database. The study is unusual in that Inuvialuit traditional knowledge

holders had the opportunity to consider the information that was compiled and documented from their own interviews and to assess it in a form of collective peer review and evaluation. Together they concluded that the general health and abundance of polar bears in the Beaufort Sea region remains generally stable but variable, annually and across the region. On this important point, there is disagreement with some other recent assessments by polar bear research scientists that suggest significant declines or suspected declines in one of two Beaufort Sea polar bear populations.

Polar bear traditional knowledge is by definition and by necessity deeply ecological: safety and success in hunting polar bears requires an understanding that integrates knowledge of ice characteristics and conditions, wind and weather, open water in leads and polynyas, seal behaviour and distribution, and habitat preferences and how these and other factors affect the occurrence and fate of polar bears. In this study, Inuvialuit traditional knowledge holders indicate that the relationships and interactions between these and other environmental conditions are very complex and have become less predictable since the 1980s. On this point, Inuvialuit traditional knowledge holders and many science-based researchers would appear to agree: climate change has introduced a lot of “noise” and uncertainty into the ecosystem that Inuvialuit hunters and polar bears are part of. They also agree that sea ice matters as important habitat to polar bears and seals, but the responses of both animals to changing habitat conditions are less certain, especially when combined with changing sea ice characteristics and weather patterns.

Inuvialuit polar bear hunters are risk-takers and polar bear hunting by any measure is a dangerous endeavour, now more than ever before in the lives of the traditional knowledge holders interviewed in this study. The occurrence and location of multi-year and annual sea ice, pressure ridges, floe edges and polynyas have affected the location of polar bear and seal denning sites, and the distribution and movements of polar bears and seals, and have altered the location of historic Inuvialuit hunting areas and travel routes. These changes are affecting Inuvialuit traditional knowledge.

Inuvialuit polar bear hunters exercise great caution in harvest practices and this caution also applies to Inuvialuit knowledge and judgments about polar bears that shape these practices. This study establishes that caution is indeed required in predicting and assessing the long-term trends for polar bear health and abundance, based on the considerable uncertainty that exists between the various ecological and environmental conditions that are in a highly dynamic state in an arctic environment affected by climate change. It is a great leap to declare with great conviction, as many have, that climate change spells the end of polar bears.

IUCN suggests the need for caution in arriving at such definitive judgments. While observing that polar bears generally will have a lesser area of occupancy, extent of occurrence and habitat quality in the future, IUCN has stated that “no direct relation exists between these measures and the abundance of polar bears” (www.iucnredlist.org/details/22823/0). However, highly publicized assertions and predictions to the contrary have been an ongoing source of frustration to Inuvialuit who are actively involved in science-based and traditional knowledge-based polar bear research.

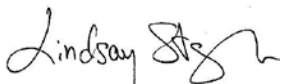
This challenging management context — where conjecture has outrun evidence — underscores the need for continued monitoring of polar bear habitat, the changing environmental conditions affecting this habitat and the response of polar bears to these changes. As “frontline” observers of polar bears and polar bear ecology, Inuvialuit hunters and traditional knowledge holders have a logical and critical role to play in any monitoring efforts, both through their own harvesting activities and in collaboration with science-based researchers.

In 1984, the *Inuvialuit Final Agreement* — a land claim agreement between Canada and the Inuvialuit — in addition to protecting Inuvialuit harvesting rights to polar bears and other wildlife, introduced a wildlife management regime that established the paramouncy of the conservation and preservation of wildlife, and made the Inuvialuit full partners in advising on all matters related to the management of wildlife in the Western Arctic. It also established the importance of conservation research to ensure the long-term productivity of polar bears and other wildlife and the sustainability of Inuvialuit wildlife harvesting. The *Inuvialuit Final Agreement* has greatly enhanced science-based research in the Western Arctic to fulfill these principles and to achieve these objectives. The agreement also established that the knowledge of the Inuvialuit would be given full weight in determining the conservation status of wildlife populations. That is accomplished through studies such as this one.

It is also accomplished through the Northwest Territories *Species at Risk Act*, the Northwest Territories Species at Risk Committee, Canada's *Species at Risk Act* and the Committee for the Status of Endangered Wildlife in Canada. All of these initiatives, in assessing the status of polar bear populations in the Western Arctic and in Canada, have designated polar bears as a Species of Special Concern, using evidence based on both science and traditional knowledge. Effectively, this means that jurisdictions responsible for the management of polar bears in the Beaufort Sea and other regions of Canada should carefully monitor their status and develop a formal management plan for their conservation. This is underway in all regions, including the Western Arctic.

Canada's Polar Bear Technical Committee conducts an annual assessment of the status of each of Canada's thirteen polar bear populations, including those in the Beaufort Sea region, based on multiple lines of evidence that includes Inuvialuit, Inuit and other aboriginal traditional knowledge. Researchers based in Canadian arctic cities, towns and communities accept that both science-based knowledge and traditional knowledge should deeply inform one another. This is the case in Canada's Beaufort Sea region, where cooperative and collaborative working relationships between science-based researchers and Inuvialuit traditional knowledge holders are improving our understanding of the complex interaction of environmental conditions that affect polar bears. Where there are differences in observations, theories, and analyses, either within the communities of polar bear scientists and traditional knowledge holders or between them, institutional relationships now exist to address these differences and to conduct further research that may help explain them.

These are important developments. It is our particular hope that this report will be given special attention in international discussions and assessments about the status of Canada's polar bear populations. This report and the larger study of which it is a part have a substantial contribution to make to the management of polar bears in the Beaufort Sea region, the assessment of their conservation status and the further research that is required to better understand how polar bears are responding to climate change and how they will fare in the future.



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Report summary

The Polar Bear Traditional Knowledge (PBTk) documented in this report is that of the Inuvialuit (“the real people”) who occupy Canada’s western Arctic. The lands that comprise this vast territory fringe the Beaufort Sea and Arctic Ocean and meet Alaska in the west and Nunavut in the east. Observing and harvesting animals creates an intimate knowledge of the land, sea and ice. Without such knowledge and the associated skills required for travel and harvesting, the Inuvialuit way of life in the region would not be possible. The Inuvialuit PBTk study documents a component of this knowledge that is related to polar bears so that it can be put to use in various decision-making processes. These processes affect not just polar bears but the Inuvialuit relationship with them as well.

Contributions by the Inuvialuit and their neighbours to collective knowledge of polar bears have not always been visible in the scientific literature and its popular byproducts. This report attempts to remedy this gap and make a substantive contribution to a body of other studies that document aboriginal knowledge of polar bears and/or attempt to integrate it with western scientific understandings.

The PBTk study was from the outset a multi-party, team research project involving Inuvialuit and non-Inuvialuit in the context of wildlife co-management under the terms of the Inuvialuit Final Agreement (IFA), a 1984 land claims agreement between the Inuvialuit and the Government of Canada. Protection and preservation of Arctic wildlife, environment and biological productivity is one of three founding principles of the IFA. Conservation is tied to these principles and underlies the management of human relations with polar bears. The starting point for the application of PBTk and biological science in support of polar bear management begins with the requirements of conservation as defined in the IFA, where conservation means “the management of the wildlife populations and habitat to ensure the maintenance of the quality, including the long term optimum productivity, of these resources and to ensure the efficient utilization of the available harvest.” On that basis, management of human activities with respect to polar bears and other wildlife is carried out and supported by the best available scientific knowledge and Inuvialuit knowledge and experience.

During the winter and fall of 2010, PBTk study researchers interviewed 72 Traditional Knowledge Holders (TKHs) from the six Inuvialuit communities. The English-language parts of the audio recordings from the interviews were transcribed, and comprise 4,764 pages of text. Spatial knowledge concerning polar bears and their world was documented using the “map biography” method (see Endnote 10). The interview transcripts and map biographies comprise the core database for the PBTk study. Numerous narratives (approximately 800) were extracted from the transcripts to include in this report so that Inuvialuit PBTk can be presented more directly to readers, and to strengthen the Inuvialuit voice in the presentation of their knowledge.

In October 2012 the draft results of the PBTk study were reviewed by TKHs and other Inuvialuit during confirmation workshops and public meetings in the six Inuvialuit communities. A Polar Bear Environmental Change (PBEC) workshop was held in January 2013 to contextualize and interpret key observations and propositions related to changes (if any) in polar bear abundance, distribution and condition.

Many other Traditional Knowledge (TK) studies have documented knowledge, but not the methods by which people know what they know about animals and other living beings and the world they inhabit. In contrast, this report describes in considerable detail how Inuvialuit come by their knowledge of polar bears. The most important aspects of Inuvialuit PBTk are intergenerational knowledge combined with direct experience. In general, this is what Inuvialuit mean by traditional knowledge: personal knowledge acquired by travelling across ice, hunting seals and polar bears, running dog teams, reading wind

directions, snow and cloud patterns, geographic features, currents and stars, as well as through inter-generational transmission. Throughout the 2010 interviews, numerous participants referred to the role their elders played in teaching them about polar bear hunting and about the complicated characteristics of sea ice and weather that must be known if travel and harvesting on ice are to be done safely. Many of the TKHs interviewed for the PBTk study stressed the importance of passing on knowledge of polar bears, ice conditions and safety to younger generations. They also stressed the importance of respecting polar bears. Respect includes an appreciation of the strength, agility, intelligence, willpower and potential lethality of polar bears.

It is clear that while the “traditional” component to their TK remains strong, contemporary Inuvialuit knowledge about polar bears is blended with information from multiple sources. For example, Inuvialuit routinely obtain information across the Arctic by way of radio, telephone and mass media, from friends, relatives and others. Participation in wildlife co-management bodies is another source, as are interactions with biologists and other members of the scientific community. The fact that knowledge is a composite of ideas and experiences from many sources does not diminish the value of the “traditional” part of the mix.

This report documents numerous elements of Inuvialuit PBTk, including knowledge of various aspects of polar bears' lives:

- habitat (e.g., the type of ice conditions that are best for the ringed seals that polar bears prey on);
- the mental and sensory abilities of polar bears;
- interactions between polar bears, foxes, wolverines and grizzly bears;
- diet (ringed seals, bearded seals, carcasses of dead bowhead and beluga whales, grasses, etc.);
- polar bears eating other polar bears;
- behaviour (e.g., how polar bears hunt seals, interact with one another, mate and raise their young, react to dogs and hunters, etc.);
- body condition, assessed using Inuvialuit criteria;
- movement patterns;
- denning behaviour, including locations and timing of dens, den site characteristics, and patterns of emergence of females and cubs in the spring; and
- interactions between polar bears and humans while hunting and when bears visit communities and camps.

Inuvialuit harvesting is planned according to weather and ice conditions and knowledge of where polar bears are most likely to be found. Sea ice serves as the main platform for hunting; preferred hunting spots are reached by snowmobile and/or dog teams. Inuvialuit polar bear hunters concentrate their efforts along floe edges, cracks, pressure ridges and other ice features where ringed and bearded seals haul up or have breathing holes and birthing lairs. Until recently, and despite annual variation, many of these features were found with some certainty in the same locations year after year. These included sites near headlands and across the mouths of straits and deep bays, where the currents of the Beaufort Sea bring moving ice into contact with landfast ice or ice grounded in shallow shoal areas near shore. Inuvialuit hunters are strategic in the decisions they make about where to look for polar bears.

The study team used a questionnaire to document Inuvialuit PBTk across a range of topics, focused primarily on biological and ecological matters. As a result, information gathered about the economic and cultural aspects of the Inuvialuit relationship with polar bears was limited. Nonetheless, a number of TKHs spoke of cultural and economic matters in terms of traditional uses of polar bear meat and pelts, their economic contribution during the fur trade period, and more recently in terms of guided sport hunts.

Inuvialuit involvement in sport hunting was authorized by the government in 1970 and continues under the IFA. The agreement gives the Inuvialuit the exclusive right to harvest polar bears, and requires that sport hunters retain Inuvialuit guides, who transfer their quota tags to them. Guiding provides income to Inuvialuit hunters and an economic rationale for the continuation of the polar bear hunting tradition. Moreover, the income from guided hunts pays for the costs of all kinds of harvesting activities (not just polar bear hunting), which increase yearly due to growing expenses for gas and other operating necessities.

Apart from their economic contribution, polar bears continue to nourish the Inuvialuit imagination. They feature prominently in Inuvialuit mythology, spirituality, storytelling, art, song and other forms of cultural expression.

The underlying theme for almost all topics addressed in this study is that ice matters. Everything from polar bear condition to mating, reproduction and polar bear harvest of seals, to Inuvialuit harvest of polar bears depends on ice conditions. There has always been significant annual variation in sea ice conditions and hence in local abundance, distribution and condition of polar bears and their primary prey.

As a result, caution is required when thinking about the effects of climate change on polar bears. Inuvialuit recognize that there have been substantial changes in Beaufort Sea ice conditions since the mid-1980s that have affected their harvesting activities and opportunities to know and learn from polar bears. Changing ice conditions and a warming Arctic in general are a great concern to the Inuvialuit TKHs who participated in this study.

The participants in the January 2013 PBEC workshop concluded that the physical condition of polar bears in their areas has remained stable over time despite the changes in the Beaufort Sea environment and considerable seasonal variation. The numbers of polar bears in Inuvialuit polar bear hunting areas have remained relatively stable within living memory. However, there appear to be fewer really big bears and no bears are as fat as they were prior to the mid-1980s. While no TKH identified a trend in the frequency of polar bear visits to their communities or camps during the 2010 interviews, the PBEC participants agreed that bears have been visiting Sachs Harbour with far greater frequency over the last two years than they did previously. Moreover, since 2010 polar bears have been seen more frequently waiting on land for the ice to form in the fall in the Tuktoyaktuk area. The TKHs at the PBEC workshop chose not to speculate about future and long-term polar bear survival.

Notes to readers

These notes are intended to provide guidance on the use of important data presentation protocols, technical terms, and matters that would otherwise require frequent footnotes.

- Throughout this report, the Inuvialuit people who were interviewed in 2010 about their knowledge of polar bears are referred to as “Traditional Knowledge Holders” (TKHs), “participants,” “interviewees,” “hunters” or “elders.”
- The former name of Ulukhaktok is Holman and the community is still referred to that way by many people. The report uses the official Inuvialuit name, Ulukhaktok.
- The confidentiality of the participants has been respected by not using their names. To document the link between data and their sources (Tobias 2009: 144), Participant Identification Numbers (PINs) are used instead of names. Participants are credited in the acknowledgements for their contributions to the study, but are not linked to their narratives. An exception to this protocol are Inuvialuit who were not interviewed for this study and who have since died; they are referred to by name.
- Almost all the narratives presented in this report are edited versions of transcripts of statements made by TKHs during their interviews in 2010. There are a few exceptions, however, where statements by TKHs are paraphrased. These are noted using the abbreviation “para,” as in “PIN 43, Tuktoyaktuk, para.”
- Where narratives are based on translated statements by TKHs, they have been marked with “Translation” beside the interviewee’s PIN and community affiliation, as in “PIN 124, ULUKHAKTOK, Translation.”
- The term “Observations, Propositions and Theories” (OPTs) is used to refer to the bundle of elements that contribute to and constitute Inuvialuit knowledge concerning polar bears, as opposed to “ideas,” “notions,” etc.
- The place name “Baillie Island” (singular) has been used, rather than the official name, “Baillie Islands,” due to the former’s popular use.
- References are made to air temperature at various places throughout the report, but THKs did not indicate whether this was Celsius or Fahrenheit. Unless scale is explicitly mentioned by a TKH, references to temperature are probably in Fahrenheit, particularly if they date to the pre-1970s period before metrification. At extremely low temperatures, the two scales merge: minus 50 degrees Fahrenheit equals minus 45.6 degrees Celsius.
- Square brackets [] have been used within quoted texts throughout the report to indicate that the words found within the brackets are those of the report author, not the TKH. Words found within parentheses () are those of the TKH.
- All photographs used in this report were taken by Inuvialuit and are credited to the photographer.
- This document should be cited as Joint Secretariat. 2014. *Inuvialuit and Nanuq: A Polar Bear Traditional Knowledge Study*. Inuvialuit Settlement Region: Joint Secretariat.

The opinions and experiences in this study reflect the input of those who participated in the study. Inuvialuit with a range of harvesting knowledge, experience and geographical specialization were interviewed for this study. Much Inuvialuit traditional knowledge is not captured in this study.

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Intellectual property

The data documented during the course of the Inuvialuit Polar Bear Traditional Knowledge (PBTk) Study, which are presented in this report, are the intellectual property of the Inuvialuit and are therefore owned by them. In this case, ownership is represented and administered by the Joint Secretariat. The PBTk study, of which this report is a product, recognizes, honours and respects the intellectual property rights of the Traditional Knowledge Holders, elders, hunters and other Inuvialuit who shared their knowledge concerning polar bears and the world they live in.

English language glossary

crow	term used by Inuvialuit for the Common raven
floe edge	the interface between landfast and moving ice or open water
glassing	scanning the icescape or horizon using binoculars or a rifle scope
iceberg	a very large agglomeration of broken up, piled-up ice; this could be multi-year ice or ice of the year that has grounded, glued into flatter new ice or is free-floating
landfast ice	new ice that is attached to the shore, also referred to as “shorefast” and “steadfast” ice
main ice	stable ice, solid ice, usually landfast ice, ice that is “not moving around” (e.g., not mobile pack ice)
multi-year ice	sea ice that has survived the summer
old ice	generally, stable, annual ice attached to the shore, landfast ice
open lead	the water that is exposed when ice cracks apart in response to pressure from winds, tides and currents
polynya	a stretch of open water surrounded by ice
pressure ridge	lines of jumbled, piled-up ice formed by one large pan of ice colliding with another as a result of winds, tides and currents
rabbit	term used by Inuvialuit for the Arctic hare
rubber ice	very thin new ice that flexes when polar bears and humans travel across it
rubble ice	jumbled, broken-up fields of ice formed when pans of ice crack apart and the pieces collide and run up on one another
seals	ringed seals ¹
shearing	the floe edge, interface between landfast and moving ice
shovel bear	a polar bear that is so large that it has feet “the size of shovels”
skittish	excitable, nervous; a term used to describe polar bears that lose their powers of concentration and can no longer hunt patiently
slap	the term used for what polar bears do when they hit prey with their paws
smoke	“frost ice,” caused by evaporation from the warmer water of open leads and polynyas into the freezing air above; also used to describe cold-weather breath, vapour, fog or steam in general
stinker patrol	aerial surveys along the coast in search of bowhead whale carcasses
stink oil	fermented bearded seal oil, used as a dip for caribou meat and other foods
ticklish	easily aggravated, upset, touchy, sensitive, unnerved, agitated; a term used to describe the behaviour of polar bears when being harassed by dogs
weasel bear	a large but elongated bear that has the shape of a weasel
young ice	thinner ice, annual ice, new ice, ice formed after freeze-up that year or in a new lead or crack

Abbreviations

aka	otherwise known as
CB	Citizens' Band (radio)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COPE	Committee for Original People's Entitlement
CW	Confirmation Workshop
CWS	Canadian Wildlife Service
DEW	Distant Early Warning Line site
DFO	Department of Fisheries and Oceans (Canada)
ENR	Environment and Natural Resources (Government of the Northwest Territories)
GNWT	Government of the Northwest Territories
GPS	Global Positioning System
HBC	Hudson's Bay Company
HTC	Hunters and Trappers Committee
IFA	Inuvialuit Final Agreement
IGC	Inuvialuit Game Council
IHS	Inuvialuit Harvest Study
ISR	Inuvialuit Settlement Region
IUCN	International Union for the Conservation of Nature and Natural Resources
JS	Joint Secretariat
MRT	Mapping Reference Table
NSB	North Slope Borough
NWT	Northwest Territories
OPTs	Observations, propositions, and theories
para.	paraphrase of TKH statement (see Notes to Readers, page xv)
PB	Polar bear
PBEC	Polar Bear Environmental Change workshop
PBTK	Polar Bear Traditional Knowledge
PCC	Paulatuk Community Council
PIN	Participant Identification Number
TEK	Traditional Ecological Knowledge
TK	Traditional Knowledge
TKH	Traditional Knowledge Holder
WMAC (NS)	Wildlife Management Advisory Council (North Slope)
WMAC (NWT)	Wildlife Management Advisory Council (Northwest Territories)
WWF	World Wildlife Fund

Section 1

Introduction

The Polar Bear Traditional Knowledge (PBTk) documented in this report is that of the Inuvialuit ('the real people'; see Box 1) who occupy Canada's western Arctic.² The lands that comprise this vast territory fringe the Beaufort Sea and Arctic Ocean and meet Alaska in the west and Nunavut in the east. The continental landmass that borders the Beaufort Sea in the south includes the extensive Mackenzie River delta and the northern slopes of the Richardson and British mountains in the Yukon. It also includes the treeless barren grounds along the coast of the Northwest Territories, peppered with numerous lakes, wetlands and the occasional ice-cored hill known as a pingo. The northeastern corner of the Beaufort is bordered by Victoria and Banks islands, characterized by very cold, desert-like conditions in the winter, with continuous permafrost, wind-swept tundra and lichen-covered rock outcrops. The average winter temperature on Banks Island is minus 32.5 degrees C; the average summer temperature is 7.5 degrees C. On the mainland in northern Yukon and Northwest Territories, average temperatures range from about minus 25 degrees C in the winter to 13.5 degrees C in the summer.

Since their ancestors first set foot in the western Arctic, the Inuvialuit have lived intimately with a large variety of animals such as muskrats, red and arctic foxes, grizzly, black and polar bears, caribou, muskox, wolves, mink, lynx, wolverines, ringed and bearded seals, beluga and bowhead whales, arctic char, ravens, eider ducks and geese. Harvesting polar bears and other animals has always been an integral part of who the Inuvialuit are as a people. In addition to nourishing their imaginations, spirituality and creative arts, these animals and the harvesting of them have until relatively recent times been the foundation of their economy.

Box 1. The Inuvialuit

The Inuvialuit number approximately 5,000 people and are made up of three subgroups — the Uummarmiut, Siglit and Kangiryuarmit — each with a distinctive dialect of the Inuvialuktun language. The dialects are known respectively as Uummariutun, Siglitun and Kangiryuarmitun, the last a variant of the dialect Inuinnaqtun. The three dialects are referred to collectively as Inuvialuktun. The Uummarmiut, some of who are closely related to Alaskan Inupiat, reside in Aklavik and Inuvik. Siglit peoples reside in Tuktoyaktuk, Paulatuk, Sachs Harbour and Inuvik. The Kangiryuarmit reside primarily in Ulukhaktok (formerly Holman) on Victoria Island, although some members of this subgroup reside in Sachs Harbour.

Observing and harvesting animals creates an intimate knowledge of the land, sea and ice. Without such knowledge and the associated skills required for travel and harvesting, the Inuvialuit way of life in the region would not be possible. This study documents a component of this knowledge, which relates to polar bears, so that it can be put to use in various decision-making processes that affect not just polar bears but the Inuvialuit relationship with them. A number of these processes are embedded in structures created as a result of the Inuvialuit land claims agreement with the Government of Canada.

Represented by the Committee for Original People's Entitlement (COPE), the Inuvialuit signed a land claims agreement with the Canadian government in 1984 in the context of hydrocarbon exploration and other industrial development pressures in the Beaufort Sea region. Known as the Inuvialuit Final Agreement (IFA), it created the 906,430-square-km Inuvialuit Settlement Region (ISR), in which the Inuvialuit exercise exclusive or preferential rights to harvest wildlife. There are numerous other provisions in the agreement; the most important in terms of this report is the co-management and environmental protection regime created by the agreement. It directly involves the Inuvialuit in partnership with their Yukon, Northwest Territories and Canadian government partners. The Inuvialuit Game Council (IGC) and the community-based Hunters and Trappers Committees (HTCs) exercise various self-management functions with respect to wildlife harvesting, habitat, conservation and renewable resource management. They participate actively in a number of co-management bodies, of which the Wildlife Management Advisory Council (Northwest Territories) and Wildlife Management Advisory Council (North Slope, Yukon) are the most important with respect to polar bears and other animals. The councils organize wildlife research, develop wildlife management plans, and make recommendations to responsible government ministers concerning wildlife harvest quotas. The IGC allocates harvest quotas for polar bears and other animals among the six Inuvialuit communities.

A Joint Secretariat provides technical and administrative support to the IGC, the two Wildlife Management Advisory Councils (WMACs), and three other co-management bodies responsible for fisheries, environmental screenings and impact assessments. The Inuvialuit PBTK study is a project of the Joint Secretariat, but it is the IGC and the two WMACs that are responsible for its conception and execution.

1.1 Study objectives

Western scientific understandings of polar bears are very recent compared to the knowledge of the Inuvialuit, Inuit, Inupiat and other Arctic peoples.³ In the early days of scientific encounters with polar bears, researchers paid careful attention to what northern peoples knew about them.⁴ Nowhere is this more evident than Canadian Wildlife Service biologist Richard Harington's research on Banks Island in the spring of 1963 (Harington 1963). Two Inuvialuit, Noah Elias and Tim Lennie, assisted Harington with

his field trips, and with Peter Esau, Geddes Wolki, Wallace Lucas, Moses Raddi, Peter Sidney, Angus Elias, Andy Carpenter and Fred Carpenter, shared their knowledge of polar bears, including den locations, where they had seen tracks of females and cubs and evidence of females carrying their cubs on their backs, the difference between male and female tracks, what polar bears ate, their hunting methods, visual and hearing abilities, disease, mortality, body condition, mating, play fighting, injury, cannibalism, parasites and other details.⁵ Harington summarized what he learned of this knowledge in an appendix to his field report (*ibid.*).

Since then, apart from acknowledgements for field work support and the occasional anecdote, contributions by the Inuvialuit and their neighbours to collective knowledge of polar bears have not always been included in the scientific literature and its popular byproducts (e.g., Derocher 2012; Stirling 2011 and 1988; cf. Stirling and Andriashek 1992).⁶ This report attempts to remedy this gap, and to make a substantive contribution to a body of other studies that document aboriginal knowledge of polar bears and/or attempt to integrate it with western scientific understandings (see Arragutainaq et al. 1995; Born et al. 2011; Dowsley 2007 and 2005; Kalxdorff 1997; Keith 2009; Keith and Arqviq 2006; Keith et al. 2005; Kochnev et al. 2003; Kotierk 2010; Shannon and Freeman 2009; Slavik 2010; Wong et al. 2011).⁷

The Inuvialuit people interviewed talk about their knowledge of polar bears as a form of Traditional Knowledge (TK):

[It] is a cumulative body of knowledge, know-how, practices and presentations maintained and developed by the peoples over a long period of time. This encompasses spiritual relationships, historical and present relationships with the natural environment, and the use of natural resources. It is generally expressed in oral form, and passed on from generation to generation by storytelling and practical teaching (Smith 2006: i).

TK goes by other names as well, including Inuit Qaujimagatuqangnit (IQ), Traditional Ecological Knowledge (TEK), Local Ecological Knowledge (LEK) and Aboriginal Traditional Knowledge (ATK). All of these terms are labels for practical, craft knowledge acquired through direct experience and by watching, listening to, and travelling and harvesting with more experienced people on the land, ice and water.⁸

In the late 2000s, the WMACs for the North Slope and Northwest Territories and the IGC foresaw the need for a Polar Bear Traditional Knowledge study in the Inuvialuit Settlement Region, to inform management of human activities in relation to polar bears. The project was initiated at a time when the status of Canadian polar bear populations was being reassessed in the context of the Canadian government's Species at Risk Act and international deliberations related to protecting the bears under the Convention for the International Trade in Endangered Species (CITES). The study was conducted as an evolving collaboration of biologists from the Governments of Yukon, Northwest Territories (NWT), and Canada (Environment, Parks Canada) in cooperation with the Inuvialuit, represented by the IGC. Responsibility for the cooperative management of the study was assumed by the WMACs (NS/NWT), which were established under the terms of the IFA. A working group was established to oversee the project on behalf of the WMACs and to work with IGC staff to facilitate its implementation.

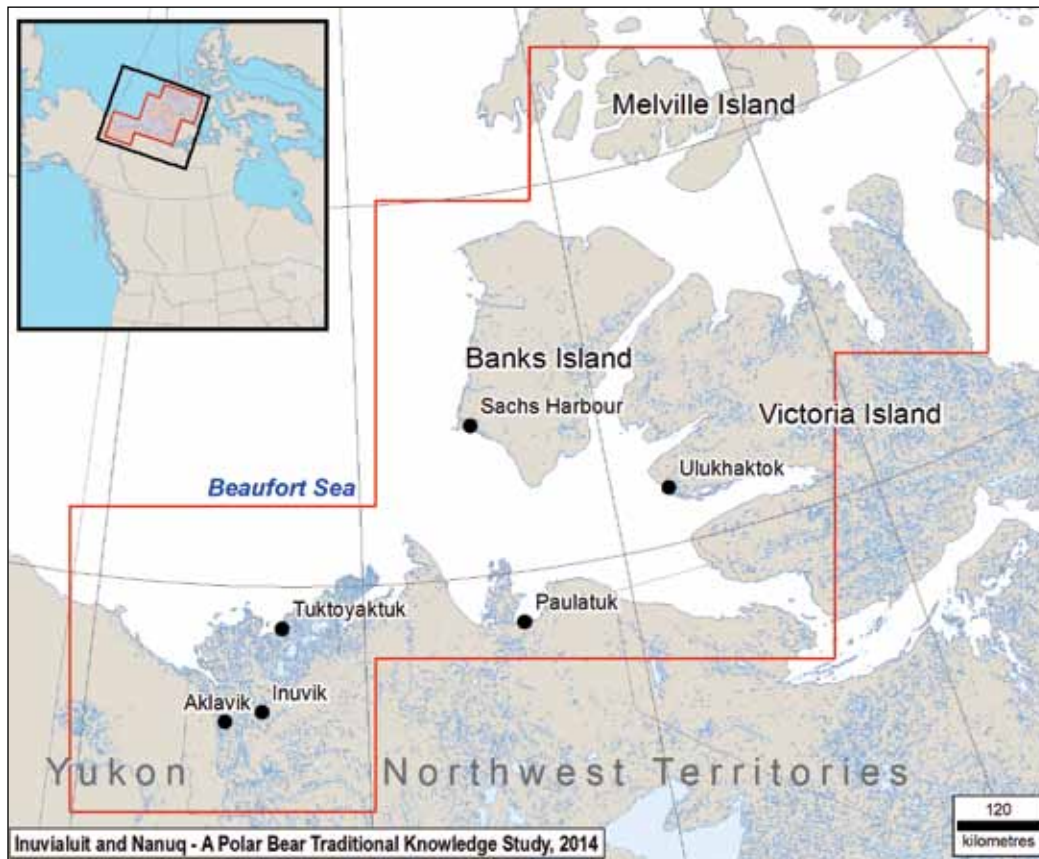
The study area for the PBTk study encompasses that part of the western Arctic and Beaufort Sea region where the Inuvialuit have hunted polar bears and observed their movements and behaviours within the living memory of the study participants (see Map 1).

At the outset the study was framed by several propositions regarding polar bears derived from western science and conservation concerns:

- climate change is significantly affecting polar bear habitat;
- changes to ice habitats affect polar bear denning opportunities, ultimately reducing population reproductive success;

- for pregnant bears that den on land, ice must freeze early enough in the fall to allow them to walk or swim to the coast. As the distance from ice edge to coasts increases, it will become progressively more difficult for them to reach their preferred locations;
- the polar bear population in the southern Beaufort Sea is suspected to be declining; and
- characteristics of ice have changed substantially over the last decade.

Map 1. PBTk study area



A variety of practical applications of the PBTk study were envisaged, where the results could be used to inform several processes:

- the design of Beaufort Sea hydrocarbon resource projects (oil and gas exploration and development activities on land and in ocean waters, such as well-pad placement);
- project scheduling (in relation to sea ice break-up and formation);
- shipping routes and timing; and
- the identification of issues of concern to harvesters regarding harvesting activities, and conservation and compensation arrangements to mitigate adverse impacts on polar bears and harvesters.

It was hoped that the study would contribute to knowledge related to population abundance, polar bear condition and behaviour (e.g., hunting, bear-human interactions) in the Beaufort region, and generate more specific observations on characteristics of key habitats. It was intended to produce information that could assist with population assessments of Northern Beaufort and Southern Beaufort sub-populations, and complement scientific information, such as changes in ice conditions over time.

Moreover, it was expected that the study could promote a better understanding of the differences and conflicts between PBTK and scientific knowledge about Beaufort region polar bears, and the reasons for them, and potentially contribute to population management and harvest management strategies for these bears.

The study methodology is summarized briefly in the next section and explained at greater length in Appendices 1, 2 and 3. The report reviews research methods and then lays the foundation for the presentation of Inuvialuit PBTK by describing how Inuvialuit knowledge of polar bears is constituted (Section 2). This discussion is intended to provide insights into how Inuvialuit develop their observations, propositions and theories (OPTs) concerning polar bear biology, behaviour and habitat. These insights help to define the limits and strengths of their PBTK.

Section 3 summarizes Inuvialuit PBTK documented during the 2010 interviews, supported by narratives from the Traditional Knowledge Holders (TKHs) themselves.⁹ Section 4 reviews their observations on the effects of climate change on the Beaufort Sea and western Arctic environment. Section 5 addresses the complex topic of changes in polar bear abundance, distribution and condition. Section 6 deals with the continuing cultural and economic importance of polar bears to the Inuvialuit. Section 7 reviews some of the report's key findings and considers potential management applications of Inuvialuit PBTK and some ideas for future PBTK documentation.

Methodological details concerning the design and conduct of the study are provided in Appendices 1, 2 and 3. An overview of the philosophies and methods by which the Inuvialuit and their co-management partners have “managed” their relations with one another, and among one another with respect to harvesting polar bears is provided in Appendix 5, rather than in the main body of the report. The reason for this is that no TKH was asked to explain in detail an Inuvialuit worldview or perspective on human-animal relations that would help non-Inuvialuit understand their polar bear harvesting practices, hunting ethics and decisions with respect to management and biological science and research. As a result, no systematic oral tradition concerning such matters emerged from the interview transcripts. Therefore, in order to contextualize TKH narratives concerning management, Appendix 5 provides an interpretation of the Inuvialuit worldview with respect to polar bears and the history of government and co-management of their relations with the animals. Appendix 6 presents a brief chronology of the development of polar bear management and co-management in the ISR.

1.2 Methods overview

As noted in the Report Summary, the PBTK study was from the outset a multi-party, team research project involving Inuvialuit and non-Inuvialuit in the context of wildlife co-management under the terms of the IFA. Ethics clearance for the study was obtained from the Aurora Research Institute in January 2010, and a Polar Bear Traditional Knowledge Study Information Sheet and Consent Form was prepared for use with each person interviewed. The Information Sheet explained the purpose of the research, what would happen to the data, and other matters. The Consent Form documented the prior, written informed consent of participants and any restrictions regarding the use of their data.

Once the research design had been completed and toolkit assembled (questionnaire, map biography base maps,¹⁰ consent form, etc.), interviews with TKHs in each of the six Inuvialuit communities were conducted by a contract researcher in conjunction with local co-researchers and youth participants. The questionnaire used during the interviews contained 145 questions. However, numerous supplementary questions were asked of TKHs who had deep experience with and knowledge of a topic.

A total of 72 people were interviewed from the six Inuvialuit communities during 66 interviews (six joint interviews were conducted, involving two interviewees each). TKHs were selected to be interviewed primarily on the basis of recommendations by the HTCs. Most of the interviews were conducted during single sessions lasting a maximum of three hours. Youth participants were included in the interviews to facilitate the transmission of PBTK to younger generations. Translation was required in interviews with nine TKHs in Ulukhaktok and Sachs Harbour.

The English-language parts of the audio recordings from the interviews were transcribed and comprise 4,764 pages of text. Draft transcripts were sent back to each of the study participants for verification. The transcripts and map biographies comprise the core database for the PBTK study.

The draft results of the PBTK study were reviewed by TKHs and other Inuvialuit during confirmation workshops and public meetings in the six Inuvialuit communities in October 2012. These meetings had several objectives:

- summarize the observations and findings emerging from the study;
- brief TKHs who had been interviewed in 2010 about the study's progress;
- confirm spatial data recorded on map biographies during the 2010 interviews;
- obtain feedback on how to interpret key findings related to polar bear abundance, distribution and condition; and
- outline the remaining steps required to complete the study.

In early December 2013 a draft of the PBTK study report was sent to the TKHs for their review and comment by the beginning of February 2014. HTCs were also asked to review and comment on the document by that date.

As noted above, the 2010 PBTK study involved recording spatial information on maps during the interviews (map biographies), along with additional information that was summarized in Microsoft Excel spreadsheets called Mapping Reference Tables (MRTs). Using ArcGIS 10.1, data from a total of 118 map biography scans (images) were digitized and coded using a number of themes that reflected the original questionnaire categories, for example, polar bear observation, polar bear den area, Inuvialuit harvest area, ice feature, polar bear feeding site, locations where polar bears were harvested. Data were divided into point, line, and area feature classes. The MRTs were combined to create a single spreadsheet that was linked to the ArcGIS tables.

A 2008 Inuvialuit TK study involved interviews with 47 TKHs from Aklavik, Inuvik, and Tuktoyaktuk concerning their knowledge of polar bear maternity dens and the movements of females and cubs post-denning each spring (Richardson, Branigan and Stirling 2008). The project mapped PBTK features including maternity den locations and female/cub movements using a version of the map biography method. The data from the 2008 map biographies were used in the 2010 PBTK study.

Selected data themes from the 2008 maternity den and 2010 PBTK studies were used to create new maps to support the confirmation workshops in October 2012. A small number of additional features were marked on these new maps during the workshops. In addition, the locations of certain features were refined and a handful of features were marked as being erroneous. The additional features were digitized, the refined features updated, and the erroneous ones marked for deletion. The updated datasets were used for cartography in this report. Further details concerning spatial data are provided in the methodology notes included in Appendix 2.

The principal investigators of the PBTk study were confronted by the need to organize, classify, query and analyze a large quantity of information embedded in narratives recorded during the interviews with 72 Inuvialuit TKHs. A software package known as “NVivo” was used to undertake these tasks. With NVivo, the analyst highlights a section of text in a transcript and assigns code to it; this copies the coded section to a “node.” This is a kind of storage box for text from multiple transcripts that are all related thematically in some way. The coding process greatly reduces the need to review each individual transcript every time an analysis of all observations or comments by all interviewees is required on a given theme, and it ensures that important text can be examined from one or more thematic perspectives. Sixty-five nodes were used to code and analyze the 66 PBTk study transcripts. Node contents were exported to Microsoft-Word documents. Textual analyses undertaken for this report, and all narratives reproduced here, are based on these documents.

It became clear during the NVivo coding process that the TKHs had different observations and perspectives on a range of matters related to changes in polar bear demographics, behaviour, habitat and ecology over time. There appeared to be no consistent pattern in their apparently differing views in terms of the age of the hunters or their affiliations with a particular community or polar bear hunting area. To address these differences and inconsistencies, a three-day Polar Bear Environmental Change (PBEC) workshop was held in Inuvik with 12 Inuvialuit TKHs in January 2013; all of them had been interviewed as part of the 2010 PBTk study. Their observations and perspectives have been integrated into this report, in particular Chapter 5, which deals with changes in polar bear abundance, distribution and condition.

A major strength of the PBTk study method is the large number of TKHs who were interviewed from all six Inuvialuit communities. As a result, a great deal of PBTk was shared in the course of the interviews, much of which is summarized below. An additional strength of the study is the process of interpretation, where Inuvialuit study participants from all communities provided interpretation to ambiguous results in the PBEC workshop. However, the study does have limitations, which are explained in Appendices 1 and 2. Primary among these is the study’s reliance on a questionnaire administered during relatively brief, single-session interviews. The kind of in-depth understanding that would be possible through lengthy experience and participant observation with Inuvialuit polar bear hunters was not possible and certainly not feasible given time and financial constraints.

Section 2

Inuvialuit traditional knowledge related to polar bears

The history of the Inuvialuit and their ancestors in the Beaufort Sea region is long and complex. It extends far back in time to the arrival of the Thule Inuit, and perhaps even to their predecessors, the Dorset people (Condon 1996: 3–21). There are three Inuvialuit linguistic-cultural subgroups: Kangiryuarmiut, Siglit and Uummarmiut. They have deep roots in the territory and a resulting vast, accumulated knowledge of its geography, fauna, weather and ice conditions (see Farquharson 1976; Friesen 2012; Nagy 2012; Usher 1976). This knowledge has made it possible for them to survive in a relatively harsh environment. It provides them with food and clothing as well as the elements of a vibrant intellectual and emotional life.

2.1 Knowledge sources and ways of knowing

Inuvialuit knowledge has passed through the generations and embedded itself in important ways in the hearts and minds of contemporary elders and younger people, who continue to spend time on the land, water and ice. The PBTk presented in this report is part of this body of knowledge.

Intergenerational knowledge

The most important aspects of Inuvialuit knowledge concerning polar bears are intergenerational knowledge (acquired from parents, grandparents and other elders) combined with direct experience. In general, this is what Inuvialuit mean by Traditional Knowledge (TK): personal knowledge acquired by travelling across ice, hunting seals and polar bears, running dog teams, reading wind directions, snow and cloud patterns, geographic features, currents and stars, and by intergenerational transmission. Throughout the 2010 interviews, numerous participants referred to the ways their elders taught them about polar bear hunting, and about the complicated characteristics of sea ice and weather that must be learned if travel and harvesting on ice are to be done safely.¹¹

Many elders contributed to the knowledge and experience of this older hunter from Sachs Harbour.

The majority of the elders that I know are gone. I travelled with most of them, learning a little bit here and there.... It's very interesting with them 'cause up here them days you don't travel a lot of times with one guy all the time. But [you] travelled, go hunt caribou, with somebody different. I went trapping with my dad, and with [a companion's] dad; did a lot of trapping with him. I learned a lot. [I] tend to try to pass it on before I get too damn old.

PIN 132, SACHS HARBOUR

Inuvialuit hunters are not foolhardy adventurers who wish to die by pursuing bears onto ice that could break off from the landfast ice and carry them far into the Beaufort Sea.¹² They certainly take risks on the ice, but it is calculated risk-taking based on TK passed to them from older generations and on experience and skill. They have stories about when they or their elders drifted out to sea, but in each case the open leads froze over or winds and currents pushed the floating ice back to the landfast ice. These stories reinforce the critical importance of ice knowledge and safety, and provide guidance in difficult situations, as explained by a Tuktoyaktuk hunter whose TK has not failed him yet.

Ice moving and breaking apart, no wind at all, just all done by the power of the current. You know you have to get back on the main ice.... You heard about that through traditional knowledge being passed down from stories told by experienced hunters. That's where I learned, right from a child. When I was growing up, when a hunter came back from a hunt, we'd go listen to a story. If it was almost a life-and-death situation, and they came back, it was important to go there and listen to them. Because the things that goes through their minds, emotional stuff that they go through, and the physical output they had to go through, all that was important for knowledge being passed on. Because if you're out there in those conditions, at least somebody told you about them. All that knowledge never really clicks in until you're actually experiencing it. They explained about the sights and sounds of it...and the atmosphere if you get drifted out, for instance.... and what to do if you get drifted out. Because we've had stories of people drifting out; three people drifting around for three months; then they came back alive. So, their knowledge of drifting out for three months is very important. That's traditional knowledge, and [it's about] what it took for them to survive; how they survived three months floating out there.

PIN 43, TUKTOYAKTUK

With increased knowledge and skill come greater comfort and confidence in travelling across sea ice.¹³ Experienced hunters know when the risks of travelling in potentially dangerous conditions are not excessive, and their mentoring of younger people is a crucial part of knowledge transfer, as explained by a hunter from Ulukhaktok who shot his first polar bear when he was nine years old.¹⁴

Some people that used to hunt bears out there with a dog team... the ice used to break up, and it used to open; and they got stuck out there. And just even a day or so, they waited for it to freeze up, because it used to freeze up really quick, like, overnight.... It gets hard [knocks on table], and they start travelling across. No matter how wide it is, they used to wait; and they even travelled on it to get to the other side. So, it used to be cold weather. The ice gets hard right away. No matter how thin it is, it used to be okay for people to travel. I travelled in those kind of

[conditions] quite a few times in my life; and I went with my dad when I was growing up. I thought I was going to fall through, but he's telling me, "It's going to be all right," and I believed in him.

PIN 117, ULUKHAKTOK

Many of the TKHs interviewed for the 2010 PBTk study stressed the importance of passing knowledge of ice conditions and safety to younger generations.¹⁵ This knowledge is a necessity in order to hunt polar bears, and it is what sport hunters rely on when they hire Inuvialuit guides. This Ulukhaktok hunter spoke of what he learned from his elders and of his efforts to instruct his children and other youth.

It's very important to remember that Skidoos can't float. I can't float. Always keep that in mind when you're out in ice. "Don't travel in young ice," I was told. I'm pretty sure that people my age tell other people, too — don't travel in young ice when you're alone. So, it's very important to remember that — don't travel in young ice when you're alone.... There's open water out there, all right, but it's covered with powder snow. You can't see the snow. That's why I always tell my kids when they're driving around out there.... Old-timers always tell me, when it's white out, that means there's powder snow out there. You never know if there's going to be a hole under the snow. They always say, "Don't go down there." Because otherwise, you might run into a hole. It might look like old ice, but you just sink right through. And one thing I always remember when I'm on the ocean — never, never go on young ice in the dark! Scary! So, that's what I was told by my father-in-law.

PIN 125, ULUKHAKTOK

A Paulatuk hunter also stressed the importance of instructing youth about ice safety, especially in the context of climate change.

It's almost hard for young people to go out without that knowledge of climate change, how it effects the ice. It is almost like saying, "here's your death warrant; go out hunting if you want," 'cause you cannot send the young person out without knowledge passed down from the elder. Because you're pretty much telling them to go dig their own grave because of the climate changes. You always need an elder and people that have the expertise to rely on.... They [youth] like to rush ahead. Every time we go out hunting with [a certain youth] — he is young, and he is hotheaded and cocky. He knows where he is going. And we always tell him, "you can't go ahead, you have to stay on the trail. In the event you get caught in a blow, it is better to have one trail to follow." Sometimes young people think they know enough, but it is always best if they follow someone who has that knowledge of the ice, because it is too risky.

PIN 150, PAULATUK

Elders admonished this Sachs Harbour hunter for his reckless behaviour when he was younger.

It was just two plates of ice that went on top of each other. I was able to cross with dog team, just to check the other side. And it was doing that daily, so one day I got brave enough or dumb enough, and went across, and elders saw my tracks doing that. They gave me shit. Never did that again.

PIN 131, SACHS HARBOUR

In addition to learning about ice, Inuvialuit youth must learn from an early age how dangerous polar bears can be, and that without caution, humans can quickly become prey for the powerful, quick-footed animals. One TKH explained that his father had once placed his hand inside the warm mouth of a recently killed polar bear so he would better appreciate how lethal a bear can be.

Sometimes the bears used to come and disturb [us] at night looking for food. I used to run between houses, go visit some of my friends. Must have been about three, four years old, I guess. One time I just got home and dogs all of a sudden make noise. That was on Baillie Island. A bear been coming in right behind me.... My Dad just finish killing it right outside of our house. He was schooling me for a little while outside, showing me what a bear could do.... He let me walk on top of the polar bear to teach me how dangerous [they are], and that it's real life. Finally he shoved my hand inside its mouth... boy, it was warm, I tell you! I sure got scared from then on. I finally noticed.

PIN 28, TUKTOYAKTUK

When camping near the floe edge or a pressure ridge (see Photo 1) frequented by polar bears, Inuvialuit like to have one or more dogs with them to sound the alarm at night if a bear approaches the camp.¹⁶

Polar bears come to my camp at nights, but I always have a dog. You have to have a dog — otherwise, that's when you have close calls, when you got no dog. So it's the best thing when you're hunting bears, if you got to camp, to have a dog to warn you if the bears come.

PIN 33, TUKTOYAKTUK

Some hunters from Ulukhaktok were happy to have a guard dog with them when camping on Melville Island because of the numerous bears near their camp.

We had to camp on the land because there were so many polar bear tracks... Good thing we brought a dog, because about three or four o'clock in the morning: woof, woof, woof. Peek out — "Hey, polar bear's coming!" So, we were lucky to have that dog, because I know there's lots of bears there.

PIN 125, ULUKHAKTOK

In general, Inuvialuit have as much respect for the power, swiftness, intelligence and potential lethality of polar bears as they do for the dangers of sea ice. Caution is key when living in bear territory.

We're pretty cautious of what we do when we are out on the ice. We are always aware of what's around us. 'Cause once you come down to it, you get very close to a polar bear and they're dangerous. In a way, you get too close to them — they're gonna defend themselves. They get very aggressive. That's what I hear, if you get too close to them. I've been close to bears, but I've been very fortunate.

PIN 132, SACHS HARBOUR

Nonetheless, caution can lapse at times, with potentially fatal consequences. In one case, the lack of a guard dog and an absorbing game of cards could have resulted in serious injury or death.

One time, we were camping and we were playing crib — me, and [a companion] and [PIN 27]... We forgot about everything, radio turned on... we start playing crib and next thing... I think one of us go for a piss behind the tent, and they see a bear track right behind the tent. We was having fun playing crib. Big bear, about ten-foot, I guess, ten-and-a-half, maybe. We were trying to get that one next day, early morning. It went toward Baillie Island.

PIN 28, TUKTOYAKTUK



Photo 1. A successful polar bear hunt while camped near a pressure ridge. Jean and Pat Ekpakhohak

Inuvialuit need more than technical knowledge and skill in order to hunt polar bears and travel on sea ice. Underlying these abilities are the humility, fortitude, tenacity and courage that must be acquired early in a person's hunting life, because there are times when ice conditions or the proximity of a stealthy, highly intelligent predator can push someone to the limits of physical and emotional endurance.¹⁷ The following account describes stormy conditions out on the ice that pushed some Ulukhaktok hunters to these limits.

We were stranded out on the ice and the ice broke up. It was not very good. The east wind was coming up while we were in this area down here [mouth of Prince Albert Sound]. While we were travelling that area, we went onto the side of the islands [Horizon Islets]... where possibly the ice wouldn't break up there, in that area. During the storm, we spent two nights there. It seems like we were stranded. When the weather improved a little bit, we started trying to head towards the land, but the land was not visible. As we were travelling towards the land, getting closer to the land, we were travelling side by side with our dog teams. We started getting closer to an open area where there was a crack, where the ice was piling up. When we stopped, we stood there for a short period of time, but then we took off right away. We left that ice piling up behind us. We travelled for a short distance — not very long — and we reached open ice. It was very difficult and scary. We couldn't do anything. So, that area where we had camped two nights before — although we might not hit it right on — we started going back to it, because it had less broken-up pieces on it. We set up camp in poor weather conditions. Without taking off our travelling clothing, we tried very hard to go to sleep, but it was very hard to fall asleep. When we woke up the next morning, the weather had improved a little bit and [the area] was more visible. We started to travel out here again [points at map]. We travelled this way for a very, very long time until this land here was visible. All day long. As it was starting to get dark, we finally reached Ulukhaktok. There were times as we were travelling on the ice, it would do this [gestures], meaning it's moving [ocean swell making the ice undulate]. It's really on thin ice. As we were travelling, it was moving... As we were getting closer to town, we went through lots and lots of rubble ice, and I got very warm, because I had a caribou overcoat on. The next day, I got sick. That was not a very good trip. Very scary, alarming, scary!

PIN 124, ULUKHAKTOK, Translation

Many Inuvialuit hunters have stories of frightening, near-death experiences with storms and ice while polar bear hunting. These Ulukhaktok hunters lost a new rifle but not their lives when caught by an unexpected powerful storm.

One time, we were out bear hunting close to Banks Island, and we ran into a big storm. I could see, before we were camping, we had about four- or five-foot-thick ice, you know... We were camping at night, playing cards, trying to kill the evening, stormy weather. I was kneeling down and I start feeling something moving, in the tent. So, I grab a flashlight and started looking around. That big ice just about hitting our tent. It was only about this far [gestures] away from it. Really stormy weather — dark. And we packed everything and took off. What happened? We forgot one of our rifles right by the tent. We need that rifle to protect ourselves if the bear comes in. We forgot it in that big four-foot, five-foot ice, piled over. We lost the rifle — brand-new .243, with a brand-new scope. That was a big deal, you know. But we were happy because it's not a human. We could always buy another one. But you can't buy another of me. That's for sure. So, you know, my elders always tell me, "You can't replace a human, but you could replace a rifle or a Skidoo." It's a tough life, but we managed to get by.

PIN 125, ULUKHAKTOK

Great courage, tenacity, quick thinking and action are what saved the lives of a Tuktoyaktuk couple when the ice started breaking up around them one day near the floe edge late in March 1994.

One time we were at Atkinson Point, me and her [his wife]. We had one Skidoo... It was a real beautiful day, and we hit the young ice in this area... Start hearing whistling sound: "whewwww." I told my wife, west wind coming up; better try going back to the main ice. And it start, ice moving, must have been six-foot ice where we were at, maybe more. Start cracking up. Start seeing smoke ahead above us [vapour from exposed water]. I told her

we gotta rush. Might get caught. Crack must have already been this wide [gestures], must be almost three feet... Back of us, ice and big chunks of water, like boiling water, but it was ice rolling around, maybe quarter mile away. I was in a cold sweat. We headed our way to our road [track] and the ice was just going up and down. [We came to a crack and] in between there was a big chunk of ice. I grab her hand, jump on that ice, [and] I bring her across. I told her I am going to jump back on and bring her back the Skidoo and sled.... ten feet away, maybe less. Ice went up again. I jump on that ice, the one in the middle of the crack.... And I told her I am going to come with Skidoo and sled when the ice come up. Well, I hit that, and I made it, zoomed around, and somehow we made it. [I] looked back and almost cried, 'cause we just about never made it. Boy, I was scared. '94, it was last time I was there, third week of March. Never got no bear that time.

PIN 26, TUKTOYAKTUK

Fear can be a hunter's greatest enemy, as explained by this hunter from Aklavik, in reference to getting drifted out on the ice.

Sometimes the current stays in one direction for a long time, and you can go way out, and you have a hard time to come back. But as long as you don't panic, you'll make it back. Most of the time, people lose their lives because they panic. They do the wrong things. They never do what they were taught to do. And it still happens, even now. Panic is the worst thing.... If you watch yourself, take your time, you'll make it back.

PIN 17, AKLAVIK

A Tuktoyaktuk hunter talked about the need for strong will.

People sometimes give up, but you gotta have a strong will. I was always told if I'm gonna train my children and anybody else, if you're scared to go out on the ice, don't go out there, 'cause you're gonna make it hard on, not only yourself, but the person that takes you out. So, [of all the challenges faced by] Inuvialuit harvesters, the most challenging and toughest one is out on the ice.

PIN 43, TUKTOYAKTUK

Self-awareness of one's emotions and learning how to deal with them in the face of life-threatening circumstances is an important part of TK, in PIN 43's view. He sometimes uses a breathing exercise to control his emotions so that he can make calm life-saving decisions.

It's just like women when they're getting ready to give birth. They go through a breathing exercise. Take a deep breath, hold it slowly, let it out through your nose. And you get another deep breath; hold it, and you do that, and it calms you down. Then pretty soon, you've got your heart where it's supposed to be.... It's the only way I could explain it. The women have to go through that breathing exercise so they have the strength to push [during childbirth]. So the lesson I'm getting [at] is it can get scary out there. You have to know how to stay calm and keep your head. If you lose your head, and you make a rash decision [you're in trouble].... You gotta make decisions in split seconds out there sometimes.

PIN 43, TUKTOYAKTUK

The extent to which experience and confidence guide Inuvialuit hunters in the decisions they make when travelling and hunting on ice is evident in the following narrative. One man was prepared to hunt far out on the ice despite the risk involved:

When we used to travel by dogs, it used to be very dangerous when there's an east wind. His wife told him not to go too far out because the lead might open and he might get drifted out to sea. [He told her that he] won't get lost even if he gets drifted out to sea. He can still get onto the land on Banks Island side, and then get on land and go home. And then he ended up getting drifted out to sea. He couldn't see the land, and then he ended up getting on land. 'Cause they were out on the ocean all day drifting, and when they got to the land, even though they knew Holman [Ulukhaktok] was close, they put up a tent and ate.

PIN 126, ULUKHAKTOK, Translation

This Tuktoyaktuk hunter credits his mother and another elder, Jim Wolki, for teaching him a great deal about ice safety and how to hunt polar bears. His account demonstrates how he integrated their advice and teachings with his own experience. For a start, his mother had a lot to say about the dangers of crossing cracks.

I got interested in going out farther from this homeland 'cause Skidoos were faster than dog teams. Every year I learn something as I go along. And most of the time I go out alone, just to test myself, how much my mom taught me. I try to follow her stories. She tell me, "never to cross a crack twenty–thirty miles out." She tell me, "never ever cross a crack, because you might get drifted out. Stay on the shoreline [side of the crack]; never ever cross a crack. When there is no wind, it is not safe to cross a crack; it is unpredictable," she said. Never cross a crack. 'Cause wind could shift and you could get drifted out. In January, February [it wouldn't be] so bad if you get drifted out. It will freeze overnight and you could go on it. It is soft, but you still can go on it; it is really risky.

PIN 26, TUKTOYAKTUK

Among other things, Jim Wolki taught him about how, when and where to hunt polar bears. PIN 26 then combined this knowledge with his own experience on the ice.

I seen quite a few bears in my time, quite a few. I let a lot of them go because I wanted a bigger one. All I did I learned from another elder, Jim Wolki. He told me, "[PIN 26], if you go out on the ice and you get to the edge, the open water edge, find a good spot and camp, just wait for the bears, they will come to you." And I did that a few times, and he was right. He was right, they come around, they follow the edge of the floe, hunting seals. It work. Don't have to run around, just find a good spot and wait. He always tell me try not to make too much noise. I did that a few times, but just by his stories, and sure enough, sooner or later, the bear just go around the shoreline by the open water and the young ice.... That time, they used to have these big multi-year ice. It was in the '70s and '80s. Mid-'80s is the last time [for multi-year ice]. But I learned lots just by elders telling me what to do. And I did it myself. Just myself, just by going out on the ice. Sometimes I go out with somebody, but I would rather be alone. I would rather be alone; there is nobody to worry about.

PIN 26, TUKTOYAKTUK

The kind of knowledge that comes from elders and direct experience on the land, ice and water cannot be acquired through book-learning.¹⁸ This Paulatuk hunter addresses explicitly the limitations of the written word when educating youth about travel routes, wayfinding¹⁹ methods, ice conditions, the wind, currents, tides, the moon, and so much more.

You can't really teach someone on a piece of paper, like theoretical. For that, you have to be more practical; you have to go out there and show them. They have to physically see what you are talking about, compared to reading it from a piece of paper. That's the teaching that I do. I bring them out there. I let them feel the ice. They can see the... different ice colours. Which is safe, which is good to go on, which is not safe, [where] it could be unstable. So, there are all these things about the ice. And you've got the currents, you've got the moon, you've got the wind direction. You can't teach a person in one week about all these changes that are happening, that you're aware of, that you could see, you could hear and feel. But giving that knowledge takes time; say, two, three years just to absorb this information and keep seeing.

PIN 158, PAULATUK

A hunter from Tuktoyaktuk also stresses the importance of giving youth direct experience of ice conditions.

My children, we all walked on rubber ice. I took them all for a walk to get the feel of it, so they would feel comfortable in that environment.... It was kinda scary for them for the first part, but if you know what you can walk on and what you can't walk on, there's always a chance you gotta do it sometime in your life, if you're gonna be hunting out there. You don't wanna take a chance of falling through, because once you go through, you're done. You gotta know what conditions you're able to move on.

PIN 43, TUKTOYAKTUK

A crucial part of ice and land use knowledge are the techniques or methods of travelling, living and hunting on ice. Every hunter has a repertoire of these methods that were acquired through the mentoring efforts of other hunters and through personal experience.

Inuvialuit skills, like those of their Inupiat and Inuit neighbours, are vast, and cannot be described thoroughly in this report. Furthermore, given the fact that ice and land use methods are part of an “embodied” Inuvialuit “craft knowledge,” they can be learned only through practice, in the process of doing and experiencing firsthand.²⁰ Nonetheless, the 2010 interviews contain many examples of the methods and practical knowledge that Inuvialuit make use of when hunting polar bears.

One such example is this Ulukhaktok hunter’s account of using a matchstick to detect current.

We were chasing some bears on rough ice. And when we got to this crack, which was about at least a metre and a half wide — because the bear tracks were so fresh, that crack had water in it. So, what he [his father] did was — he wanted to find out which way the current was going. So, he got a matchstick and he threw it in the water. Then he knew why the ice had cracked. The matchstick was following the ice. So, we didn’t bother — we didn’t want to get stranded out there.

PIN 113, ULUKHAKTOK

A Tuktoyaktuk hunter used a piece of ice to check the direction of the current.

The first thing they’ll [older hunters] tell you is don’t go out when it’s too strong of an east wind, like blowing off-shore out into the ocean. Don’t go on the young ice when it’s that kind of a wind. They always checked. They tell you when you reach the edge to check the current, and you just throw a piece of ice in the water, and you could tell which [direction] that current is going, in or out.

PIN 161, TUKTOYAKTUK

Lunar cycles and associated tides add to the complexity of the ocean currents and require the attention of hunters. Landfast ice is normally attached to the land, as the name suggests, but sometimes, when the moon is full and the tide is running a particular direction, some of it will crack.

But it never would open enough that you’d be in danger. It would just open a foot, half a foot.... And I’m talking four- or five-foot-thick ice.... I know for sure that the moon has lot to do with ice too.... if the tide and the wind is in the right direction it’s going to cause some major movement [in the ice] out there.

PIN 163, PAULATUK

Inuvialuit know how to check the direction of the tide.

Sometimes when you are out here, you can tell if the tide is coming in or going out by using a piece of rock or something [tied to] a string. You put it down, and the farther it goes down, and starts to sway this way or that way, you can tell what the tide is doing.

PIN 158, PAULATUK

Other examples of practical knowledge relate to the use of snow patterns on the ice to tell direction. This method is of great importance when hunters are travelling beyond sight of land or when visibility is poor.²¹

And even if I was going to go with somebody, he [his father] used to tell me to look after the snowdrifts, because we used to have east and west wind, and those are the ones we used for markers to know which direction to go until you can’t see the land anymore; ‘cause even if it’s nice and clear out, you could lose the land, because you have to go way out.

PIN 117, ULUKHAKTOK

The most important thing is the snowdrifts, and once you know the snowdrifts, you’ll never get lost. You travel in dark or whatever, as long as you know where the wind is. Is it east wind? Okay. And you know where the snowdrifts are; you know that Tuk is over there.

PIN 25, TUKTOYAKTUK

The stars serve as wayfinding sign posts and help forecast weather.

If it's a clear night.... look up at the stars, [and] if they start blinking, then you can expect a storm.... But you have to know which stars to look at. 'Cause there is some stars that actually blink on purpose.

PIN 160, PAULATUK

When I travel, I found [that] the one star my father always told me about was always to my right side when I was travelling home from Cape Parry. Especially by myself. I use it quite a bit by myself. I'm not sure what it's called in astrology sort of thing... and I don't know who else uses it... Say I start off five o'clock in the evening, just when it's getting dark. I can see it on my right side when I'm travelling from Brown's Harbour.... And the farther south I get, the more straight ahead of me it is.... I tried to get lost on purpose or get off track on purpose, and use that same star to get back into Paulatuk, and it works.

PIN 160, PAULATUK

A generation ago, hunters could predict wind directions by looking at the sky.

Some of them [elders long ago] were really good experts in that they have no instruments; they just look at the sky and tell the wind is changing.... they'd say it's gonna be west wind pretty soon, and it's right-on all the time. My dad was like that. He'd look at the sky and say, "There's some wind forming up in the sky there. It's gonna turn into east wind pretty soon." And sure enough, it turned east wind.

PIN 23, TUKTOYAKTUK

Invaluable to a hunter, wayfinding and weather forecasting techniques are used in travelling to and from ice features that are frequented by polar bears. Track-reading techniques (Photo 2) are also an indispensable part of a hunter's toolkit,²² as explained by this hunter from Paulatuk.

You see and hear stories, you can see tracks on the snow that tells you the whole story. Just like the Indians and the cowboys movie where they look and read the track. It's the same thing with us, here. We can look at the track, tell how old it is, how many hours, days, and day and half or whatever. The footprints always leave a story.

PIN 158, PAULATUK



Photo 2. Polar bear tracks tell their own story.
John Lucas Jr.

Another hunter described how he instructed his nephews in reading tracks when he took them to the Shingle Point area northwest of Aklavik.

Once I'm at Shingle, then I'll [tell them] what I know along the coast, what to watch for, how to brush the tracks, when you get to a track, to determine how fresh the track was. If the track is fresh, if you brush it, the track is going to be brushed right away if it's fresh. Then if it's a little older, the track is going to be a little harder, the inside is going to be hard, and you know it's going to be a day, two days since the polar bear passed.

PIN 19, AKLAVIK²³

Tracks announce not only the presence of polar bears and the timing of their passage but also the gender and condition of the bears. Experienced hunters know how to read such information in tracks with relative ease. They note the orientation of the toes, the shape of the track, whether it has a heel, the presence or absence of claw marks, and the depth of the track in the snow, keeping variable snow conditions in mind.

You could tell a male and a female bear from the tracks. Male bears are the ones with heels. This is what they call "heel" (Photo 3). It's not the back feet.... You could see a mark when it's walking. That's a male bear. And also, their feet are forward. Female bears, their feet are round, and they turn inwards. Male out; females inwards, and they're round. So, male bears are the ones with heels, and females don't have heels. But if a female is running, you could easily mistake it for running from this heel, but if it was walking along by itself... you could easily tell if it's a male or female, and you could easily tell if it's a fat bear or a skinny bear just by the tracks.

PIN 117, ULUKHAKTOK²⁴

Like many other aspects of PBTK, track reading is a skill passed from elders to youth, and honed through experience.

You know the bear's in good shape by their tracks.... Polar bears may be heavy and big, but if it's a fat bear, the elders always said, "It's hard to find their tracks," but if it's a skinny bear, you can easily see it going through, even on a little bit of hard ice or snow. So, their claws are not really showing if it's real fat, but if it's skinny, you can see their claw [marks].

PIN 117, ULUKHAKTOK



Photo 3. Tracks of an eight-foot male polar bear; note the heel.

Tony Green

Box 2. Other Arctic animals

The sea ice is home to a variety of animals in addition to polar bears, and Inuvialuit hunters watch the behaviour of some of these animals for clues about the movements of polar bears. For example, when they see foxes, wolves, wolverines and crows travelling across the ice, they know polar bears are out there as well. It is a matter of these intelligent animals putting two and two together — they are either looking for ringed seal pups or scavenging the carcasses of seals killed by polar bears. In either case, their presence on the ice points to polar bear activity. Examples of Inuvialuit knowledge of these animals are provided in Section 3.4.

Perhaps the most important information comes from polar bears themselves, because it is they who teach the hunter about their environment and behaviour.²⁵ Thinking like a polar bear is absolutely essential to a good hunter, as explained by this Tuktoyaktuk TKH.

[If] you run into a bear track, it's a good time to backtrack them to see how successful they were in their hunts, and just to read their minds. What made them shift and move in different places. And so the bears are teaching you their environment, their hunting techniques. Just the way they hunt the seals, you can study them. And how far they throw the seal... right from the time they grab it and throw it. You're reading all that sign.... And so they're the best teachers. If you're gonna make polar bear hunting your life, the bears are the best teachers.... A bear wants you to understand them, because they depend on us to become almost their voice.... That's why all my boys and my girl have a hard time getting their first polar bear, because the polar bear is trying to tell them; the polar bear is trying to teach them that this is their environment. The first one is always the hardest, because they're gonna teach you about their conditions before they give themselves to you. For me, that's traditional knowledge.

PIN 43, TUKTOYAKTUK²⁶

A fully modern people, the Inuvialuit have added to their repertoire of traditional techniques for wayfinding across the ice and hunting polar bears. Although reading tracks and studying wind-driven snow patterns on the ice are still important, Global Positioning System (GPS), computers, camp radios and satellite maps are now considered useful additions to their toolkits, if not essential for safety reasons. High-powered rifles with scopes; binoculars for “glassing” bears, seals and ice conditions; double-walled tents; snowmobiles (Photo 4) and other modern gear are basics.²⁷ GPS units help them navigate in low visibility and conserve gasoline when travelling far out on the ice where there are no visible landmarks. These units are also handy when it comes to reporting the geographic coordinates of polar bear harvest locations to the Department of Environment and Natural Resources (ENR).²⁸

Now we try to go 'til we get a polar bear to come back [with].... And it's good if you hunt out here, you could come home just any time, because today you have the GPSs. Now, you just go and travel any time, whiteout or not. Your GPS is so easy to use now. Before that, we all went by using our heads, and snowdrifts and that, travelling.

PIN 103, INUVIK

New technologies help Inuvialuit hunters live more comfortably in complex ice environments — which can change drastically with little notice — without crossing the line between acceptable risk and fool-hardiness. Here are two examples related to the use of satellite maps.

Last year [2009] was really hard to go anywhere; there was a lot of ice last year. Even when you checked the satellite maps. There was very little water last year, but it was all rubble.

PIN 135, SACHS HARBOUR

You can use satellites [maps] to check out the ice. You can check to see what the ice conditions [are] — you can see where the flat spots are.... I know someone showed me that one time, through the computer.

PIN 12, AKLAVIK

Well educated in ice safety, this Sachs Harbour man makes a point of including a satellite phone with his hunting gear while on the sea ice.

My father always said to be careful when I went out to Nelson Head, because even when there is no wind over there, the ice would break off 'cause there's a lot of current over there. It's pretty deep close to land there, so it's kind of a dangerous area to hunt in.... That's why we try always carry a little boat with us, everything for an emergency, like extra clothing in case you happen to fall in the water, a little tent, emergency food and satellite phone.

PIN 139, SACHS HARBOUR

The contexts in which Inuvialuit gather environmental knowledge useful to polar bear hunting have changed over the years. Nonetheless, hunters continue to talk to one another informally about seasonal weather and ice conditions, tracks, signs of seals, seals, foxes, wolves and wolverines, and other information that may have a bearing on the presence and location of polar bears. Hunters may also monitor seasonal temperatures, wind directions and storm patterns that pile up or rubble the ice, because they are a key part of determining the location and extent of pressure ridges and open leads. This is where polar bears are likely to be encountered during the hunting season. A hunter from Tuktoyaktuk explains:

You don't go out there in November when the ice is still unstable. You gotta know the months and the ice conditions, the wind direction, the force of the wind, plus the big rolls [ocean swell]. Because you gotta remember every storm that you have, which direction. Really important is knowing the wind and the past storms. Because what you're doing is, you're reading it when you go out there; you're reading the ice, what the storm did with the ice.

PIN 43, TUKTOYAKTUK²⁹

Information gathering is continuous, and any number of tidbits of information can be added to the mix, informing hunters in myriad ways about how, when and where to go hunting, and what to expect when they get there. For example, in the days before aviation, Inuvialuit would take note of bears, signs of bears, ice conditions and other environmental conditions while travelling back and forth between Banks Island, Victoria Island or the mainland on schooners.

But some schooners used to see polar bear between here [Cape Parry] and Sachs Harbour. That's far out. I can't believe it even. Schooners travelling through there see polar bear swimming. I don't know how he eat; so slow when they swim, too. I don't know how he's going to live. That far out.

PIN 162, PAULATUK



Photo 4. Heading across the sea ice on a modern-day polar bear hunt, with snowmobiles and a dogteam.

Robert Kuptana

At one time when I was going by schooner from Jesse Bay to Sachs Harbour in July, just right around here [gestures] we seen about ten polar bears in the space of maybe three or four miles.

PIN 115, ULUKHAKTOK

Once aviation started, similar observations were made from the windows of low-flying aircraft.

When I was flying to Inuvik, you could see some dark spots, eh? It used to never be like that. It used to freeze once; freeze, never open, and stay frozen, and it was just beautiful.

PIN 117, ULUKHAKTOK

I've flown across when I was going to school, in the winter, flying across with the RCMP plane around Easter time, and all the way across. We were travelling really low, 'cause we counted a lot of bears that time when we flew with the RCMP plane.

PIN 135, SACHS HARBOUR

Certain types of wage employment have also provided new contexts for gathering information related to polar bears. For example, one hunter spent a summer travelling back and forth along the Yukon and NWT coastline looking for whale carcasses, which attract polar and grizzly bears.

I did a stint with DFO for one summer, one stinker patrol.... That's what they call it. You just fly along and look for beached whales.

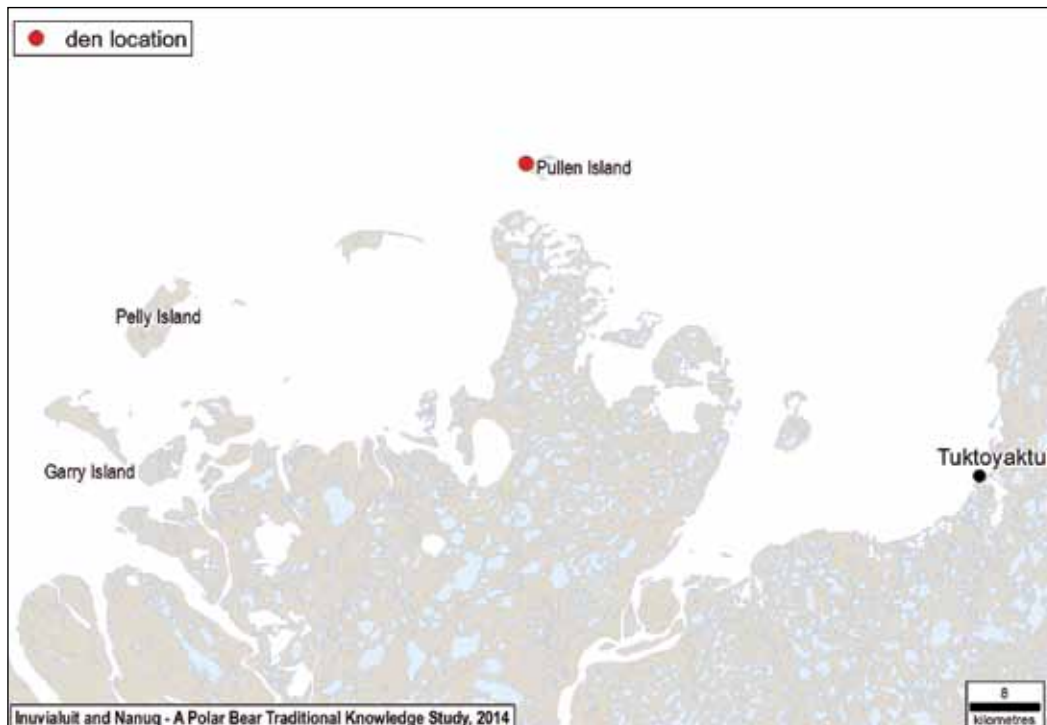
PIN 3, INUVIK

Employment as wildlife monitors on oil-drilling platforms in the Beaufort Sea placed two hunters from Tuktoyaktuk in ideal locations to observe many polar bears and even maternity dens (Map 2).

Talking about dens, Pullen Island, there is always denning on the west side of Pullen, the bank here, in the snow part.... There was a mother bear there with two cubs there one year.... Early '70s. I was on a job. I was guide and wildlife monitor for company [inaudible]. Go on my own, I didn't find it myself. I was looking out [and] I see a bear. I went to it and look around. It was a bear den, and two little bears just going in and out of there.

PIN 26, TUKTOYAKTUK

Map 2. Location where PIN 26 saw a maternity den, mother and two cubs while working as a wildlife monitor



I used to see the mother bears teaching them young ones around the Baillie Island area. While mother bears is waiting for seals, she get them to run around right where it's quite a ways from that hole, trying to flesh out the seal. When I get to work one time for Imperial Oil, I was wildlife monitor. There was a lot of bears outside of here. Manmade island outside of Hooper Island, Garry Island; must be about twelve, ten miles out, maybe little bit more.

PIN 28, TUKTOYAKTUK

It is clear that while the “traditional” component of their TK remains strong, Inuvialuit knowledge about polar bears is now blended with information from multiple sources, not just direct experience and what elders have shared in the past. The fact that knowledge is a composite of ideas and experiences from many sources does not diminish the value of the “traditional” part. Peter Usher, who has a long association with the Inuvialuit, makes the same point: “[c]ontemporary TEK explanations can hardly be unaffected by aboriginal people’s knowledge (scientific or otherwise) of the wider world” (2000: 185).³⁰ In practice, therefore, it is not always easy to know if particular OPTs are based on direct or shared observations of the environment or on external sources of information such as nature programs on television, natural history texts or interactions with western-trained biologists.³¹

In the modern era, Inuvialuit routinely obtain information across the Arctic by way of radio, telephone, and mass media and from friends, relatives and others. Participation in wildlife co-management bodies is yet another source, as are interactions with biologists and other members of the scientific community. For example, in sharing information face to face and using communications media, a hunter from Paulatuk said, “We talk to people from other communities and they hunt too.... When we meet with them.... When we go by Inuvik or CB radio.... ’cause there are hunters from Tuk that we keep in touch with on the CB or whenever we see them in Inuvik or Sachs Harbour” (PIN 150, Paulatuk). When asked if hunters from Sachs Harbour and Ulukhaktok share information about polar bears, another hunter said, “Yeah, just like over the phone here. Not having a meeting or anything. We like to ask questions to them: ‘Do you see the bears? Are there more bears?’ and stuff like that. ‘Did you have a good time over there or not?’” (PIN 114, Ulukhaktok).

Information is shared with Inuit and Inupiat outside of the ISR, including people from Kugluktuk, Cambridge Bay and Kaktovik.

We know each other every year, like Kugluktuk area. They hunt polar bear over this way. We know what’s going on over there when they’re hunting. We got two-way radios, bush radios. I listen to them every day when they’re at the cabin out there, and we talk to them.... Our conversations with the other communities like Sachs, Kugluktuk and Paulatuk, once in a while. We talk to these people. They don’t hide. We don’t hide anything from each other, because we like to go out there and hunt and stuff like that.

PIN 114, ULUKHAKTOK

I don’t think we ever had much problem with polar bears, no. Even down at Barter Island there, I talked to them on the phone, eh? It’s right in Alaska.... That’s Kaktovik.

PIN 106, AKLAVIK

When we get CB,³² then we start to contact other communities, with those trappers’ radios.... Let’s see, it must be ’70s we start getting that kind... early ’70s, that’s when some people find fur, get seal, white fox; some of them start going in the bush.... Catch [receive and transmit] a long ways, right to Alaska, sometimes. Especially those little forty-channel radios. But they fade away fast, though. Can catch a lot of people from the east. Next thing, you cut off, never come up again.... Sachs, Holman, Coppermine area. [Talking] not only about polar bears, you start listening to the news. Get what kind of animals, where they go, and you feel safe already, because in case open water take you out. Sometimes too... you have a hard time getting a call from Browns [near Paulatuk], the

other guys can hear it really clear. Some times when something happens, something serious, you can send message too.... Now sport hunters got their satellite phones and make it easier for themselves.

PIN 149, PAULATUK

Information about local and regional ice and weather conditions is exchanged using camp radios, satellite phones and in Paulatuk across the airwaves of the community radio station.

What I try to do is get all the information I can from the hunters. Because I work the [community FM] radio station here, and I get on the radio. I pass out that information to all the hunters on the radio, if they're listening.

PIN 160, PAULATUK

I talk to him [hunter from Sachs Harbour] a lot on the radio when we're out there [about] weather conditions, ice condition. Is it windy?

PIN 113, ULUKHAKTOK

According to a Sachs Harbour hunter, satellite phones became the primary method of long-distance communication around 2000.

We used to have trapper's radios. So when someone got a bear, we heard about it on the radio, throughout the regions. Everybody had the channel [for] the weather and stuff.... But nobody uses those no more. Everybody has satellite phones.

PIN 134, SACHS HARBOUR

During the 2010 interviews, many participants mentioned various types of mass media as sources of information concerning the weather, ice and polar bears. Environment Canada and AccuWeather websites are consulted for up-to-date weather forecasts.³³

It's also good to look at forecasts before you go out. Most forecasts are accurate. Such as Environment Canada, they have a big site. AccuWeather is the most accurate. Just punch in Sachs Harbour and it is very accurate.

PIN 134, SACHS HARBOUR

Information from other parts of the Arctic can be gleaned from television; this can be compared with local knowledge and with OPTs never before witnessed or experienced. For example, when asked if he had watched polar bears hunting seals, one hunter replied, “no never, only on TV” (PIN 29, Tuktoyaktuk). A Sachs Harbour man said, “I've never seen a bear with cubs actually kill a seal. But I've seen their carcasses and that. You can't really tell too much... I've never watched them, I've seen them on TV” (PIN 135, Sachs Harbour). When asked if he had ever seen a female polar bear with triplet cubs, another hunter replied, “No, never seen any bears with triplets. Only two [cubs]. I seen them on TV, but never in real life” (PIN 123, Ulukhaktok). A hunter from Aklavik said he watched one or more polar bears stalking seals underwater — on television.

If I seen a seal, and I go from the rock by the side so they can't see me, and I'll sneak through the rough ice.... shoot them after that. And then try to get them. But I know, guaranteed, the polar bears must use the rough ice, too, because they always say they always hide their noses.... They always cover their black part. They always cover their nose there, and then they always start sneaking up to them.... That's how come we always see on TV, sometimes when they're in the water, just their eyes are out and their nose is in the water.... and they just start going towards — like, there's a seal over there, and there's a little swamp of water. They'll have their nose right down into the water, and they'll be sneaking up to them.

PIN 13, AKLAVIK

Another Aklavik hunter has compared the seal carcasses he has seen on the ice with those on television programs about polar bears.

It's like on TV, when you see those little wee seal carcasses with the rib bones and the small, little pieces of bones there? Just like when I see that out on the ice, I always [think] — “Oh, just like on TV.” The way they show it on

the eastern Tuk side. And they show the seal carcasses that the polar bears eat, and they leave the rib bones and backbones. It's just like looking on TV; we see those out that way, too.

PIN 13, AKLAVIK

News of polar bears encountered far inland travelled fast by word of mouth and television.

Years ago for some reason there was bears way up the Mackenzie River. I think you heard about that, where they actually ended up in Deline [NWT], or wherever. That was kinda strange. Maybe because of the ice condition. I don't know, maybe just a freak thing that happened. Unheard of... [One person] said he saw them on TV and he said he felt so sorry for the bears.

PIN 161, TUKTOYAKTUK

When asked about the conditions that bears need for denning, a hunter from Ulukhaktok compared his personal experience to what he had seen on television.

They need a snowbank like that, and make sure it's enough to make big — igloo size. Enough for the bears to have their babies in there and wait for them to grow up a little bit. And when the springtime comes, like in March or April, they come out and play around. The one I seen on TV, it reminds me of how they do it.

PIN 125, ULUKHAKTOK

A Tuktoyaktuk hunter's memory of old grey polar bears was nourished by personal experience as well as television news.

I remember once I got a big polar bear. Must have been 12 feet plus, but it had such a poor skin, it must have been a really old one. And this is from what I heard in the news, I think one time, and on TV. When a game warden spotted a polar bear around Banks Island, the bear was so big that it even looked grey. That's how the bear I got one time [looked]; it was grey, his colour, because maybe it was so old.

PIN 27, TUKTOYAKTUK

Some participants in the 2010 PBTk study have participated on the HTCs and IGC, which were established under the terms of the IFA in 1984.³⁴ These are important conduits for the flow of OPTs from the scientific community to the Inuvialuit at the local level. This Paulatuk hunter blended his TK with what he learned through the IGC and the internet.

Because I sit on the Game Council, I get all my information from science, or most of my information from science. But because I sit on the Game Council I try to get as much information on hunters, harvesting, everything I can. I work at the [community] radio station, and I want that information so I can give out accurate information to the hunters.... To communicate hunting areas. Where the caribou are in the wintertime... Polar bears; get on the computer and try to look for the leads, where the leads are, in this area and that area. Temperature, weather conditions, ice conditions.... [The hunters] actually come into town and I talk to them. It's face-to-face, so that I can get accurate information. But for ice conditions, I go on the computer and I try to get the latest information on ice conditions in our areas.... I go to AES — Atmospheric Environment Services — and AccuWeather.com. I go to that one. But my information is basically a week old, so this year I'm going to try to find a site where I can actually get real-time information.

PIN 160, PAULATUK

Another hunter first learned that polar bears can den on the ice through contact with a biologist at an HTC meeting.

The last year I was with the Hunters and Trappers [Committee], we had a meeting about polar bear dens.... And that's the first time I ever heard of polar bears having a den out on the ice. I'd never heard that before.... Our head instructor; the guy that was holding the meeting, he said he travelled between Herschel and Garry Island, and he was pointing out where they seen bear dens.³⁵

PIN 163, PAULATUK

Interaction with polar bear, whale and seal biologists and other members of the scientific community has taken many forms over the years, including involvement in environmental assessments and climate change research projects, work as field technicians in the context of environmental monitoring programs, and research with the federal Department of Fisheries and Oceans.³⁶ Furthermore, information that the NWT's Department of Environmental and Natural Resources (ENR) sends back to hunters when they submit tattoo numbers, ear tags, radio collars, and body part samples to the department blends scientific knowledge with Inuvialuit PBTk. Several people interviewed for the PBTk study mentioned the type of information they gleaned from these sources, including the great distances travelled by collared or tagged polar bears and seals, the speed with which they travel, polar bear ages, denning and other behaviour.

Inuvialuit holding polar bear hunting tags “are legally required to provide certain samples and information,” and ENR provides a tag kit to help hunters “record information and collect the required and requested samples.”³⁷ Samples taken from polar bears include the skull or lower jaw, baculum and testicles, ear tags and tattoo numbers, fat, bone, skin with hair and ovaries/uterus, in addition to measurements of the bear's straight line length³⁸ and girth. Such requirements were mentioned by several PBTk study participants.

Now when we go polar bear hunting we got to take samples, 'cause the scientist or the wildlife guy wants to see what they are eating and how come they are so lean or whatever, like the age.

PIN 142, PAULATUK

You look at the lungs too, but every time we do that everything's good. And take back the samples, whatever the Wildlife needs. You always got to take a sample back. Piece of liver or fat. Piece of fur. I think it's the penis if it's a male. You always got to take a tooth out too. Get samples; it's Wildlife's law, I guess.... 'cause you get money too, for some samples you bring in. You get twenty bucks or something like that for each thing. And it's good too, so the scientists know what age and how the bears are doing.

PIN 151, TUKTOYAKTUK

This Tuktoyaktuk hunter learned the age of the polar bear he harvested after he sent his samples to ENR. *The oldest bear I got was 22 years old.... I [had to send] papers to the Wildlife people, [and they would tell] me how old they were, when they start to sample the tooth. We used to have to bring the tooth, and then [we] know how old it is.*

PIN 33, TUKTOYAKTUK

After submitting an ear tag from a bear he harvested (around January 2005) to ENR, another Tuktoyaktuk hunter learned that the animal had travelled all the way to his area from Alaska.

[The polar bear] had an ear tag on it. It had a different kind of an ear tag; it was size of that roll of tape there.... and about the same thickness. I took the ear tag... to ENR and they told me that bear was tagged in Alaska. Why it had a different kind of an ear tag [is] because they could fly over the bear with a plane, and they could activate that little radio. They don't have to tranquilize that bear again to know which bear it was.

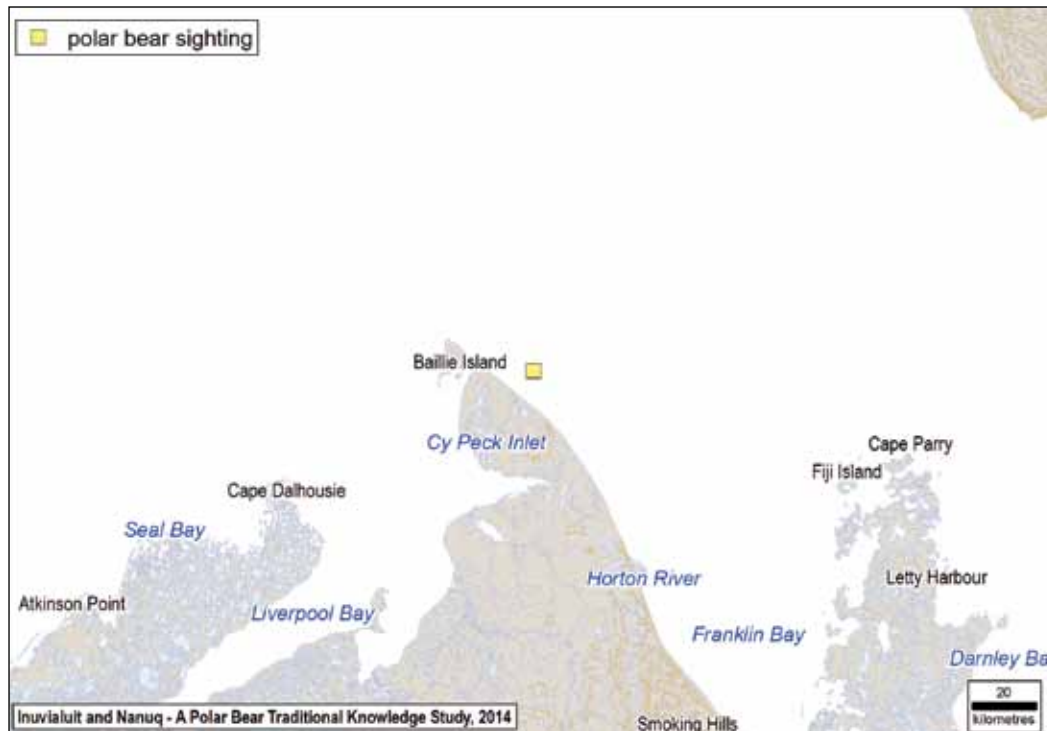
PIN 161, TUKTOYAKTUK

Even greater distances may be involved. The bear mentioned in the following account (Map 3) had been tagged twice — at Churchill, Manitoba, and Nelson Head, NWT — before it was harvested near Tuktoyaktuk.

I got a bear in that same area, ten-and-a-half-foot polar bear, it was tagged two times. The first time that bear was tagged was in Churchill, Manitoba. And then the second time it was tagged somewhere outside of Nelson Head, about ten years later. And then I killed that bear there, it was 21 years old; 21 years old, and it came from Churchill, all the way, it was good skin, had no paint, nothing on it. Very good skin, but it was tagged in Churchill, Manitoba. Second time tagged, it was around Nelson Head. And then a few years later [circa 1996] I killed it over here.

PIN 42, TUKTOYAKTUK

Map 3. A tagged bear that travelled from Churchill, Manitoba, to Nelson Head was harvested near Tuktoyaktuk



The lightning speeds that polar bears can travel in a short period of time (Map 4) became clear to this hunter from Paulatuk after he sent the tag and tattoo number to ENR.

One year, April, they tagged a polar bear north of Banks Island and next day, when I got it, [it had] travelled 100 miles in one night.... I harvested it just out here for subsistence.... I sent the tag out; tattooed, everything. They tell me they just tagged it the day before.

PIN 147, PAULATUK

Information provided by radio-collared ringed seals is also of interest to hunters.

They migrate every fall and spring. 'Cause we used to put radio collars on them; and I've seen some seals travel, and they give us reports on a satellite. The seals just from here, they go all the way up towards Melville. And just before fall time in September, he [one seal] travelled in seven days right to the place where he was caught. We couldn't believe it.

PIN 117, ULUKHAKTOK

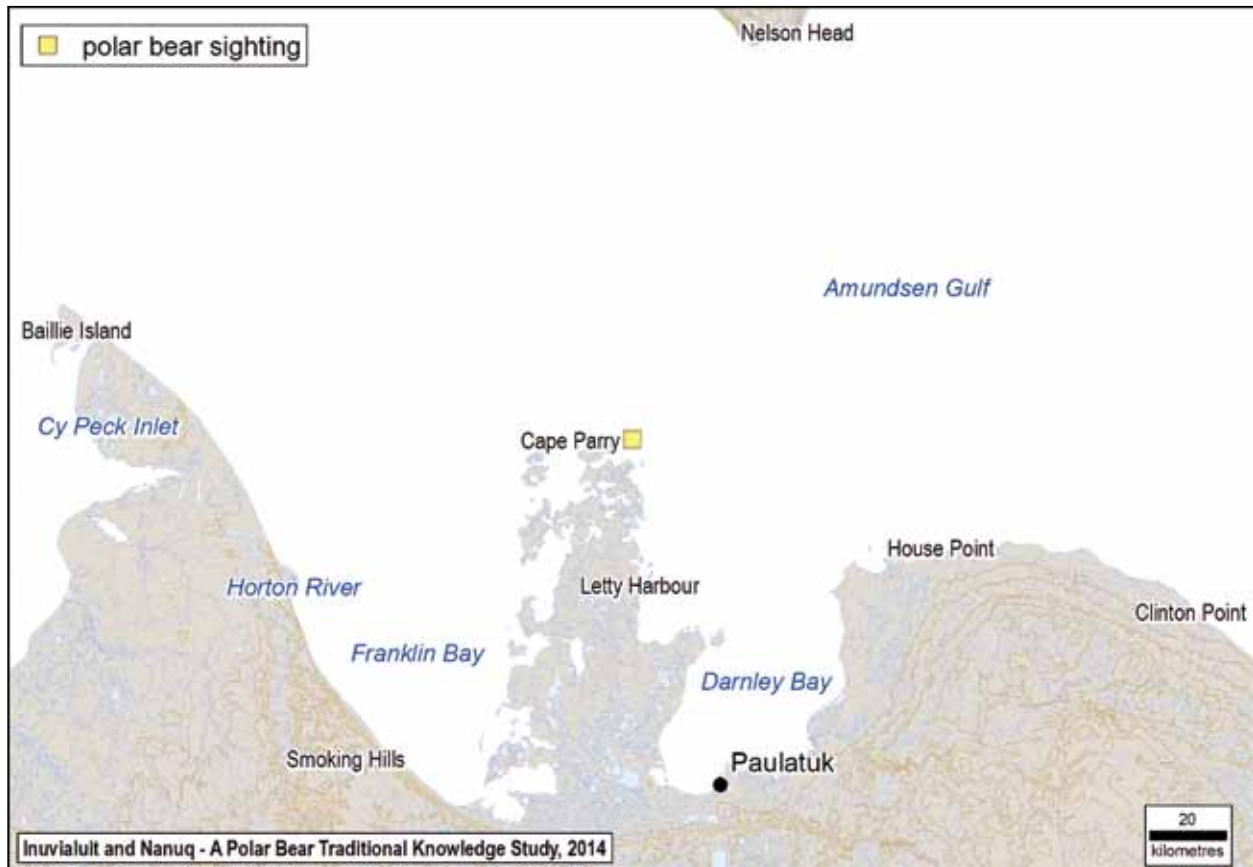
A number of Inuvialuit, including hunters interviewed for the PBTk study, have worked as field assistants with prominent polar bear biologists, including Ian Stirling, Dennis Andriashek and Andy Derocher, and some have read these biologists' books and other documents.³⁹ Despite the relative invisibility of the Inuvialuit in these texts, their accounts of interactions with the biologists suggest a two-way flow of knowledge. For example, Stirling once told a Paulatuk hunter about a large number of seals he had seen hauled up on the ice along a narrow lead (crack) off Cape Parry one June. However, the seals stopped hauling up once the lead (crack) opened up. The biologist said he had never seen this before. When the hunter explained that he was already aware of this phenomenon, Stirling laughed and said, "Every time I see something new to me, somebody's been there already" (PIN 149, Paulatuk).⁴⁰

Some of the observations made by scientists appear to be new to the Inuvialuit. One example is a polar bear that drowned because it could not extract its head from a seal hole.

Story of Ian Stirling he been telling to [PIN 23]. The bear been biting seal in the breathing hole. After he bite it, he try to pull the seal out, but he come to the narrowest place just enough for the neck to pull out, and the seal is inside his mouth, and it really get stuck right there and make him drown. He couldn't open his mouth to pull his head out of the narrow hole.

PIN 128, SACHS HARBOUR

Map 4. A tagged bear travelled from north of Banks Island to Cape Parry in one day



A Paulatuk hunter said he had never seen evidence of polar bear “cannibalism,” even though Stirling mentioned it in one of his books.⁴¹

I know that guy: Ian Stirling. My father-in-law has his book, and he's done lots of studies with Ian Stirling out in [Cape] Parry.... I noticed in his book that there was a lot of cannibalism with the polar bears, but [I] never seen that out here. Never seen bears in such shape that they revert to that; just seen bears fighting for the right to mate. Nothing out of the ordinary.... I'm sure even the elders would be surprised to see that book, and see what polar bears actually do to each other when they're starving.

PIN 160, PAULATUK

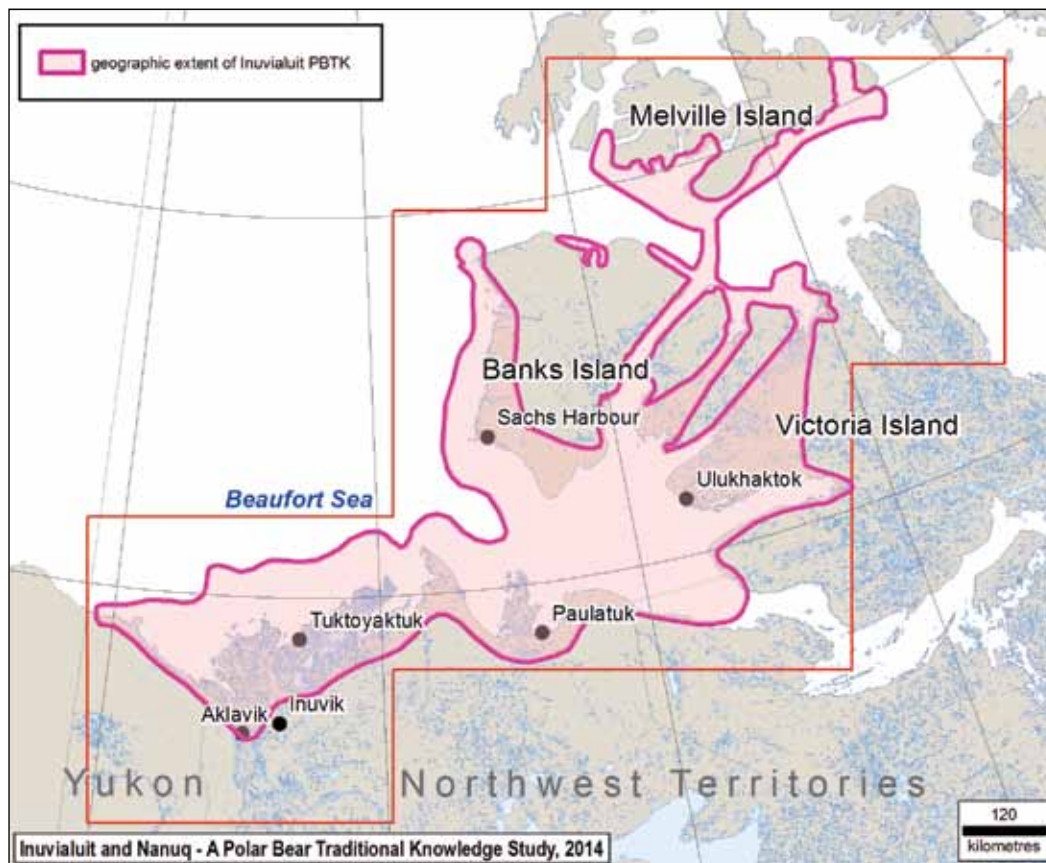
2.2 Geographic extent of Inuvialuit PBTk

The knowledge described above is applied practically and is nourished and renewed through ongoing travel and polar bear hunting throughout much of the ISR. The geographic extent of the area depicted in (Map 5) is based on a composite of all the PBTk study spatial data including harvest locations, sightings of polar bears and their prey, maternity den locations, etc. While much of Inuvialuit knowledge about

polar bears can be generalized throughout the Arctic (e.g., the bears' preference for seals, denning behaviour, etc.), the polygons on this map show the spatial extent of Inuvialuit knowledge of polar bears in the western Arctic. This is particularly relevant to movement patterns, distribution, maternity dens, interactions with grizzly bears, scavenging and other behaviours that are strongly influenced by the regional geography and climate of the Beaufort Sea and its surrounding land masses. In a sense this reflects a spatial limit to the geographical knowledge of the Inuvialuit as it pertains to polar bears. They, like other hunters, “comment upon their local area and do not tend to generalize beyond the spatial area with which a person is directly familiar” (Thorpe 2004: 60).⁴²

The time period covered by the PBTk study is primarily the living memories of participants, the oldest of whom was born in 1915. However, the polar bear knowledge of the Inuvialuit extends beyond living memory due to the knowledge passed to them from previous generations. Of those participants for whom their first polar bear kill dates were noted, the earliest kill was circa 1943.

Map 5. Geographic extent of Inuvialuit PBTk as documented in TKH map biographies



The 14 TKHs from Aklavik and Inuvik interviewed for the PBTk study have harvested polar bears within their living memories⁴³ in the area from the Mackenzie Delta to Herschel Island.⁴⁴ Understandably, this is also the area where their TK of polar bears is grounded, with the exception of two older hunters who lived on Banks Island for many years and hunted polar bears and engaged in other harvesting activities there. This is more or less the same area mentioned by Usher in his description of use and occupancy by the Inuvialuit of Aklavik and Inuvik. Seals and polar bears “are of limited importance to the economy of this region. They are sometimes taken in association with other game, and certainly in much the same areas.

The seaward limit of polar bear and seal hunting corresponds with the normal position of the floe edge, which is rarely more than ten miles offshore” (Usher 1976: 22).

The 17 TKHs from Tuktoyaktuk interviewed for this study harvested polar bears in the area between the Mackenzie Delta and Baillie Island/Cape Bathurst. One hunter had also harvested bears near Sachs Harbour. Usher noted (circa 1976), as is the case today, that “[t]he Cape Bathurst region is particularly good for polar bear hunting, mainly on the northeast coast where the floe edge is rarely more than five to ten miles offshore” (Usher 1976: 25).⁴⁵

The 13 TKHs from Paulatuk have harvested polar bears in the area between Cape Bathurst and Clinton Point within living memory. In the days before climate change made long-distance ice travel exceptionally dangerous, if not impossible, a number of hunters ventured halfway across Amundsen Gulf within sight of Nelson Point on Banks Island. Usher also said Paulatuk people harvested polar bears in this area pre-1976.

Bear and seal hunting sometimes occur in association, especially in winter and spring. Since the abandonment of camp life, and particularly of those camps on the west side of Parry Peninsula, both activities have shifted almost entirely to the east side of the peninsula. Bears are now usually taken north and east of Cape Parry, and off Pearce Point. There has been a considerable northward expansion of the bear hunting range in recent years, and it now overlaps with that of Banks Island residents (ice conditions permitting), so that virtually all of Amundsen Gulf is potential bear hunting area (Usher 1976: 28).

Within living memory, the 15 TKHs from Ulukhaktok have harvested polar bears (Photo 5) as far south as Cape Larsen, across the ice towards Clinton Point on the mainland and Nelson Head on Banks Island, deep into Prince Albert Sound and Minto Inlet, Prince of Wales Strait and Wyniatt Bay. In recent years they have harvested along the southern shore of Melville Island, although primarily in the context of guiding sport hunters.⁴⁶ Farquharson described polar bear harvesting locations mainly for three sub-groups of Inuit who settled at Ulukhaktok (Holman), the Kanghiryuachiamit who were associated with Minto Inlet, the Kanghiryuakmiut associated with Prince Albert Sound, and the Puivlingmiut associated with Read Island in the Dolphin and Union Strait (Farquharson 1976: 56). In the period 1916–55, the Puivlingmiut hunted polar bears:

on the sea ice west from Read Island far out on the ice of Amundsen Gulf and north on Prince Albert Sound. Though there were few polar bears on Dolphin and Union Strait, there were many on Amundsen Gulf. The Read Island people usually hunted them at the end of the trapping season in early May, although a few hunted bears in fall and mid-winter and, on occasion, in their dens along the west coast of Wollaston Peninsula (ibid., 38).

When the trading post at Read Island closed in 1962, most of the Inuit associated with it moved to the Kugluktuk (Coppermine) area. However, some people settled at Ulukhaktok (ibid., 60).

In the period 1923–39, the Kangiryuarmit (Prince Albert Sound Inuit), “hunted polar bears in the immediate vicinity of their camps, but later, as bears became scarce, they travelled as far as the Horizon Islets to hunt them. However, these people did not depend on polar bears as much as the Minto Inlet people did, nor did they consider themselves to be primarily polar bear hunters like their neighbours” (Farquharson 1976: 59). In the period 1939–65, the Kanghiryuachiamit (Minto Inlet Inuit) hunted polar bears “far out on the ice, south of Nelson Head on Banks Island, southwest of Holman Island, and far north in Prince of Wales Strait nearly to M’Clure Strait” (ibid., 61). Following settlement in Ulukhaktuk, in the period 1965–74, polar bears were “hunted far to the west in Amundsen Gulf, along the whole length of Prince of Wales Strait, and as far as Glenelg Bay. Many people at Holman maintain dog teams primarily to hunt polar bears” (ibid., 60).

The 14 TKHs from Sachs Harbour have harvested polar bears within living memory along the west side of Banks Island as far north as Gore Islands, and around Nelson Head in the south to Jesse Bay in Prince of Wales Strait. An older hunter had also hunted bears near Cape Bathurst on the mainland when living in that area in his younger years. With the exception of some trappers who visited Melville Island in 1961, Inuvialuit did not use the area north of Banks Island within living memory before the 1980s (Usher 1976: 30).⁴⁷ In the period 1980–91, Sachs Harbour hunters harvested polar bears along the southern shore of the island and guided sport hunters there as well.⁴⁸ A number of elders interviewed for the Aulavik Oral History Project circa 1999 noted that Nelson Head had “always been a favorite spot to hunt polar bears as they are numerous there,” although they spoke also of harvesting or encountering them at Big Bluff, De Salis Bay, Jesse Bay, Sachs Harbour, and Satchik (Nagy 1999: 74, 82–84, 94, 101).⁴⁹ In 1976, Usher said that polar bear hunting for Sachs Harbour people,

*is an important activity, and Banks Island is the chief denning area for polar bears in the western Arctic. When bears are common, the greatest number are taken within twenty miles of Sachs Harbour, generally in the direction of Cape Kellett. However, special trips are sometimes made farther afield, chiefly to Nelson Head and some distance offshore to the south, and also toward Norway Island and even as far as the northwestern tip of Banks Island (1976: 29).*⁵⁰

Cape Kellett and Nelson Head continue to be hot spots for polar bear harvesting, a point returned to later in the report when discussing areas of abundance.

2.3 How Inuvialuit harvest polar bears

Hunting locations

As a general rule, Inuvialuit harvesting is planned according to weather and ice conditions and knowledge of where polar bears are most likely to be found; hunters do not search in a random way across the ice in order to find and harvest polar bears. Sea ice serves as the main platform for hunting, with preferred hunting spots reached by snowmobile and/or dog teams. As explained at greater length below, many



Photo 5. Bella Kuptana of Ulukhaktok is an Inuvialuit woman who has hunted polar bears.

David Kuptana

hunting expeditions entail establishing base camps on stable ice, often for many days at a time, unless they are day trips from the communities (e.g., Sachs Harbour).

Inuvialuit polar bear hunters concentrate their efforts along floe edges, cracks, pressure ridges and other ice features, where ringed and bearded seals haul up or have breathing holes and birthing lairs (dens), and where polar bears hunt these animals. Until recently, and despite annual variation, many of these features were found with some certainty in the same locations year after year. These included sites near headlands and across the mouths of straits and deep bays, where the currents of the Beaufort Sea bring moving ice into contact with landfast ice or ice grounded in shallow, shoal areas near shore. Inuvialuit hunters are strategic in the decisions they make about where to look for polar bears, as is clear in the following account.

His father taught him not to travel on flat areas where there's no pressure ridges, where there's no cracks or anything, because it's less likely of him spotting a polar bear. So, when he started following his father on a dog team, going out by dogs, using one dog team to go hunting bears, those were the orders or directions that he was given, to always follow those directions, those habits, get into a habit of following those pressure ridges. So he's always followed the pressure ridges to go hunting and never forget what his father had taught him — word-for-word. And rough ice conditions, his father taught him never to travel on rough ice conditions when he's out hunting bear, because it's less likely for him to spot a [polar bear] that's looking for a seal hole, because seals don't make dens or make holes — breathing holes — in rough ice.

PIN 120, ULUKHAKTOK, Translation

Occasionally, Inuvialuit harvest polar bears opportunistically; for example, when hunting seals by boat in the summer months.⁵¹

You could get a bear pretty well anywhere at any time of the year. I got a polar bear with one of my older brothers one time in August before freeze-up. Of course, we had to go out on the polar pack ice, and that's where we seen a polar bear. We got it. That was before the tags opened.... there was no quota then⁵².... That time we were hunting seals...with a boat... We went from Toker Point straight out.... [The polar bear was] just hunting seals, probably on the ice pan it was on. When we spotted it, and when he seen us, he started swimming across to the pack ice. Then we went and cut it off, and brought him back to the ice pan. That's when we shot it.... That year, for some reason, there was a lot of ice.... We got the bear and there was no quota then. We skinned it, took all the meat home. The bear had a good hide.

PIN 27, TUKTOYAKTUK

An Aklavik hunter combines polar bear and grizzly bear hunting in March and April, depending on the conditions.

If I go to the coast, I'll grab a polar bear tag, and [if] the conditions are starting to warm up on the mainland... you might be able to see the grizzly bears starting out. I'm going to be hunting the polar bears, doing my hunt on the ice, and I've also got a grizzly bear tag. So, after my hunt on the ice, I'm going to come on the mainland, and I'm going to do a big circle. I'm going to have a base here at Shingle. I'm going to have a base at Herschel. I'm going to do my hunt or go up the Firth [River], staying on the east side of Firth; then hit the mountains, come right alongside the mountains, looking for grizzly bear sign.... I travel along the hillside, come to about Babbage or above Stokes, and I'll head right back to the coast.⁵³ Hit the coast — say at Stokes — and go right back out on the ice and make my way west along the ice to Herschel. I'm trying to cover two areas at once.

PIN 19, AKLAVIK

No matter what time of year or where hunters are located, Inuvialuit hunting strategies are based firmly on safety considerations and knowledge of polar bear habitat, feeding behaviours and movement patterns.

We had most of our luck here [Pearce Point]... We had a lot of clients that got their polar bear here.... It's hard to say [how far offshore], 'cause that time I didn't use a GPS; we mostly camped on the ice, where it's rough, where the bears are following the ice.... And once we got the bear, just go to our base camp, and get everything ready; then we come back here.

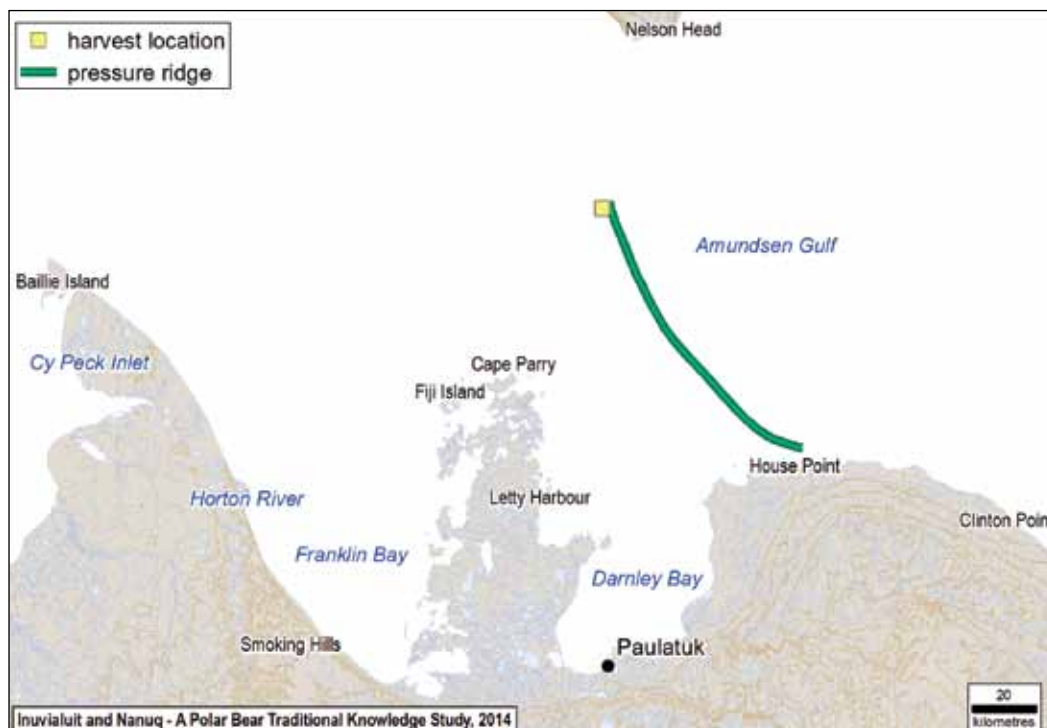
PIN 142, PAULATUK

This Paulatuk hunter tracked a polar bear along a pressure ridge for 16 hours, taking careful note of the bear's seal hunting efforts along the way (Map 6).

I've followed bears where there's an eight-foot pressure ridge... [from House Point]. There was this one bear that was following this ridge. And four times he managed to dig into a seal hole and make blood, but no, just make blood, that was it. That was in four different holes. On the fifth hole, we finally came across the bear, probably 16 hours since we started tracking it. We came across the bear and on the fifth try, it finally managed to take one [a seal] out of the hole. So he dug into eight feet of snow and got at four different seals. Made blood on there. So it definitely made contact, [but] couldn't get the seals.... [circa 1984, eight-foot male].

PIN 163, PAULATUK

Map 6. A TKH tracked a polar bear for 16 hours along a pressure ridge



As noted previously, safety is always an important consideration when camping in bear territory, and it influences the choice of camping spot, according to the same Paulatuk hunter.⁵⁴

Another thing my uncle taught me was if you're camping in a tent on the ice, always camp where there's a long snowdrift. Because your dogs [hear the] message sometimes. Maybe the bear will come in from downwind, and that little bit of snowdrift amplifies the bear walking. The sound just amplifies through the snow. So always camp in that kind of a snow cover, so you have a little bit of time to defend yourself if a bear walks in.

PIN 163, PAULATUK

Another hunter, from Ulukhaktok, said his elders told him to stay clear of young ice when camping because of the prevalence of polar bears in such areas. Camping on “old” ice is safer, they said.

Elders always say, “You should never even camp in young ice — no, no!”... If you see young ice, get away from it, and go in the old ice and camp. Because the bears can walk through in that young ice, and you never know, they might get you first before you get them.

PIN 125, ULUKHAKTOK

A Sachs Harbour hunter says he and his father liked to establish a base camp near the floe edge and then explore for bears on snowmobile and dog team from there. However, they were careful to take a small boat and other safety gear with them on their explorations in case they were stranded by open water.

I like to go hunting polar bears January until April. When it's really cold out, like when it's 35 below, trips usually last between 10 and 12 days. Sometimes we camp right in the tent on the edge of the ice... and try to make day trips, and drive around. When we drive around, I always take a little boat with us, like an open-water boat for an emergency kind of thing. We tie it on the flat deck [of the] homemade sled and carry some extra emergency gear in there...like extra clothing, a primer stove, some naphtha [gas], some emergency food.... travel pretty prepared.... It's usually when me and my father are hunting on our own kinda thing. When we're sports hunting with a client, we have to take our dogs with us, so it's a big difference.... A lot of times we stay in one spot doing day trips and driving around.

PIN 139, SACHS HARBOUR

Hunters preferred to establish their camps where multi-year ice was present, at least up until the late 1980s, after which it disappeared from many parts of the Inuvialuit territory as a result of climate change.

If you ran into the multi-year ice, that's good for tea. Fresh ice is all salty. And then you have to go look for snow that's not been blown on the ice for too long, otherwise that's going to be salty too. So it's a lot of things to look for when you're out there. They teach you all that.

PIN 133, SACHS HARBOUR

The relative abundance of ringed seals is also an important factor when choosing a camping location from which to hunt polar bears. Seals equal polar bears, as explained by a hunter from Tuktoyaktuk, describing a hunt north of Hutchinson Bay. His hunting party hit the floe edge, where the moving ice meets the landfast (main) ice, three hours out from the bay.

I told my crew we could put the tent up and wait around. Waited for six to seven hours maybe; never make noise.... And I told them we might see a bear today. It was so nice; the ice was just moving, and [we] could see seals popping up. We try to get a seal, but we have no manaq⁵⁵.... when you get seals, [there's a] 75% chance you're going to get a bear.

PIN 26, TUKTOYAKTUK

Hunters must recognize the movement patterns of polar bears, which will move from one area to the next in pursuit of seals. Seals will get “skittish” with too much bear activity and move to another area, taking the bears with them. However, seals will return to the original area at some point, and patient hunters await the bears that come back with them. This was explained by another Tuktoyaktuk hunter, for whom waiting is key to polar bear hunting.

It's not only the polar bears. The seals are very important [as well]. If there's no seals in the area... they [bears] go to another area where dens of seals are available. Utilize the area for maybe a week, eight days, [then] just move on, because.... the seals are getting more worried.... So they just wait for a period of time and let everything settle down, and then they come back, or another bunch comes back. They might move and start hunting ten miles away. But usually, in my experience, every eight, nine days there's [the] same bunch or another bunch [of polar bears] comes by and starts hunting in that same area. But you gotta let it stay quiet for a while, and that's why you see bears moving. You see evidence of bear tracks in all sizes, just wandering around.... It's very difficult to run into bears sometimes, but you see evidence of a lot, and then you're limited to their environment. The only way you can get them is to stay still and wait for one to come by. You wait. You don't go out looking for bear. You

let them come to you. That's the kind of hunting techniques you got. You find a good spot and wait. Sometimes the waiting is very long, but it pays off, especially when you're driving with Skidoo and the noise makes it very difficult; especially in the rough ice, as they hear you. You see them going over the rough ice, all you see is a sign. With dogs, it's not too bad. The only thing is, any bears moving, you gotta spot 'em first. If they spot you first, then you got no chance of getting them. It's very important that you know their environment and where the bears might be. You just keep an eye out.

PIN 43, TUKTOYAKTUK

This TKH says Paulatuk hunters used the same hunting strategy: set up a base camp in good polar bear habitat and wait.

Mainly what we did when we get to our base camp is we tried as much as possible to set up camp on an open lead. That way we didn't have to travel anywhere. We just sat there and waited for the bears, especially if the open lead had a sign of bears on it. You can see the tracks, 'cause usually what they do is they work an open lead. Just go back and forth if they have success in it. Then they won't leave it. So that's basically what we did. We set up base camp, sat by an open lead, get a lot of glassing, a lot of binocularing, and just waited for the bears to come... Leads, as I'm describing to you, is a crack in the ice. There'd be a lot of them on occasion. I think generally there was one main lead, just outside of Browns [Harbour] that we set up camp at. [Also] there's usually a main lead outside of Pearce Point, where a lot of the hunters would camp at.

PIN 159, PAULATUK

Nonetheless, there are years when patience is not enough; when, despite the quality of the habitat and signs of polar bears, none are encountered. This reflects the great variability from one year to the next in both ice conditions and polar bear movements, and in particular in the local abundance of seals. Thus, "some years were good, some years you don't get nothing. Some years you stay out there for a long time waiting for bears" (PIN 42, Tuktoyaktuk).

People back home sometimes worried about the hunters who had to wait for lengthy periods of time out on the ice, especially in the days before trapper's radios.⁵⁶

I remember, like, heading out from Russell Inlet. We stayed out for ten days, and that's how long we waited for bears to come to us. Apparently, that trip only one bear came to us, and we stayed out as long as we could, as long as supplies could last, our food and stuff. I remember even planes had to come and search for us 'cause everybody was worried about us. We were staying out too long them days there. There was no such thing as trapper's radios or bush radio, no way of communication with home... We waited and waited 'cause our gas supply was low. We couldn't travel anywhere else; we just waited and waited. We thought that we'd get another bear, because we got a bear soon as we got out there. But that was it. There was no other bears then.... Mostly the ice conditions would stop us from getting bears. Some years it might be too rough to travel, because the ice is piled up so bad out there. There might be bears but you cannot see them or get them because the ice condition is so bad.

PIN 27, TUKTOYAKTUK

Despite a lengthy wait, or long-distance tracking of polar bears along a pressure ridge or open lead, there is no guarantee that a hunter will have a successful hunt, even when a bear is finally encountered, because polar bears can be wily and nimble. A number of Inuvialuit TKHs described situations when polar bears escaped the hunters. A common escape strategy for bears is to run into the rubble (rough) ice.

The rumble [rubble] ice is so pointed and jagged, even the bears wouldn't go on to that part unless they are being hunted. It is more of a safe place for them to hold [up], 'cause they know we can't go in there unless we walk. And even though you walk, you have to skin the animal; you have to drag it out, and it's a lot of work just to do that. If you got a bear in rough ice, you have to drag it out to where your Skidoo is. Even one kilometre, that's a long walk if you are alone.

PIN 158, PAULATUK

A polar bear may also rush for open water to escape a hunter, as witnessed by an Aklavik TKH when hunting just east of Herschel Island one year.

You know how a cat jumps around in a house? A polar bear is the same thing like that, no matter what size it is. The one time we chased one, me and [PIN 12]...an eight-foot polar bear.... There was a chunk of ice about this big here [gestures]. [The bear] jumped from that corner on to the chunk of ice [about four feet] and then jumped to this corner — say, from that corner right there, to that chair right there, to just a small chunk of ice [about 12 feet]. And then past this corner right here, and then gone. And then as soon as it hit the blue ice... it crawls across. And as soon as it passed that blue ice, it stood up, and it ran, and just dove right into the water. And we were on our way back walking towards where we started chasing from, and we were walking in between icebergs, and we were looking at that chunk of ice, and where it jumped and all that. And the first thing we thought about was a cat, how a cat jumps around in a house. That's how polar bears are in their country, in their land.... We watched it dive into the open water. Once he hits open water, once you see that he's in the water, we just leave after that.

PIN 13, AKLAVIK

Use of firearms and traditional weapons

The methods used by the Inuvialuit to hunt polar bears have a direct bearing on the ways in which they obtain knowledge about the animals. Prior to the arrival of snowmobiles in the early 1970s, Inuvialuit hunted bears on foot and with sleds pulled by dog teams. Before the arrival of firearms, they killed the bears using lances and bows and arrows (Nagy 1999: 33–35). Bear dogs were used to track, harass and “stop” polar bears so that they would hold up in one place, often rough ice; this gave the hunter time to catch up and make the kill. At times, females and cubs would be killed in or near maternity dens.

Well into her nineties, this Ulukhaktok elder said that people had already made the transition from lances, bow and arrows to guns by the time she started polar bear hunting.

But the first ones, the first hunters before her, the people back then would have bow and arrows, a knife and a spear. Like a spear-probe. Like a steel probe. They used their snow knives, tied it around the wood [she demonstrates], and used it as a spear. If they used a bow and arrow on the bear and it didn't die, they didn't kill it with an arrow, they would put a string around their snow knife onto a stick or a spear, and that's what they used to kill the bear.... No fancy stick, just a walking cane for an emergency hunting tool⁵⁷.... The people before her used to go hunting for bears in their dens. And they knew where the dens were. Either close by the shoreline or up higher in the land. The people back then knew from the people before them where the polar bears make their dens.

PIN 101, ULUKHAKTOK

One or more bear dogs would distract the polar bear, enabling the hunter to get close enough to spear it.

They called it a spear. It just have a great, long handle, with a knife in the front of it. That's all it is. It go in about that deep [gestures]. But those two dogs...keep the bear busy; he's [the polar bear] not looking at the man. That's how they managed to spear the animal.

PIN 17, AKLAVIK

A baited barb of baleen (spring bait) was another traditional method of hunting polar bears.

I was young and dumb and never used my ears back then. I should have, because every day after school he'd [his grandfather] would be telling me stories about how he used to hunt bears. And one of the ways is he'd take a baleen of a whale, sharpen both ends. Twist that thing up into as fine of a spring as you can. Put a ball of meat over that, just big enough that a bear could gulp it down, and let it freeze. Freeze it solid. The bear would come along and gulp it right down, and it would go into his stomach. And when the meat melted [it] would just spring open. He said it would take them two days of tracking to finally be able [to catch up to the bear so] that it would be weak enough that they could spear it.

PIN 163, PAULATUK⁵⁸

Some Inuvialuit began to use set-guns in the 1930s, when they first acquired rifles and shotguns through trade with the Hudson's Bay Company; their use continued until the signing of the international Agreement on the Conservation of Polar Bears in 1973.⁵⁹ Younger hunters have no direct experience of this harvesting method.

I heard stories of people setting bear guns out on the ice. Just leave the gun there loaded with string tied to your bait. And then when they [polar bears] go in and they pull on the bait, get shot.... I heard my dad used to do that too.... Them days, polar bears weren't worth much. It was mainly food and just for the hide. Use the hide for something else rather than sell it.

PIN 133, SACHS HARBOUR

An older hunter learned the method from Sachs Harbour Inuvialuit when he first moved to Banks Island.

I made a hole [in the ice] and I put bait in it.... and then I fixed that gun. So, right when he goes down, then the only place he's going to get shot is in the neck or the head. I put a trigger and everything; and when he bite that bait, poof.... Exactly in the head...and when I go down, pull that bait, he's dead.... You don't have to be there; they shoot themselves. I went up there, I got, boy, a frozen big bear. I had big trouble putting it on my sled.

PIN 2, INUVIK

Whether it is by foot, dog team or snowmobile, Inuvialuit methods of harvesting polar bears allow hunters to study tracks, ringed seal carcasses and other evidence related to the behaviour of polar bears. Such methods bring them close, if not face to face, with polar bears, enabling them to observe much of what is described in this report.

Dogs and snowmobiles

Dogs have been extremely important helpers to the Inuvialuit during polar bear hunting, and risk their lives in the process (Photo 6). Two Ulukhaktok hunters described the way in which dogs assisted them in tracking and stopping polar bears.⁶⁰

I really enjoy hunting polar bear by dog team, especially when the dogs are smart.⁶¹ When you come across polar bear tracks and you untie your dog from the harness, when the dog is very smart, the dog will follow the polar



Photo 6. Dog teams continue to be an extremely important part of Inuvialuit polar bear harvesting.

John Lucas Jr.

bear tracks. As the dog is tracking the polar bear, when it reaches the polar bear, it will keep it in one place by biting on the hind legs, barking at it, keeping it in one place. That is why the polar bear stays in one place. When you hunt polar bear that way, it is very good.

PIN 124, ULUKHAKTOK, Translation

Probably, when I was about maybe 15 years old, I started going hunting. First I would go with my dad and it's usually because I couldn't hunt alone. I was too scared to go by myself... Exclusively dog team, and then, we'd see polar bear tracks and we'd track. Also, sometimes we'd seen polar bears and we'd train a couple of dogs to stop the polar bears. So, that's what I learned from my dad, how to stop the polar bear if it's running away. I think I trained one dog that way in my lifetime.... At one time when I see bear tracks, and they're fresh tracks, I would just turn him loose. He'd follow the tracks. Never seen polar bear yet. About two hours later I catch up to the dog and the polar bear. He had stopped the polar bear.... At first I try to go ahead of it, because a lot of the polar bears are "ticklish" [quinaktuyuq nanuq] — nervous — of dogs (Photo 7). So, we'd go behind and his [the dog's] movements are faster than the polar bear. So, he would bite him on the hind legs and pretty soon that bear get too ticklish, so he would stop. The dog would keep him there until I reached the polar bear. You know, there's only a few dogs that are pretty good that way.

PIN 115, ULUKHAKTOK

Some dogs got "greedy" when harassing a polar bear, which could have fatal consequences.

You just need one good dog. That's all you need. Even a big polar bear, just sit down and it won't move.... I don't think there's any other animal chase them around. They're ticklish. You know, they bite them — you could see the dog bite in the same place, right here [back of the heel].... It was nice to watch. They're really fast — the dogs. They could go in between his legs. Poor bear is too slow. But some kind of big dogs are greedy.... They figure they could handle that bear like anything else, and he gets slapped — one slap, and he's a dead dog.

PIN 17, AKLAVIK

Dogs must be handled properly from an early age and given hunting experience on the ice if they are to become good bear dogs. Knowledge of how to train dogs and of their behaviour in relation to humans, one another and polar bears is another component of Inuvialuit PBTk.

If you want bear dogs, you gotta be out there. Not just one hunt every year.... your dog has to be [there] all the time. You don't choose any dog to become a bear dog.... You have to train them. Got [to] start right from when



Photo 7. Polar bears are "ticklish" around dogs.

Jean and Pat Ekpakhohak

they're pups. The traditional knowledge of bear dogs is, right from pups, you don't control them like you do your dog team. You let them grow up... without hitting them.... They learn by observing.... But if you touch them the wrong way, right away they go on the defensive.

PIN 43, TUKTOYAKTUK

Contemporary polar bear hunting by the Inuvialuit relies heavily on snowmobiles and to a lesser extent dogs, which are used primarily when guiding sport hunters. A hunter from Paulatuk said the transition from dog teams to snowmobiles started in 1965 as a result of the local priest's influence, but at least one elder regretted making the switch.

We travelled with dogs in the old days until 1965. From there the Skidoos started to pop out. The priest tell the elders "shoot your dogs"... it was the starting point. No more dogs in just a couple of years — all the dogs was finished. Now, just Skidoos. But the old priest, he told the elder, "here, get rid of your dogs, shoot them all." He told the guy right out, "you shoot your dogs, get a Skidoo." Bugger! The elder didn't like it. A while after he got a Skidoo, [it] started to break down. [The elder said], "Boy, you know what that priest tell me? He tell me to get rid of my dogs, and now I am suffering. I am walking now, breaking down." Boy, he was mad.... I tell you, boy, I never forgot that one, too.

PIN 164, PAULATUK

Undoubtedly, the speedy machines have changed the way that Inuvialuit hunt polar bears, adding convenience and efficiency to the hunt.

And bear tracks, you see, you could really go full blast and look for them.... I've got a son in Sachs who's got a strong, big scope, always looking out in the ocean. When he sees a bear, he just waits, and then, he takes off with a Skidoo. And that's how he hunts now, my son.... People always go and drive around. They've got Skidoos, they go and look around every place. It's so fast now, not like a dog team anymore.

PIN 2, INUVIK

Many of the Inuvialuit interviewed for this study have mixed feelings about the merits of snowmobiles versus dog teams (see Table 1).⁶² Obviously, snowmobiles allow hunters to travel greater distances in a short period of time, but these benefits come at a price. For a start, as noted by two senior hunters, dog teams are safer on the ice in certain respects: snowmobiles are heavy, and dogs sense bad ice and other dangerous conditions.

That's a big difference with hunting with a snowmobile and a dog team.⁶³ With a dog team, you can control it a little bit farther and take a bigger risk of going out in the ocean. With a snowmobile, the snowmobile is heavy, so it's got an easier chance of going through ice.

PIN 116, ULUKHAKTOK, Translation

The dogs they would feel the ice. They would be kind of afraid to cross any kind of cracks [and] they would just turn off. But with a Skidoo... you cross it anyway. That's the difference. Now a lot of hunters get in trouble over that.... Dogs knew what they were doing.

PIN 164, PAULATUK

On hard-packed snow, when the polar bear's tracks are extremely difficult to see, dogs can still follow the bear by using their strong sense of smell.

It was a little bit harder for me when they started using the snowmobile. 'Cause kind of rough ice, you can't go by.... On the ice, if it's really rough, dogs could go by, but snowmobile, you had to [chop the ice with an] axe and make a road. And I used to use dogs. It used to be easy for me, because the dogs could smell it [polar bear] before I start seeing it. The dogs smell it, they go to it, and you could see it.... I find out when I was using a snowmobile, it's hard to track if it's hard snow. The lead [dog], I could follow it even on hard snow.... I don't have to use the tracks. They [the dogs] smell it.

PIN 121, ULUKHAKTOK

This hunter from Tuktoyaktuk says that they are more likely to miss sleeping or hiding polar bears these days because their snowmobiles cannot smell bears.

In the past, they used dogs, and the dogs, they smell the bear. You couldn't pretty well pass a sleeping bear. Now bet you a lot of times we pass a bear, not knowing it's there. I remember there was two, three hunters ahead of me that headed out to the floe edge from our tent, and my Skidoo couldn't start. I stayed behind. I told my buddies to go out ahead of me, and they did. It wasn't about an hour later that my Skidoo started, and I started following their trail out towards the floe edge from the tent. When I got to the floe edge, there was so much Skidoo trails, some going west, some going east, I don't know where they went. So I just took a guess. I started following the trail going east. I only travelled a couple hundred yards, and there was a bear right in front of me, running out, a big one: ten-footer. I end up getting that one. They [had] been passing it. They didn't know it was there.... You should have seen when, after a while, I start skinning the bear, two of the hunters came and said, "gee, you got my bear."

PIN 27, TUKTOYAKTUK

Dogs are slower but less noisy than snowmobiles, and they know how to stop a polar bear.

Hunting changed when snowmobiles arrived. Everything got easier when we first started hunting with snowmobiles.... Because they are so fast. You could catch animals just right there, but with dogs, dogs are way slower, but they're quieter.... And it's hard to get around with snowmobiles, through the rough ice.... Some of [the hunters], they train their dogs how to stop polar bears, and then they walk up to them and shoot them. But today, you can't train Skidoos to stop polar bears.

PIN 103, INUVIK

It took more skill in the past to hunt polar bears using dog teams, according to this senior Paulatuk hunter.

It changed really quick. We travel miles and miles within a couple of hours [whereas] we used to take two days with dog sleds. That's what makes a difference.... But the old days with a dog [team], you're going 20, 25, 30 miles if you're pushing it every day. With a Skidoo, you're going a hundred miles.... To me, it's not the real way to hunt any kind of animal, with a snow machine. Anybody could do that. You don't have to be experienced. You could probably get your animal. But the old days, you had to go with dogs and you had to try your best to get the animal, to be a good hunter. You had to be a good hunter, for sure.⁶⁴

PIN 165, PAULATUK

Table 1. Pros and cons of dogs and dog teams versus snowmobiles

Dogs and dog teams		Snowmobiles	
Pros	Cons	Pros	Cons
ice smart (know bad ice)	slower	faster; can travel many km in a day	heavy and dangerous in thin/bad ice
less noisy	travelling great distances takes more time	polar bear tracks can be followed for many km	noisy
sense of smell (tracks, dens)	must be controlled at camps/communities when not hunting/ travelling	in some cases polar bears can be harvested in one day, with the hunter returning home the same day	no sense of smell, travel too fast, sleeping or hiding bears, and dens are missed
can "stop" bears	skill required to run dog teams	less skill required to operate	cannot "stop" bears
can guard camps	TK required to train	cannot guard camps	mechanical knowledge needed to maintain/repair
alert to sleeping/hiding polar bears	some dogs get killed		mechanical failure
required for sport hunting	need to be fed (seal meat, etc.)		money required to buy machine, gas, parts, etc.

Ice

Whether for domestic harvest or a sport hunt, hunters start by assessing the condition of the ice and taking careful note of the weather, in particular the wind direction. The pattern of freeze-up, recent wind directions and frequency of prior storms tell the hunter what to expect in the way of rubble ice, pile-ups, pressure ridges, open leads and other features associated with polar bears and ice safety.⁶⁵ Hunters with access to computers can study satellite images in order to find open leads that may be frequented by polar bears.

Inuvialuit travel to places where they stand the best chance of encountering polar bears, as noted previously. Along the way, some watch the sky for ravens (crows) and scan the snow-covered ice surface for bear, fox, wolf and wolverine tracks, taking careful note of bear scat and breathing holes for ringed seals. Tracks, recent seal kills and other signs along pressure ridges may signal nearby bears. A hunter from Ulukhaktok explains:

His ancestors, his father and his father before him, have always followed those traditional ways of hunting, like following the pressure ridges, following the cracks; because they know they're going to either spot a bear track, or either spot the bear itself, or spot a bear hunting down a seal, trying to get to a seal hole, slowly going to a seal hole, or going to a seal that's already basking on the ice. Either of those kinds of situations are going to come up, because they're following the pressure ridges, and they know where the polar bear is going to be out hunting the seal.

PIN 120, ULUKHAKTOK, Translation

Hunters may follow old tracks for considerable distances until they encounter a bear. However, if no signs of bears are to be seen, they will often climb on top of a ridge, pile-up or iceberg (see Glossary) where they can “glass” for bears in the distance.⁶⁶

When travelling across the ice to open leads and floe edges, hunters may have to cross pressure ridges and patches of rough, rubble ice that are impassable by dog sleds and snowmobiles. Crossing requires having to chop a path through the rubble; this is hard work that can take a couple of days. The effort may be rewarded fairly quickly if bears have been hunting ringed seals in their breathing holes or birthing lairs along the far side of the pressure ridge. Alternately, it may mean travelling farther offshore to explore more distant ridges, open leads and the floe edge.

Wide open leads that have recently frozen over can be tricky to cross on snowmobile. As explained by this Paulatuk hunter, hunters must be careful to stay a certain distance away from a leading snowmobile when crossing thin, rubbery ice. Both the lead and following machines set up wave patterns in the ice, and if the two patterns are different, and collide with one another, the ice will shatter and the following snowmobile and its passenger will end up in the ocean.

You have to know that ice. My first time out there hunting bears, to travel on rough ice, you have to make your own way out. With the axe, you have to break trail. When I first got out there, once we broke the trail, I'd check the thickness of the ice that we were going to travel on, because it looked like a lead. A frozen-over lead. I was told it froze up overnight, so I figured, Jeez, we can't travel on that. I chopped the ice and it was about this thick [two and a half inches].... So we went on the ice and sure travelled. My father didn't teach me that, because we didn't travel with Skidoos much. I found out from [PIN 164] that you can travel on that ice. Even though when you're travelling you can see the ice beside you; you can see it actually rolling. But he didn't have no fear of breaking through. He said as long as I stay a certain distance from him, we're okay.... When you're travelling on soft ice, you create a wave, and if it comes together, it breaks. Like, if I'm behind, and he's in front, he's actually creating a wave that comes back, and I'm creating a wave that goes forward. [They] come up this way and break here.

PIN 160, PAULATUK

Deciding whether to cross thin ice over a freshly frozen lead is one example of TK; crucial decisions also must be made about whether to cross cracks, because they signal potential danger. Cracks frequently occur where winds, tides and currents subject the ice to enormous stress. Giant pans can rapidly and explosively burst open and break away, with the seaward portion drifting into the Beaufort Sea. A hunter stranded on the wrong side of the crack when the rupture takes place is in serious trouble.

Seals as bait

Although the use of dead seals as bait to attract polar bears was more common in the past, a couple of TKHs said they continue to make it part of their hunting practice.⁶⁷

Sometimes I'll get the odd seal.... I'll kill it and skin it, and use it for kind of a bait source.... Take the skin and leave [the carcass as] an attractant.

PIN 12, AKLAVIK

You get two to three seals, and just cut them open, and drag them around on the ice. They [polar bears] smell them miles and miles [away]. And you put them [seal carcasses] in a flat place, and just watch. Sooner or later [the bears] will pop up; they smell the seal.

PIN 26, TUKTOYAKTUK

Close encounters

In general, Inuvialuit shoot polar bears with high-powered rifles at close range, although they also use some smaller-calibre rifles, including .228s and .243s. A few Inuvialuit and their sport-hunting clients use a bow and arrows to hunt. Thirty years ago a hunter now resident in Tuktoyaktuk killed two polar bears in one day when hunting at Banks Island: an 8-footer with a bow; and an 11-footer with a rifle. He also hunted muskox with bow and arrow.

I hunted polar bear with a bow myself. I got that bow and arrow; straight bow, no compound.⁶⁸ You know how many pound? 35 pound.... I get a lot of muskox with that straight bow. Someplace here [gestures] I got that polar bear.

PIN 38, TUKTOYAKTUK

No matter what weapon is used, polar bear hunting requires a close encounter with a nimble, powerful and highly intelligent predator. Stealth and acute attention to a bear's behaviour are key when stalking, as explained by this hunter from Tuktoyaktuk. He describes an occasion in 1964 when he was hunting near Cape Kellett on Banks Island.

One time I was hunting polar bear in young ice.... It was the end of the pressure ridge. A polar bear was waiting for a seal. I was sneaking to it, and I couldn't get any closer, about five hundred yards. I had white clothes on. I was watching him. "How I gonna get close?" Look, listening this way, and wait for it. [The bear] goes up like this: "Whoo" breath; go down again. Don't move.... I turn away a little bit. I looked again. He got a seal already. He pulled the seal up alive, just playing with it there, for bleeding it. He could tear it someplace here with the claw just to bleed it. Don't wanna kill it; he don't like blood too much in the blubber, I think. I was watching it when it was playing with that seal. Yet I run to it, it was too late, I get right close to it, and I shot it. One shot. I got one seal and one polar bear.

PIN 38, TUKTOYAKTUK

In some cases, the encounter with a pursued bear is dangerously close, and brings the risk of serious injury or death to the hunters. The story of one hunt by a Tuktoyaktuk hunter and two teenage boys provides a graphic illustration.

Had three Skidoos, and we went out springtime and run into a bear same day, bear track. Fresh one, though, and track it down.... We got it... I was gonna drive Skidoo on top there, and I got stuck in the rough ice. That 12-horse

[motor] in those small Skidoos, yellow one. While I was trying to pull it out, my boy had my other Skidoo. "Dad," he said, "polar bear is right down below." I was saying, "where, where?" Soon as they see it, the Skidoo get kinda light; pull it out right away. We was chasing it, run it down. I was trying to let my boy shoot that bear. He had a dog with him too, and I wanted to train it for polar bear. [The polar bear was so interested in the dog] he never look at my boy. My boy got scared. He took off. He was about 14 years old, I think. I had a good rifle though, and that dog didn't know my boy took off with his Skidoo.... Right after that, the dog turn around. [The polar bear] start chasing my boy. Before he get too close to those two, I shot it, just wounded it. I let my boy shoot it so he could learn right up close, maybe about 15 feet away.

PIN 28, TUKTOYAKTUK

On two occasions, a Paulatuk hunter has been so close to the polar bear when he pulled the trigger that his weapon left gunpowder marks on the hide.

I never get a close call from the bears, but I did get really close to bears.... Can you tell me how close you have to be to put powder into the [polar bear's] skin, gunpowder? That's close, man!.... When you see the powder, you have to do that close, really. I never aim. I just go ahead and pull my trigger like this — "pow!"... It's not the only time; it happened two times to me. I put gunpowder in two bears. Without aiming. It's hard for me. If I tell it to other hunters, they don't believe me. [They say], "You're full of bullshit."

PIN 164, PAULATUK

This Tuktoyaktuk hunter needed a cup of tea and some quiet contemplation immediately after he shot a charging bear.

Four years ago, I went outside of Pullen Island and the ice was really rough. I used to drive my Skidoo, and I'd run up on a piece of ice and look to see where I could go. One of those times, I saw a polar bear, and right away, I grabbed a gun. The polar bear's walking over here, and I was over here. I left my Skidoo, and I ran out to go meet it, because it was walking or eventually gonna walk to me. I figured it was about the right place to stop, [so] I stopped and hid behind a piece of ice that was as high as his tail. The bear was walking, and then when it seen me, the wind was coming from the bear. When it seen me, it just kinda turned and went towards me, because I'm different, I guess. I was pretty glad that it was coming because I thought I'm gonna have to shoot it at a far distance. It got about fifty yards, I think. I thought, maybe it's time that I can shoot it without it getting away. I thought that if I shot it at too far a distance, I would just wound it; it might get away. So, um, bear at fifty yards. I got up from behind that piece of ice, and I set my gun quite a while, and soon as the bear seen me moving around it.... started running full blast towards me. I tried yelling and hollering, just thought maybe it might stop, but it wouldn't, so I just took really careful aim. All I could see was the head and the shoulders because it's running towards you. I took real careful aim between the eyes and I shot it, and that's where I hit it, between the eyes. I didn't go look at the bear [right away].... I could see blood coming out of its ears and I knew it was dead for sure, so I walked back to my Skidoo and had a cup of tea; sat there for a while and thought about what just happened. Then I chopped my way to the bear with a Skidoo, and then I tied a string onto it. Before I left, I decided to see how close it actually was before it fell down. When I shot, it must have [been] nine steps before it [fell]... it was actually pretty close.

PIN 161, TUKTOYAKTUK

Some Inuvialuit hunters interviewed for this study say polar bears are more agile with one side of their bodies than the other, in the same way that humans are. However, it is not clear from the explanations provided by these TKHs whether polar bears can be both right- or left-handed or just left-handed, as some people think they are.⁶⁹ In either case, a hunter must study the bear closely; if it charges, he or she has a chance of escaping by moving instantly to its more awkward side.⁷⁰ A hunter from Tuktoyaktuk says that the bears can be either left- or right-handed, and that one must study them closely to determine their more agile sides.

This is how smart these bears are. When you are in their environment, where they're comfortable, and when they're threatened, you could sense it. You watch the bear to see if it's right-handed or left-handed; for instance, which way they're turning. It's important to know exactly if they're left-handed or right-handed, because if they charge you, and you want a second chance, and they be on top of you, well, you gotta know which side is his weak side.

PIN 43, TUKTOYAKTUK

Another senior hunter from Paulatuk exhorts others to stay calm when close to polar bears, and says they are left-handed.

You have to be really calm. Man, you don't move or get excited, otherwise he's going to jump you right now, and in a second you're gone. They look slow, but they're really fast, man. That's why they get their seals, 'cause they're so fast. They're left-handed, but they are good at it.... Really lively, the left hand side of the bear. [You] have to watch which side you want to go onto. It's got to be on the right side because it take a little while [for them] to turn.

PIN 164, PAULATUK

Shooting a polar bear does not mean the hunt is over. For a start, a hunter has to ensure that the bear is truly dead. The careless hunter may be in for a big surprise if this rule is ignored, as explained by the same senior Paulatuk hunter.

That's what I always told our younger generation. Be careful, look at the eyes.... If he's got it closed, he is playing dead on you. He is going to jump. So, first thing you do before you get too close is look at the eyes, see if they are closed or open.... But closed, man, you better give him a bullet right now, right where you are, don't wait.

PIN 164, PAULATUK

Skinning and fleshing

When the polar bear is confirmed dead, it must be skinned and the meat prepared for transport. At the outset, great care must be taken with the liver because it can spoil the meat. Ideally, a hunter should also wait a short time for the bear's blood to stop circulating so the hide does not get bloodied.

When you shoot the bear, you have to wait at least about half an hour before you open the skin. You wait for the blood to stop.... When you open it right away, it bleeds so much.... Blood is still circulating when they just died. You have to wait to cool it off at least about half hour. I like to do that. Not too much blood when you're cutting it. Polar bear, it's a little bit different than the other animals.... My ancestors taught me how to do that: "Don't skin that animal right away when you just shot it, because it's going to make a mess on the hide".... I talk to my boys: "Don't open the skin right away when you just shot the bear. Then you don't have a problem." Well, you have a little problem. When you're staying on the moving, thin ice, you're worried that the ice is going to crack, and you might go under the floe ice or something. So you have to skin it right away or open it and take the liver out so you don't have to spoil the meat. If you leave the liver in for a little while, probably about two, three hours, it spoils the meat from that liver. The liver is so strong it spoils the meat right away.... That's how I know about that. A lot of people know about that.

PIN 114, ULUKHAKTOK

The fleshing work — removing fat and other tissues from the hide — is done by expert woman back in the base camp or community (Photo 8).⁷¹ These women are skilled with the traditional semi-lunar knife known as the ulu.

I have trouble skinning an 11-footer by myself. It is a lot of work if you are alone. So there is different ways. An eight-footer, I can handle it easy. I teach [younger hunters] where to cut, how far to cut, and where to turn, [the] proper skinning way, how to butcher the joints from the feet, how much fat to leave on the hide for the women. Because if you take off most of the fat, it's hard for the women to flesh it. So they need the fat... the weight just takes care of itself⁷².... We do leave some fat on the meat, especially the ribs. They [elders] prefer the ribs, the feet, the hindquarters. The shoulders are straight muscle. So that one would be given to dogs.

PIN 158, PAULATUK

Frequently, a great deal of fat (oil) must be removed when fleshing a polar bear.

It takes a long time to flesh a bear, 'cause there is so much oil on that hide. It takes about two people working with three hands to flesh a bear... It will take three, four hours to flesh the oil.... A lot of the times you have to keep sharpening your ulus because the oil makes it dull. So it entails a lot of oil that you have to be fleshing.

PIN 150, PAULATUK

Hides should be skinned carefully so that the best possible price can be obtained from a taxidermist or at auction.

It could make a difference on how you skin it.... 'Cause lots of people want mounts now, and you have to know how to skin it.... Nowadays, you get people that are just asking for the hide alone, like without fleshing.... I don't know what it is; they do a better job. But a lot of game animals now, they prefer that you don't flesh them or anything. Just leave them, skin them out.

PIN 133, SACHS HARBOUR

In former times, women would transform the hides into clothing or bedding.

I seen a lot of people used to have clothing, mitts and mukluks and wind pants. I had the wind pants in my younger days. [When I was] about two years old, I guess. Polar bear — warm. They last a long time.... They used to use them for a bottom mattress because they don't get wet like a caribou skin. They put that polar bear hide next to the snow and another one on top to sleep on. My dad used to have a lot of those when I went out hunting in my younger days.

PIN 114, ULUKHAKTOK

2.4 Polar bear hunting season

As noted previously, by far the most significant aspect of Inuvialuit PBTk is direct experience and the knowledge passed from older to younger hunters. Both components are acquired through observing polar bears and their interactions with land, water, sea ice and a variety of other animals that share these environments. Furthermore, opportunities to observe polar bears, their tracks and other evidence of their presence in the ISR occur primarily in the context of hunting them while they are on sea ice. This means that Inuvialuit knowledge of polar bears is obtained primarily during those months of the year when sea



Photo 8. Skinning and fleshing provides information about the condition of a harvested polar bear.

John Lucas Jr.

ice is safe enough to travel across, although polar bears are also encountered during the warmer months while they are swimming in open water, sealing from ice pans or walking along shorelines, waiting for freeze-up.⁷³

The seasonal focus of PBTk is reflected in the polar bear harvest data collected for this study. Of 228 harvest locations within living memory marked on map biographies as part of the spatial data component for the study, 82 were tagged with information about the month when they occurred. Of these 82, 78 (95%) polar bears were harvested between freeze-up and break-up in the period December 1 to May 31 inclusive (Table 2).

Table 2. Months when polar bears were harvested

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
5	9	19	33	7	0	1	1	1	1	0	5

Source: Inuvialuit PBTk study

A similar pattern is evident in the harvest data reported in the Inuvialuit Harvest Study (IHS; Joint Secretariat 2003: 170–197). In that case, 423 (97%) of an estimated 435 polar bear harvests, were harvested from December 1 to May 31 inclusive in the ten-year period between 1988 and 1997 (see Table 3). In both of these data sets, the month with the most polar bears harvested was April: 33 (40%) in the PBTk study and 145 (33%) in the IHS.

Since approximately 1993, this is the open season for hunting bears:

- Northern Beaufort Sea zone — October 1 to May 31 (no females are to be harvested October 1 to November 30);
- Southern Beaufort Sea zone — December 1 to May 31;
- Viscount-Melville zone — January 1 to May 31.⁷⁴

Table 3. Months when polar bears were harvested, 1988–97

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1988	5	10	7	27	3	—	—	—	—	—	—	—
1989	5	11	6	15	18	—	—	—	—	—	—	8
1990	8	9	13	20	2	—	—	—	—	—	—	2
1991	5	10	12	18	7	—	—	—	—	—	1	—
1992	10	13	6	19	1	—	1	—	—	3	—	5
1993	2	1	8	13	13	—	—	—	—	—	—	5
1994	2	3	7	4	1	—	—	—	—	1	1	—
1995	2	3	11	9	—	—	—	—	—	—	—	—
1996	3	2	7	4	2	—	—	—	—	2	3	5
1997	—	3	20	16	1	—	—	—	—	—	—	1
Total	42	65	97	145	48	—	1	—	—	6	5	26

Source: Joint Secretariat 2003

2.5 Effects of changing ice conditions on Inuvialuit ice use and PBTk

The unpredictability of the increasingly thin ice, the lack of stabilizing multi-year and grounded ice, and unpredictable, stronger and/or more easterly winds in some areas (such as Ulukhaktok) have greatly increased the dangers associated with ice travel. Many polar bear and seal hunters no longer feel it is

safe to travel and harvest in some areas offshore because of the heightened danger. These days, no one travels straight across Amundsen Gulf from Cape Parry or Ulukhaktok to the point where they can reach — or even see — Nelson Head on Banks Island. In general, with rare exceptions, polar bear hunting beyond sight of land has been curtailed due to ice and safety issues.⁷⁵ There is simply too much thin unpredictable ice, rubbled ice or open water.

Several TKHs from Sachs Harbour, Ulukhaktok and Paulatuk spoke of how changing sea ice conditions and climate have affected their harvesting activities in recent years, and by extension, their knowledge of polar bears (see Section 2.6).

In later years, the ice being not as thick as it was, any little wind that comes up, you're definitely making your way back to landfast ice for sure. 'Cause that ice is not very thick. [It's] going to break off.

PIN 163, PAULATUK

Back in the day, it was the same, multi-year ice. Pretty stable ice. When it open up, it didn't really open up as bad as what it is today. [When] it open up, it'd still be safe to cross the next day. But today, if a wind comes up, man, you get across that crack right now!

PIN 163, PAULATUK

We used to be able to follow them every year, [but] with the thinner ice, we can't really see what they are doing nowadays.

PIN 115, ULUKHAKTOK

There's no more old ice, so we can't hunt, like, even ten to twenty miles out of Banks Island, 'cause of no more old ice. That's the only change I see, but the bears are still out there; we see their tracks. We see them but we can't reach 'em.

PIN 137, SACHS HARBOUR

By the second week of April this year, it was really warm already, not even like about ten years ago [when in the] middle of April [it would] still be thirty below.... We quit polar bear hunting early this year 'cause it was too warm and the sun was starting to throw heat too, so it would be too warm for the polar bear meat.

PIN 139, SACHS HARBOUR⁷⁶

It's just all broken, you know [between Ulukhaktok and Nelson Head]. Like I said, when I was flying to Inuvik, you could see some dark spots. It used to never be like that. It used to freeze once; freeze, never open, and stay frozen, and it was just beautiful.... Good for travelling. That's how come we used to go a long ways out! And there used to be pressure ridges. That's what we used to look for, and that's what I really miss right now. If this was frozen, we probably could have had our quotas. How many years in a row we could have finished our quotas if this was frozen. That's our problem. We can't get out there. There's animals out there. It's just that we can't go out, because there's broken ice.

PIN 117, ULUKHAKTOK

In my younger days, I always say nobody had to go far for polar bears when they want them. They used to use dogs in the old days, and there's no snowmobiles.... People, when they want to go polar bear hunting, they're just gone for maybe a couple of hours with dogs and turned around with a polar bear on the sled, come back with a polar bear. Sometimes they stay out a couple of days, three days, they come back with four or five bears, with dogs. Today we cannot do that anymore out of here. Sometimes we can't even go out right here because of the open water or the rough ice. We are different today; so much wind all the time, almost all the time, and breaking up the ice and stuff like that. Ice conditions right now this time of year [16 February 2010] not good anymore, every year now. No ice to travel on. You can't even travel three miles out here. Open water right there. Five minutes drive from here, maybe, to open water.

PIN 114, ULUKHAKTOK

With the ice conditions, it's open water now these past few years. So people don't go out in that direction as much as they used to. Yes, there's always open water out there all year round, and there's hunting areas...they don't go to them as much, or he hasn't gone there for years. Ones out here, farther out. People don't go hunting in that area anymore because it's always open water. It's always open out there. And all one year when I was young, I used to travel farther out there.

PIN 120, ULUKHAKTOK, Translation

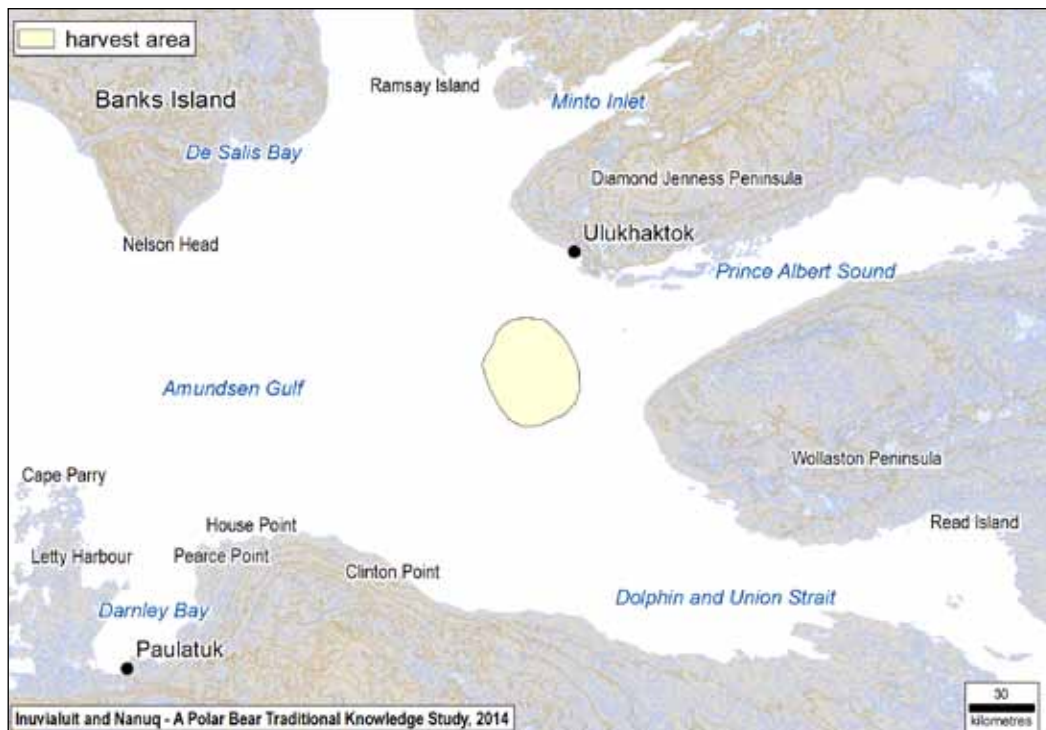
Like in the earlier years you could go out, way out, and not find a polar bear. But now the pressure ridges are closer, so you don't have to go as far and still see them.... 'cause in the past, you could go out here to here and not find a bear track, because the lead might be on this side.... It's like a needle in a haystack. You look for it, you can't find it, but as soon as you find where the open lead is then you find your needle.

PIN 158, PAULATUK

I first started [guiding] in 1985, I think, '86, from Paulatuk. From Paulatuk we had to go, we were hired, so we drove our dog team all the way to Cape Parry.... Last year I really gave it up 'cause there was so much open water [Map 7]. Even out here now, there is so much water, and it's really not very safe now to be out there.

PIN 142, PAULATUK

Map 7. A former polar bear harvest area that is no longer used due to open water



Compared to what the elders talk about in the sea ice, you know they could travel for miles on solid ice. And today, you see so much of that rough ice, and this stretches out, all outside of the islands. So when we used to try to go out, used to have to kind of go on top of the islands and see where you can try to get out.... And it is very hard to try to go anywhere with that packed ice, and makes it kind of hard to hunt. It will freeze, but the winds now will push it as much as it does. I never seen that miles and miles of smooth ice.... Once we get out past the rough ice, we can go for a distance, but then you're always going around rough ice.... and open water.

PIN 150, PAULATUK

If I'm going to go out there now, I'm going to take a big chance in order to get a bear. I don't want to go sink and get into a accident out on the ice. It's so easy now [because the] ice is so thin any time of the year, it could open up behind you and may not close for a while. That's why a lot of people shy away from the polar bear hunts now.... There's more than one in the community that goes out there hunting polar bears, but a lot of the younger generation really shy away from it now... [T]he experience you have to have out there; you gotta be smart and your thinking about what the ice is going to do. You gotta think about the wind and see how the clouds are going to go.... There's a lot of stuff that young people never really got to know. I grew up with some of it but I still need a little bit of teaching on the thin ice.

PIN 145, PAULATUK

In summary, climate change effects such as warmer temperatures, thinner ice and winds that break up or seriously rubble the ice are affecting Inuvialuit polar bear harvesting activities and the knowledge they gain from it. Hunters are no longer able to travel in some areas because of open water or dangerous ice, and as a result they are in no position to observe and learn from the bears. In addition, warmer temperatures mean that poor ice conditions arrive sooner in the spring. This disrupts Inuvialuit observational and knowledge-gathering activities that extended much longer into the season in past years.

2.6 Effects of changes in Inuvialuit economics, culture and ice use on PBTK

Changes in technology such as binoculars have enhanced the observational powers of hunters, but some technologies may have had the opposite effect. For example, the dog's acute sense of smell was once a great asset in finding polar bears, as noted by an Ulukhaktok TKH.

[T]he dogs would smell a bear, or either because of the wind, they'd smell it, or either they'd spot the tracks or just smell the tracks, even if they're partly covered from snowdrifts. It makes hunting a little easier with a dog team.

PIN 127, ULUKHAKTOK

The change from dog teams to snowmobiles as the primary means of transportation across ice and snow has reduced the frequency of maternity den sightings. An Ulukhaktok TKH noted that these days it is hard to observe changes in the numbers and locations of maternity dens, because hunters no longer use dog teams.

There is no differences in the dens, but nowadays, it's hard to tell, because we don't see them or there's not enough snow out on the ocean.... When he lived on Read Island, he knows there used to be dens year after year, but nowadays, there are no more dens there that he has heard of or seen. I think the same at Ramsey Island, too. It must be the same thing.... Nowadays, we're so different. We don't use dog teams anymore. We're very different now, so it's hard.... We used to tell with dogs; the dogs used to smell it.... Snowmobiles got no sensor.... Those dogs were the very important travelling equipment.

PIN 122, ULUKHAKTOK, TRANSLATION⁷⁷

The ban on harvesting females and cubs in maternity dens also appears to have affected PBTK of dens because Inuvialuit no longer have an economic reason — food and fur — for finding them.⁷⁸ The effect on TK is clear in this hunter's answer to the question of whether he had seen a change in the number of dens or where dens are located over his life. "I have not," he said. "I did not see too many dens. I did not go looking for dens because the White people tell us not to hunt in the dens" (PIN 124, Ulukhaktok, Translation).

Even though maternity den observations tend to be accidental these days, hunters are more alert to the presence of dens in areas known for high den density in order to avoid a surprise encounter with a female. They may also follow the tracks of females and cubs back to their dens out of curiosity.

As a hunter we're not looking for dens. We just accidentally run into them, or when you're going through a bank where there's usually a den. If [it's a] high denning area well then you watch for that, because you don't want a bear charging out of the den at you. So it's just by chance a lot of the time, and if you see a track [of a] mother and cubs going out, then you just back track them... to see where they came out. That's how you're able to identify these ones here.

PIN 43, TUKTOYAKTUK

Prior to the mid-1970s, when Inuvialuit trapped white fox intensively, and it was possible for a person to have as many as 1,000 traps on lines running 100 to 300 miles (160 to 480 km) in length,⁷⁹ the amount of time spent harvesting and the great distances covered facilitated more frequent contact with polar bears and observations of maternity dens. This TKH from Sachs Harbour said the following in reference to the west coast of Banks Island:

Long ago there used to be a lot of denning areas here. I know all around the coast when you travel, even up on land, you used to run into dens in November when they first start going, this time of year, late October, first part of November.... But now you hardly ever see that anymore. When we used to trap, we used to run across polar bear tracks heading up. But we never bother them 'cause we're busy setting traps; that's our thing. But along here, there's lots in the coast. But now we don't really travel that often. There is a few here and there that we see in the late spring that come out.... Not as much as back then [in the] '70s, '80s.

PIN 132, SACHS HARBOUR

Several TKHs spoke of the factors responsible for what they believe to be a decrease in traditional harvesting activities and the knowledge transmission associated with them. They include an increased dependence on community life, formal schooling (including residential schools), wage employment, the increasing cost of travel and harvesting (e.g., gas, snowmobile purchases), and immersion in a global culture of television, internet and computer games.⁸⁰ Younger generations are not spending as much time on the ice, water and land, they say, and therefore have fewer opportunities to learn from elders. A Paulatuk hunter said that the frequency of encounters with polar bears has declined due to decreases in harvesting and the amount of time spent at remote camps.

When I was growing up there was so many dog teams. They always have a team around the camp or whatever. Every camp you were in there is always dog teams. And you have seals all in your camp. Nowadays, I guess there's not very much people going out there, and that's where we see it changing. Not very much people going out on the camps now, stay out there for months and months like that. Just no people out there now to have any polar bear encounters.

PIN 145, PAULATUK

The same apparent decline in participation in harvesting activities was noted by a hunter from Tuktoyaktuk, who thought the cause may be related to “too much computers.”⁸¹

I've just noticed since I started hunting up until now there don't seem to be as many people travelling out in the ice as there used to be. I think you'd hear that from different hunters too; there seems to be not as much traffic out there as there used to be.

PIN 161, TUKTOYAKTUK

A hunter from Sachs Harbour attributed a decline in polar bear hunting to economic factors and competition with global mass culture.

Well, it's hard today because of computers and iPods, and they don't want to; no interest in hunting and that type of stuff anymore. Times have changed.... The American economy is way down; they're not sport hunting very much anywhere anymore.

PIN 138, SACHS HARBOUR

His reference to sport hunting relates to the ban on importing polar bear parts into the U.S. as a result of the U.S. government listing the bear as threatened under its Endangered Species Act on May 14, 2008.⁸² The reference to the “American economy” relates to the subprime mortgage crisis and resultant severe economic depression that hit the U.S. and other countries. Certainly, the ban on trophy and pelt imports had a serious impact on guiding by Inuvialuit, the majority of whose sport hunting clients were American.⁸³

When asked if polar bear hunting is still important to Inuvialuit people today, this Aklavik hunter was pessimistic about the effects of global culture on the transmission of knowledge about polar bears to youth.

Don't think it's important anymore. It's just big game, that's all it is.... People nowadays, they don't think anymore, not like long ago. Can't even pass our knowledge no more. They don't want to hear it. Honest to God, it's true. Try and tell stories; some of them get interested a little bit.... When I was younger, I was inquisitive. I always wanted to know everything. But there's no more young people like that anymore — no more. Everything is, you know, White man way — computers and things — more interesting.

PIN 17, AKLAVIK

No studies have been conducted among the Inuvialuit to examine long-term trends in harvesting. A detailed analysis of harvest trends, and the relationship between them and the transmission of PBTK to younger generations, was beyond the scope of this report.⁸⁴

Section 3

The world of the polar bear

Inuialuit PBTk has much in common with zoology, which is the study of the “structure, physiology, classification, and distribution” of animals.⁸⁵ A sub-branch known as ethology parallels PBTk more closely in that it concerns the study of animal behaviour under natural conditions. Ecology is also a good parallel because it concerns the relationships that animals have with one another and with their environment.⁸⁶

Although the PBTk study contributes to zoological, ethological and ecological knowledge about polar bears, the goal was not to build an exhaustive inventory of such knowledge. The knowledge documented here was derived primarily in response to a questionnaire administered during relatively brief interviews, as noted previously. Polar bear ecology — including habitat, food preferences and food procurement methods, in addition to behaviour, abundance, distribution, maternity den characteristics and locations, and polar bear body condition — receive the greatest attention. Most of these are important matters for humans who hunt polar bears and who therefore need to know where to find them and how to harvest them in a safe manner.

Only a small sample of Inuvialuktun terms are used in this report. English was the primary language of communication during the interviews and an in-depth linguistic component was not built into the study. Nonetheless, many of the TKHs are fluent Inuvialuktun speakers and some of them were interviewed in their native language with the assistance of interpreters. They used a variety of Inuvialuktun terms to communicate their knowledge of nanuq and the world they live in; a small sample of their vocabulary is provided in Appendix 4.

3.1 The mind of the polar bear

The Inuvialuit hunters and elders who contributed their knowledge about polar bears to this study share a deeply rooted cultural understanding of the animal's mind and/or personality and its mental powers.⁸⁷ Their view that polar bears and other animals are sentient beings is shared by other traditionally-minded indigenous peoples around the world.⁸⁸ Although never stated explicitly during any interview, TKHs implied such an understanding through their use of particular English-language terms. Polar bears have "attitude," "minds" that can be "read," and they are "aware" of what is going on around them. They want to be "understood" by humans, so they "teach" Inuvialuit hunters about themselves and their environment. When hunting seals, polar bears "concentrate" and are "focused" on breathing holes where they hope a seal will surface for air. They can also be "careless," "jumpy," and "excited" when hunting seals; these mental qualities and/or behaviours invariably scare seals away and lead to hunting failure. In addition, polar bears can be "leery," "provoked," "curious," "shy," "patient" (when hunting seals), "cautious," "stingy," "ticklish" (around dogs), "scared," "afraid," "brave," "mean," "pissed off," "laid back," "aggressive," "mad," and above all, very "smart."

It appears to TKHs, furthermore, that polar bears share a human moral universe in that they respond to respect and disrespect by humans, in the latter case by not presenting themselves to be killed by the hunter. This implies that they share human understandings of respect and disrespect, a point discussed at greater length in Appendix 5 dealing with the management of human relations with polar bears.

Examples of narratives that feature terms related to mind, personality and mental powers include this one from Ulukhaktok, in which a hunter talked about polar bears being "curious," not "scared" and not "aggressive."

My dad always said, "If there is a young male and you have occasion to stop or your dog makes noise or if there's something making noise, a young male who is out, running away, he could come to you and check you out to see what's happening." They're curious; not like females. They run away, but the young males come and check you out. They're curious.... They're not scared, you know. They're not aggressive or anything. They're just curious.

PIN 117, ULUKHAKTOK

A Sachs Harbour hunter described them as "shy," "very aware," "cautious" and not "aggressive" unless they are "provoked."

They are very shy animals. Once in a while, when they are really hungry, will they come to you. Otherwise, when you see them, they are running away all the time.... Polar bears are very aware of what's going on around them. 'Cause to me polar bears are not aggressive animals, unless you really provoke them. A lot of times when you see a polar bear, half a mile away, soon as they hear you or see you, they're going to run away. No matter how small or big they are. The ones we see, the big ones, they're more aware of what's going on around them maybe than other bears, that sort of thing. Once they see you they're going to run away. It is very, very interesting how animals, the polar bears anyways, they're... how do you say it? Cautious.

PIN 132, SACHS HARBOUR

Some polar bears get "scared" due to previous experiences with humans and as a result they get "jumpy," which means they get restless and startle easily.⁸⁹ Any kind of noise or abrupt movement on the ice will alert wary seals to the presence of a polar bear.

Long ago, they [elders] said the bear sometimes when they're chased by a human, or shot at or something like that, they get scared. And these animals are supposed to be hunting for their food. And then, when they're waiting for seals, sometimes when the seal comes up, they get jumpy... and when they move, the seal hears it and

gets away.... A lot of times, the elders used to say the reason why they get skinny is 'cause they can't hunt good anymore; they get jumpy.

PIN 23, TUKTOYAKTUK

Although he had seen and harvested many polar bears in his life, an Ulukhaktok TKH had only encountered one that was “really mad,” an injured male that had been fighting recently with another male.

I saw over probably 90 bears, somewhere around there, maybe 100 bears, but I seen only one bear really mad.... Every time I wanted to go after this bear — about a nine-foot bear — he turned around and get after me before I get close to it. Maybe from here to the hotel, he turned around and he wants to get me. I do that a few times when my wife is there with me and my boy, quite a few years back in the Prince of Wales Strait, in here somewhere [gestures].... It was quite a few years back, about '80s, somewhere around there. This one is full of scars all over; one part there's no skin, the skin's off. It just finished fighting, I guess, with another big male. I never seen it, but I could tell he finished fighting with another male. When I'm catching up to it, he's still mad, I could tell. I had to shoot this one, because I pitied it; no skin and bleeding on the neck around here on the left side; no skin about maybe that big [gestures].... This one is a real fat bear. There's lots of fat on it anyway.... But I could tell this one is a problem bear, like, mad. It wanted to kill somebody. Yeah, wanted to punch somebody.

PIN 114, ULUKHAKTOK

3 According to one Tuktoyaktuk hunter, female bears are more “leery” than male ones, while eight-foot males are more “brave” and not “afraid” to enter camps. In general, however, polar bears, don't want to be around us. They'd rather run away than stick around.... The females don't usually come to camp. They're more leery.... Very seldom a female walks up to you at a camp. It's always a male.... usually it's about an eight-footer that comes into camp because they are not afraid; they're feeling their oats a little bit, and they are getting more brave. They don't have to look over their backs a lot of the time because... they're good hunters, very fast. Sometimes the bigger bear just waits for a smaller bear to get a seal and they just take it away. That's why they [the smaller bears] keep looking back, and looking around.... So they're more aware of what's going on around them. Big bears don't even have to lift up their heads because they're not afraid. You see a big nine-, nine-and-a-half-foot... ten-foot bear...they keep their head down. The only time they lift up their heads is when they stop to sleep⁹⁰.... Young bears, you see them going like this [gestures] all the time; they just continue moving their heads. [These are] just observations, but big bears they just go their own way, doing their own thing, not afraid. They're just going at their own pace.

PIN 43, TUKTOYAKTUK

Another Tuktoyaktuk hunter said polar bears can be “mean” when they are hungry.

Good condition that one 'cause it was a really good hunter.... that was in April, and he was killing young seals.... little male, just separate from its mother, I guess.... Those are more dangerous than big ones, 'cause sometimes they're hungry, because other, bigger bears take their food, and they get kinda mean sometimes.

PIN 28, TUKTOYAKTUK

However, polar bears can also be “laid back,” particularly in comparison to grizzly bears. This Paulatuk hunter compared the different “attitudes” of the two bears while watching a combat video shot by a sport hunter.

I did see a video of a polar bear and grizzly fighting outside of Holman Island [Victoria Island].... I had it from a sports hunter. I took him out on a trip. He was out there and he was tracking an 11-foot bear, and this grizzly and polar bear met. Big mess. Next thing this grizzly is eating on this big [polar bear].... Somewhere outside of Holman Island.... But that was pretty weird. I thought, okay, a grizzly is more aggressive, a polar bear is more laid back, but in the fight, you can see the grizzly is more agile, and his attitude is just opposite [to that of a polar bear]. Whereas a polar bear, if he got mad enough, he just give him one hit, and his neck is gone.

PIN 158, PAULATUK

An in-depth exploration of Inuvialuit thinking about the “mind” of the polar bear is beyond the scope of this report, but one productive avenue of inquiry in the future may be to examine narratives in each of the three Inuvialuktun dialects for descriptive terms related to polar bear mental functions and powers. For example, the term *ihuma* (or *isuma*) normally refers to all the human “functions that we think of as cerebral: mind, thought, memory, reason, sense, ideas, will” (Briggs 1970: 359; see also Lowe 1984: 30). Some Inuit use this term when describing the thinking abilities of polar bears. For example, Pauloosie Angmarlik, a Pangnirtuuq elder, used it three times in his story about a polar bear at Qikiqtarjuaq who repeatedly pulled and released an outboard motor starter. “My belief that polar bear have the capability to think like humans became stronger after I saw for myself how the bear pulled and released the starter repeatedly” (Oosten and Laugrand 1999: 121–122). A better understanding of the way in which Inuvialuit conceptualize the “mind” of the polar bear is needed.⁹¹

3.2 Sea ice conditions associated with polar bears

Participants in the PBTk study identified and named a variety of ice conditions (Box 3), some of which are strongly associated with polar bears. The association is almost entirely related to the fact that the primary food sources of polar bears — ringed seals and bearded seals — are ice-living creatures for most of the year. Seals make breathing holes in the ice and haul-up on ice along the floe edge and open leads. They hunt Arctic cod under the surface of the ice and excavate birthing lairs for their pups in the snow on top of it. Polar bears travel across the ice in search of seals; male bears cover impressive distances in late winter and early spring each year in search of mates. Ice allows polar bears to cover far greater distances than would be possible if they had to swim across open water or navigate beaches and other terrestrial features. Moreover, ice is a polar bear hunting platform: they station themselves on ice when hunting at seal breathing holes or birthing lairs. The great importance of ice to polar bears was summed up by an Aklavik TKH:

[t]hey have to have ice — the polar bear. Can't live without ice. The way they hunt that seal. The seal won't go to them. They have to go after the seal to get it. In order to get it, they've got to have ice. No ice: no food.

PIN 17, AKLAVIK⁹²

Ice is important not only to polar bears but to the Inuvialuit as well. They use it to travel and as a hunting platform. However, some ice is an impediment to Inuvialuit hunting — when it is too rough or too thin to cross — even though polar bears may be in the area.

Ice is formed and manipulated by important land features such as capes and islands that shape the strong currents circulating around the Beaufort Sea. It is also structured by undersea features, such as shallow shoal areas where piled-up ice or icebergs (see Glossary) can ground and thereby anchor new ice against the pressure of wind and currents. Ice is greatly affected by wind, currents, tides and temperatures, which are profoundly dynamic. A constant flux throughout the year, and from one year to the next, greatly influences seals and polar bears. Climate change — with later freeze-ups, earlier break-ups, warmer temperatures, thinner ice, stronger multi-directional winds and other effects — has complicated the already dynamic nature of this complex interplay between weather, ice, seals and polar bears, adding more unpredictability from an Inuvialuit harvesting perspective. Changing sea ice and weather conditions are discussed in Section 4.1.

The meanings of “main ice,” “old ice,” “landfast ice,” and “multi-year” ice were not always clear in the context of the interviews, and for this reason, they were clarified during the October 2012 confirmation

workshops. In addition, the study paid minimal attention to the conceptualization and expression of PBTk in Inuvialuktun, because no in-depth linguistic component was built into the PBTk study, as noted in Appendix 1. Nonetheless, Inuvialuktun vocabulary for ice and related sea states was elicited during the interviews, many of which are presented in Appendix 4.⁹⁴ These terms were supplemented by additional words from Inuvialuktun dictionaries and language experts, who reviewed the spelling and meaning of terms obtained during the interviews.

Box 3. English-language and Inuvialuktun terms

TKHs used a variety of English-language and Inuvialuktun terms to describe the ice and related sea states that are associated with seals and polar bears, and with their travel and harvesting activities. English-language terms included floe edge, pressure ridge, pile-up, iceberg, crack, open lead, thin ice, young ice, new ice, rough ice, rubble ice, polynya, open water, hot spot, landfast ice, shorefast ice, steadfast ice, grounded ice, main ice, old ice, pancake ice, broken ice, moving ice, candle ice, multi-year ice and drain holes.⁹³

3

Pressure ridges

TKHs from all six Inuvialuit communities said that polar bears frequent pressure ridges, defined as follows by a hunter from Paulatuk.

A pressure ridge is from two large pans of ice coming together. When there are two large pans of ice, and there's a lead, and they have no place to go, the pressure is so great that they have to build up this way. On the sides of the pressure ridge you can actually see water, because it's got a dip on both sides. You can see salt water along the edges.

PIN 160, PAULATUK

Pressure ridges are an ideal place for polar bears to find seals. That is why Inuvialuit hunters often concentrate their harvesting efforts along such ice features (Photo 9), as explained by this Ulukhaktok TKH.

They look for a place where there's a pressure ridge and good ice. You have to have good ice. If you don't have good ice, you're going to have a hard time with the bear. They can't find a feeding ground. Like my dad always say, "If the ice is too smooth and it's too good, there's no bear; and also, if the ice is too rough, there's no bear." You've got to have ice where an animal could notice where the game is going to be more, the seals are going to



Photo 9. Inuvialuit establish camps on the ice and base their polar bear hunting activities there.

Jean and Pat Ekpakhohak

be. "Good ice," that's what I call it. It's kind of old ice but not glaciers; not old ice. It's a place where there's pressure ridges, and it's not lumpy, not rough, like ripples and that. It's smooth, but where it's packed up and opened again and packed up again, so there's a pressure ridge. That's the one where they could find seals to squash, or either a spot they're making pups in, because it's all snowed up and they make dens. So, they look for a place where there's good ice, where the seals could make their pups and also, the polar bears are hunting for good ice. If they know there's a good pressure ridge, no matter how many bears there is, the bear could use it back and forth for quite a while, because it's got a good feeding place, because all the seals are there. That's how they usually look for a place where they could hunt. My dad used to go straight out from here. I used to follow him. He used to find a good pressure ridge and we used to camp there, 'cause he knows the polar bears are going to go back and forth.

PIN 117, ULUKHAKTOK

Polar bears do not roam in a random way across the sea ice; they concentrate along pressure ridges (Photo 10) situated near points of land, according to another Ulukhaktok hunter.

At the points, there are usually pressure ridges. So, the person would walk along the pressure ridges and look for, or try and find the seal through the snow.... By using the pressure ridges, they would hunt the bear, because they know the bear is hunting out on those pressure ridges, looking for seals.... When there's no pressure ridges... the bear is just wandering around, not hunting.

PIN 120, ULUKHAKTOK, Translation

Female seals make their dens along pressure ridges. Inuvialuit observe polar bears hunting there in April when the seals are being born.

I think the most ones they like is where there's pressure ridges moving all the time, because there's always holes there. A lot of the time, too, when there's young seals that are born in April, you'll see a lot of the polar bears, their tracks. They're going onto the old ice, like landfast ice. Maybe five, six feet thick, because seals will have their dens in those ones, and then, in their dens young seals would be there. That's how they do their hunting for young seals, as well.

PIN 115, ULUKHAKTOK

Participants in the Ulukhaktok confirmation workshop in October 2012 pointed out a long pressure ridge (Map 8) running along the shoreline from Nelson Head to Coal Mine Bluffs, Ramsay Island, Mount Phayre and from there to Kitikkat (south shore of Minto Inlet) and Ulukhaktok. The pressure ridge is in more or less the same location from one year to the next. It emerges when the ice freezes solid and settles. Polar bears will use one side of the ridge or the other, depending on the wind direction.



Photo 10. Looking for young ice from the top of a pressure ridge, March 1995.

Tony Green

The bears would follow them at times, 'cause they're pressure ridges and they're open sometimes. Then they look for seals on them.... They walk on the side [of the ridge] where the wind is blowing towards so that they can smell if there are seals that might be going up or breathing from the pressure ridges.⁹⁵

Map 8. A predictable pressure ridge, from Ulukhaktok to Nelson Head



A Paulatuk hunter also spoke of polar bears sniffing out seals along pressure ridges.

When the ice gets this thick here, that's where they [polar bears] look for seals with young ones and their holes ... That would happen from January to April. You see them [polar bears] following ice ridges. Every time you see a bear track, they're going to be heading for the ice ridge, like they'll use it.... they'll be following the ice ridge, just smelling the seal.... as long as you see an ice ridge, you're pretty much guaranteed to see bear tracks.

PIN 145, PAULATUK.

Another Paulatuk hunter described a combination of pressure ridges and open leads that form annually off Cape Parry and Pearce Point (Map 9).

Every year there's the same pressure ridge. Every year it's the same place.... I show you this one here and Pearce Point.... and then it would run right across there. And then there's a place call Fiji Island, which is this one [gestures].... There'd always be a lead there.... Going through Pearce Point, and every year it would always be a lead there.... Hardly ever get out there in December unless we're doing something else out there. Don't really get out on the ice 'til probably January. Back before my time, though, guys used to go out hunting polar bear before Christmas.... like, in December. We'd go out any time from February to the end of April.... [It would] be pretty much the same.... It would be a lead and a pressure ridge.... The lead would open up and.... close like this. Constantly be a lead in there somewhere.... And then when it closes, of course, it's a pressure ridge. But when it opens, it's a lead again. So basically it's a pressure ridge that usually opens and closes. Those features are still here today.

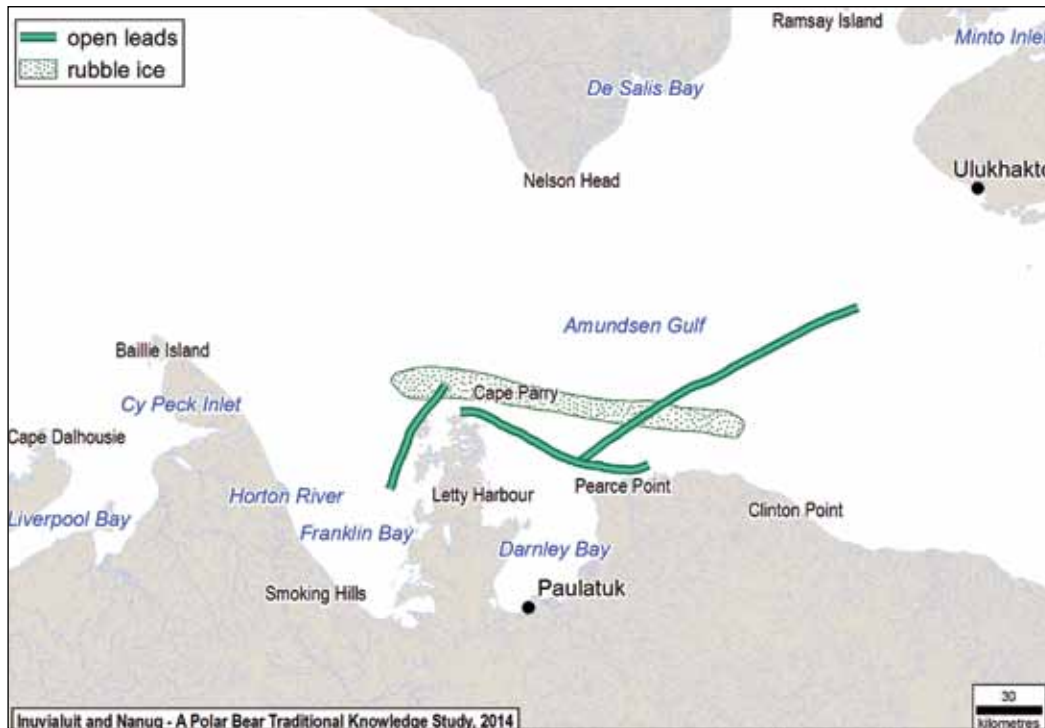
PIN 163, PAULATUK

Pressure ridges form near Herschel Island as well, and Inuvialuit hunters from Aklavik know that polar bears follow them in pursuit of seals.

Polar bears always [follow] the pressure ridges, and then that's when you know there's a crack there. And they start digging around.... for example, out at Herschel Island, towards the east, about a mile out, there's always that big chunk of ice that gets grounded; must be a shallow spot. They always get grounded by the ice there. And when it piles up, and then when seals always use that for going on to, and then they go back down.

PIN 13, AKLAVIK

Map 9. Locations of open leads and rubble ice as described by one Paulatuk hunter



Source: PIN 163

Cracks

Currents, tides and winds exert exceptional pressure on all kinds of ice. In addition to forcing large pans together so that they form pressure ridges, these forces also cause ice to crack open. Although the water in the cracks may freeze, the thin ice covering them is good for seal breathing holes. An Ulukhaktok hunter explains:

Also, the cracks that have formed in the winter, they're opening up, and then they form ice; and that ice is a little bit thinner, and seals make holes — breathing holes — in those areas. So, the bear would use that to hunt in those areas.... It's always changing.

PIN 120, ULUKHAKTOK, Translation

A Paulatuk TKH described a single crack running from Pearce Point towards Ulukhaktok where he harvested his first polar bear at the end of February 1980. At that time, winter temperatures were low as minus forty or fifty degrees Celsius, and many bears were concentrated along this crack. It was the first time he had ever seen so many along a crack.

There was all this old ice out there, solid ice, and there was just one main crack that ran probably from there, right to the Holman Island area.... There was one main lead that was running somewhere in that direction. I was 18, so it would be 1980.... One lead in there. The cracks were probably eight-foot wide, with bear tracks. And every few feet there'd be bear track coming in or going out of the crack. It was pretty wild. That's the only time I've

ever seen that, so many bears concentrated in one area.... They were feeding in the area.... Back then, we'd have communication with other people in the region with bush radio.... Guys were saying it was solid ice, no cracks, nothing anywhere. So that's probably why [the bears] were all concentrated in the area.... I was 18 at the time I got my first bear. We got four that one day. It was open, the tag system. The quota system was a lot different back then; it was more old-school. The good old days, you know. Anyways, we got four that one day. They were all big bears.... nine-and-a-half- to ten-footers.... They were all males.... We probably saw a good twenty bears, counting the females with small ones. There was lots of females with young in the area, too.

PIN 163, PAULATUK

A Tuktoyaktuk TKH said the cracks are the best place to hunt polar bears because of their preference for this ice feature.

[Polar bears] like cracks. Cracks is the best place to hunt for them; even in whole ice, if there's a crack they'll follow it. There's some cracks they call aayuraq. Even if it freezes, it keeps opening, keeps getting wider. That's the kind they like to follow.... that never heals.

PIN 33, TUKTOYAKTUK

An Aklavik hunter knows that a linear series of seal holes indicates the presence of a long crack covered by thin ice.

I always tell other people, "wherever you see a seal hole, that's a crack." If I see a seal hole here, another ten minutes, five minutes ride, we see another seal hole there. That's a main crack. I always try to explain to people, "The more seal holes you see, that's the more cracks are out there." There's cracks here, one seal hole here, you go about a mile out, there's another crack, another seal there.... And that's the way I go by, because seals always stay in the cracks. They always be in the cracks.

PIN 13, AKLAVIK

Open leads

When an ice field cracks open, and the water between the cracks is large enough, it is known as an open lead. The size of leads depends on the strength of the current or wind in the area. Photo 11 shows an



Photo 11. An open lead north of Paulatuk, winter 1972.

Tony Green

open lead that formed north of Paulatuk in the winter of 1972. Paulatuk hunter Tony Green said he and his companions “had a bear across there [open lead], and we were figuring how we were going to get to that.”

Seals like open leads and so do polar bears, explained another hunter from Paulatuk.

[I]f you had ice like this here [gestures] and it cracked and opened up twenty feet, that would be a perfect place for a [polar] bear to hunt seals. They'd harvest from that; they'd walk along it. That lead there would be a perfect seal area.

PIN 145, PAULATUK

One of his fellow community members first spotted an open lead north of Darnley Bay on a satellite map. He and his hunting companions found the lead using a GPS unit, and it soon proved to be a good bear-hunting location.

The one year there was completely no leads of any kind.... not sure what year that was [after 2000] but the whole thing was just solid.... And what happened was my uncle [PIN 147] somehow got a map of the ice, and through satellite we found one lead that was coming out, like that.... He had a map of the ice. So on that map there was dark-coloured ice.... and we found looking at that it's got to be a lead, 'cause the whole thing is solid.... And I punched in the GPS. Then we went from the camp out, and sure enough this was a lead, and that's where the bears were hanging out.... [T]hey don't really hang around when there is no lead. They're mainly hooked on to the lead. Whatever lead they can smell or see, they will be there.... This one was like a straight crack; it was going straight out, and it was into the rough ice. That's why we couldn't see it. There was about four of them [polar bears] that came out that one day.... they were using that one a lot. So we got one that was 11 foot for the sport hunter out of this one [lead].... I think they were hunting along that area.... All the rest was just frozen, so they hunt along this one here. I don't know how far it went, but you couldn't even see the other side when you look into there.... On this satellite map it was a long, long one [lead].... I believe in March.

PIN 144, PAULATUK

Open leads may be considered open water when they reach a certain size (Map 10), and they can be detected from afar because the clouds above them are darker than those over solid ice.⁹⁶

That is another thing I learned, too. When you are out on the ice, and sometimes you are out and there is no open water to be seen. Ice side look for dark clouds, and the dark clouds are a reflection of open water. So people start to follow where the dark clouds are, and they usually find open water. And that's where seals are and the bears go to eat.

PIN 150, PAULATUK

Polynyas

Polynyas are a type of open water that does not freeze during the winter or which remains open for long periods of time. Their edges are normally productive zones for seals and polar bears, and they can be detected from afar because of the “fog” that forms over them during extreme cold.⁹⁷ A Paulatuk hunter described the large polynya he ran into between Cape Parry and Nelson Head in the winter of 2005 (Map 11).

[PIN 164] and I ran into that one, back in, I think, 2005. It was in that area.... What's-his-name was across from us [PIN 132]. He was on the other side.... When we ran into that one, it was there, but it's moveable. It's not a polynya that stays there every year. Sometimes on Holman Island they run into it not far out of Ulukhaktok.... If you look into our recent planning for a Marine Protected Area, science shows that the polynya is basically outside of Cape Parry, in that feeding area.... Science says it should always be there because there's a lot of current around there. But it's not always there, even though the current is strong.... You have to remember that what we're stating as “polynyas” now, they used to call “open water”.... You can't see [across it] because in the winter-time there's a fog. The water creates its own fog system.

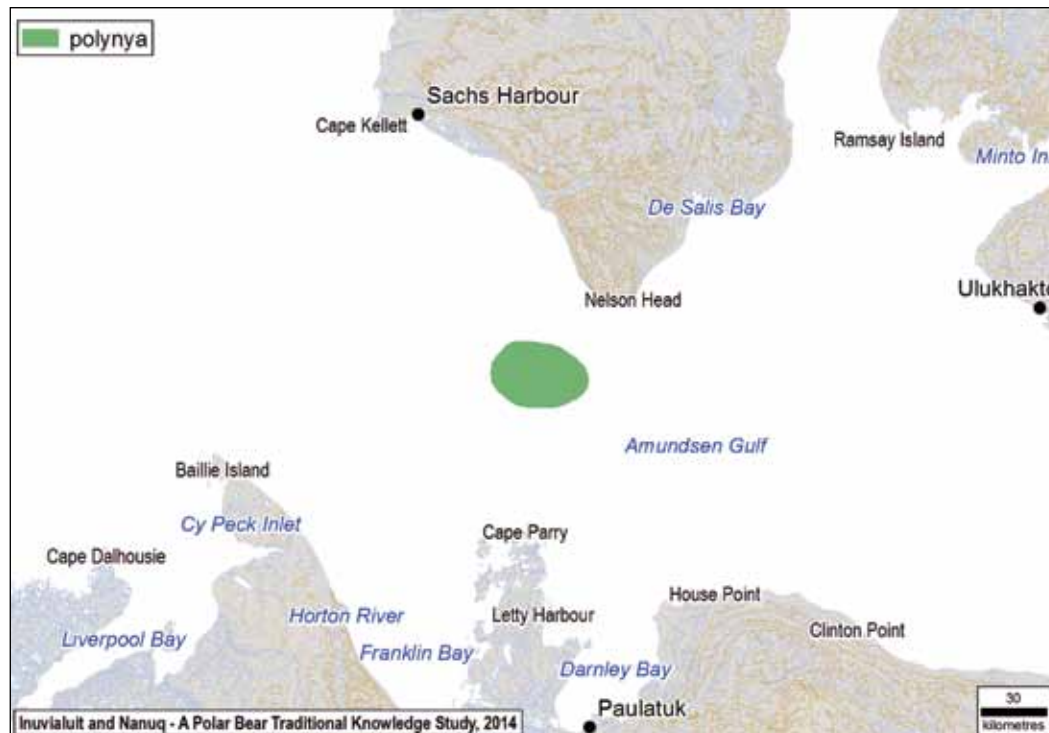
PIN 160, PAULATUK

Map 10. An open lead from Darnley Bay north towards Nelson Head, identified using a satellite image



3

Map 11. A recurrent polynya (open water) that forms between Nelson Head and Cape Parry



Source: PIN 160, Paulatuk

Young ice, new ice, thin ice

Young ice, otherwise known as new ice or thin ice, forms on the water created by cracks in icefields and grows outwards from the ever-expanding landfast ice in the late fall and early winter. Polar bears hunt seals at breathing holes along cracks, as noted previously, and in the zone where young ice and older solid ice meet. Ringed seals may keep their breathing holes open as the ice grows thicker throughout the winter, and as snow accumulates on top, they may decide to make their birthing lairs there. An Ulukhaktok hunter explained:

The way [the polar bears] hunt is on the edge of the thin ice, where the seals make a hole.... So, if the seals make a hole on the edge of the thin ice, and then it gets covered with snow, the more snow it gets, that's where the seal hole is. The seal hole is going to be big, and he's⁹⁸ going to start digging onto the snow and he's going to start making his den. If he makes his den there, that's where he's going to have his pup. That's how come the seals have to find a place where it's going to have all ice — like, maybe about four feet/six feet of ice, and then, young ice on it so he could have seal holes. That's the thin part. And after that, it's going to start getting thicker in months to come. But it's not going to be thicker, the other place, because it's going to have a snowbank on it. The snow is the one that keeps it warm. That's where he's going to have his pups. Not only the females, they stay in the den; even the big male seals. But the bearded seals don't do that.

PIN 117, ULUKHAKTOK

Another Ulukhaktok TKH described the importance of this zone to polar bears (Photo 12). The reference to old ice, in translation, is probably to solid ice that has cracked open, not multi-year ice that has survived the summer.

They [polar bears] like to be around where the young ice is and the old ice meet together — the part where it meets and opens — open and closed. They don't usually be around rough ice, but they seen some when they travel that they used, that route where the old ice and the young ice are together, meet together. At one time, when we were travelling, following the old ice and the new ice — it's safe enough to travel on. And as we were travelling, we come across a lot of tracks where the old ice and the new ice meet.... It is like that when you come at the right time; as you travel, seems like there are lots of polar bears.

PIN 119, ULUKHAKTOK, Translation

Polar bears are able to walk on extremely thin ice, as noted by a Tuktoyaktuk TKH: “[t]hey can walk on thin ice, for sure. If a man can't walk [on it], I think they could probably walk on it, 'cause they spread their feet right out and crawl” (PIN 33, Tuktoyaktuk).

Multi-year ice

Multi-year ice is ice that has survived the summer.⁹⁹ Sachs Harbour TKHs know that this ice resides far to the west of Banks Island and that its eastern limit was much closer to their shores prior to the late 1980s, when climate change effects became apparent. Inuvialuit have observed isolated and large patches of multi-year ice in the past offshore of Banks Island, in M'Clure Strait, Wynniatt Bay, floating down Prince of Wales Strait, and even along the coast of the Northwest Territories and Yukon North Slope. One Ulukhaktok hunter said that polar bears avoid multi-year ice, particularly large, solid fields of such thick ice.

The polar bear will avoid multi-year ice, because they know that there's no seals in that area where there's multi-year ice. That really thick ice. They'll go to ice that is thin and also where the seals are coming up through the young ice and where they have their holes.

PIN 115, ULUKHAKTOK

However, other hunters noted the presence of polar bears on or around floating multi-year ice. One Sachs Harbour TKH said he had encountered a polar bear floating on a large chunk of such ice just south of the community a couple of years previously.

But last few years, been no ice at all. Two years ago we saw one polar bear out here. [That] was on the multi-year ice that came down the [Prince of Wales] strait. And we could tell it's multi-year ice, 'cause they're big chunks of ice, and they're not flat. And, he didn't look in very good shape, because you could almost see the rump, eh? We snuck up to it on the boat. He couldn't hear us 'cause the waves were hitting the ice. And I guess he's just laying on those big chunks of ice, 'cause there's no flat ice for seal.... [There] just wasn't that much ice. It all drifted around here, 'cause as soon as we see ice, we'll go out.... check it. 'Cause that was the only ice that was around, is up there. And that's the multi-year ice.

PIN 133, SACHS HARBOUR

A Tuktoyaktuk TKH reported that pieces of multi-year ice, probably from the Melville Island area, used to end up near the community. Many polar bears were observed on such ice in the spring.

I think some of those multi-year ice come from, what you call, that other side of Sachs Harbour, that Melville Island.... it breaks, some pieces break off and they end up down here.... They [polar bears] love those old ice. It's full of bears sometimes. They so enjoy the motions, those bears, you know.... Some of them, they so full, they sleeping and resting and digesting their food and looking for their girlfriends too, I guess. Springtime anyway; that's the time they start looking for females.

PIN 28, TUKTOYAKTUK

In the Paulatuk area, polar bears were observed hunting seals that had hauled up on chunks of multi-year ice.

My brother told me a story about them seeing polar bears just in this bay here.... Around them big icebergs, floating ice. Now you don't; it's just no more, how do you call that ice? Multi-year ice. They'd [polar bears] hunt seals then on ice; lots of seals haul up on the ice, and they reach the prey, I guess, swim around them and pop up right beside them.

PIN 145, PAULATUK.

Paulatuk hunters no longer see multi-year ice along their coastline. When it did persist throughout the summer, it played an important role in ice formation at freeze-up the next fall.



Photo 12. A polar bear on young ice, March 1995.

Tony Green

We don't get that ice anymore.... When you had those multi-year ice coming in, in August or September, then they would fuse all the ice together. That ice would stay there. Now we don't get that anymore. We don't get that movement of multi-year ice within the bay area. Now we get a big east wind or a west wind, all that new ice is put to the beach.

PIN 160, PAULATUK

Multi-year ice was a source of drinking water for Inuvialuit hunting polar bears. According to one hunter, they could get good water, “[r]ight on top of the ice... you’d have fresh water, but we don’t see those kind of ice anymore” (PIN 142, Paulatuk). Floating chunks of such ice also provided drinking water after break-up to people travelling or hunting by boat.

I remember back in the '70s and '80s, when we used to get that [multi-year] ice out here, we used to go out with the boat, go to the icebergs and fill up your buckets with ice. That's the water you could drink. Not anymore.

PIN 160, PAULATUK

Icebergs

Large agglomerations of any kind of ice, whether formed that year or multi-year ice, are generally referred to by Inuvialuit as icebergs. A Paulatuk TKH provides this definition of iceberg.

What we call iceberg around here... it could be a big pressure ridge broken off and goes sailing off into the sea. Fusions of all the ice being broken off from a pressure ridge or multi-year ice being pressured on land, as it breaks up and goes farther into the ocean.

PIN 163, PAULATUK

On occasion, hunters would observe icebergs sailing upwind, carried along by the powerful currents swirling by Browns Harbour.

Back in the '90s, when we used to do whaling out in Browns Harbour, we used to watch those big chunks of.. icebergs, or ice islands. We'd have a strong east wind, but still those big chunks of ice, they're still coming at us. They're still bucking the wind from the current.... You don't see them anymore.

PIN 160, PAULATUK

A Tuktoyaktuk TKH made the same point; the currents around Cape Bathurst will at times transport enormous icebergs upwind.

One time when we was going to a camp in North Star Harbour, we went with a boat. Out here was a really strong current. You could see those big holes going around. You can't get near it 'cause the boat gonna get near it and can't come out.... The current is really powerful. Sometimes the current alone, even though it's windy, it could go against the wind, the ice could travel. Big ice we used to see sometimes; we used to see travelling against the wind.... big iceberg, bigger than this house.

PIN 28, TUKTOYAKTUK

An Ulukhaktok hunter said that polar bears stayed on icebergs in the summer.

The bears stick around on the old ice in summertime; and at this time of year [February], they're always looking for thin ice. They're just trying to find some seals. In the summertime, they've got to stay on the icebergs.

PIN 122, ULUKHAKTOK

Rubble ice, rough ice, and pile-ups

Rubble ice or rough ice and pile-ups have always been an important feature of the Beaufort Sea environment during the winter months, although there is more rubble ice these days as a result of warmer temperatures and thinner ice conditions overall.¹⁰⁰ This point was reiterated at the Paulatuk confirmation workshop in October 2012 by a TKH, who said, “[i]t's not thick enough, and that's why it turns to rubble

ice. Unlike the old days, when it's cold. Now, any kind of wind you get out there, it just moves the ice along and it's really rough" (PIN 164, Paulatuk). Another hunter from the community noted the normal annual variation in the extent of rubble ice, but also said that conditions had changed substantially since the late 1990s.

But the thing is, outside of this here.... always seem to be water and young ice and rubble ice. Lots of rubble ice. Some years you can't even go out, because there's so much rubble ice.... That main place would probably be right in this area right here [gestures].... Every year there's always rubble ice there, but probably since the '90s, it's been showing up all over the place, the rubble ice. The open water is in this whole area, right from here out here. Always seem to be rubble ice and open water. That'd be from the late '90s until today.

PIN 163, PAULATUK

In the 1940s, farther west in the Tuktoyaktuk area, the ice used to thicken considerably in the extremely cold temperatures that were normal then. As a result, the ice grounded and the currents piled more ice on top until it was at times mountainous, as much as forty feet (16 m) high.¹⁰¹ Huge piles of thick ice are no longer seen, according to this Tuktoyaktuk TKH.

It depends on the current, and the wind. [If] there is a lot of wind, I see a lot of rough ice. When we was staying on Baillie Island in those years, we witnessed a lot of ice movement. There is always a strong current right here at North West Point. Even in summertime, you go, there is a lot of current there, and it is always opening up, because it is really deep. Deep under the bluff here.... In the fall time, if you are living there where you are watching all of this, [it] takes a long time [for the ice] to get farther and farther [from shore]. It stays very close [to shore] for a long time. And then, as the winter starts, ice starts getting thicker. I believe it might be a little changed now. I believe the ice might be not very far anymore. Then, it used to be because it is a lot different in the ice thickness. In those years, like in 1940, the ice was thick; seven and a half feet thick sometimes, and the ice [temperature] is so cold. Ah: fifty, sixty below, every year. It never change. And late winter, when it start to get really thick, that's when it started getting grounded earlier, 'cause the thicker the ice, the quicker it reaches through to the bottom. You see lots of rough ice, big, it's just like mountains sometimes. Now you don't see that anymore; hardly no more rubble.

PIN 23, TUKTOYAKTOK

Large agglomerations of piled ice, at times mountainous in size, are called pile-ups (Photo 13). They form in shallow water areas, as explained by a Tuktoyaktuk hunter.



Photo 13. A large pile-up of ice.

Jean and Pat Ekpakhohak

There's always pile-up, like piled-up ice and that. Shallow water — that's where they pile up. Ice condition not always the same; they're always different, but shallow water, that's where they get grounded. That's where we mostly camp; we call it safe ice.

PIN 28, TUKTOYAKTUK

An Ulukhaktok TKH also observed pile-ups in shallow water zones.

That's what the ice is, piled up. And when it piled up like that, it takes me a little while to know which is the shallow parts out there. Shallow parts is the ones that always have big pile of ice. When the bottom touch the thing, when they start build up on top, you notice this right away, call it shallow part. Could be six, eight feet, but it still builds up.

PIN 117, ULUKHAKTOK

Like an iceberg, a pile-up (Photo 14) may be useful for “glassing” polar bears or better ice conditions, but it is not good a place to hunt polar bears.¹⁰² Seals do not make breathing holes in ice like this, particularly if it is still actively building. An Ulukhaktok TKH explained that his father taught him to avoid such ice conditions when hunting polar bears.

His father taught him never to travel on rough ice conditions when he's out hunting bear, because it's less likely for him to spot a [bear] that's looking for a seal hole, because seals don't make dens or make holes — breathing holes — in rough ice.... like a pile-up of ice on top of each other. Ice piles.... Hunt on those small pressure ridges, but on the pile of ice that's constantly being piled up all the time, that gets thick, seals do not use those areas for making breathing holes. So, his father had told him not to hunt in those areas, because you won't have a good chance of seeing a polar bear in that area.

PIN 120, ULUKHAKTOK, Translation

A Paulatuk TKH had a slightly different perspective on rubble ice and whether seals make use of it, although the difference may be related to the configuration of the rubble and whether it is active or not. From the perspective of this hunter, too much rubble ice is not good for polar bears, because there are too many breathing holes for seals. He explained that in the winter of 2006 Inuvialuit hunters and scientists had both noted that the bears were “lean” because of extensive rubble ice. Conditions were so bad that he telephoned his sport-hunting client to advise him not to come. Despite the conditions, however, the hunter did come, and he succeeded in killing a bear in the vicinity of their camp near Fiji Island.

This was the last bear we got, that was 2006.... The same year, there was a team of biologists working out of Browns Harbour. They were doing a polar bear study. And we had done our hunt and passed by the camp.... [PIN 164] was there so we decided to have coffee there. And started talking about [how] the bear was pretty lean. The scientists were saying every bear that they had studied that year was the same thing — lean, lean, lean.... And that year the ice was so badly rubble, this was the only way I could do my hunt. I phoned the guy, “this is the only choices we have... to sit there and have the bear come to us. Because we're not making any movement. If you want to come back next year, come back next year.” But he was an older guy, 67 years old, so he said sitting there [at camp], no problem. He was happy.... We sat there for ten days. On the tenth night he [the bear] came in. Twelve midnight. Eight and a half foot long, so that was a good thing. But like I was saying, these scientists were saying that year that they were all lean bears. And then that year it was all rubble ice. Man, everywhere was! We went to scout out this area [Pearce Point]. It was all rubble, it wasn't worth it. So we decided to go up there. Just sit up there.... I could understand why they were not having any scientific knowledge or anything, having knowledge on the land. I could see from the condition of the rubble ice there was nowhere for these bears to concentrate. 'Cause there was so much open places for the seals to go. They'd be all spread out all over the place and just nowhere for the bears to hunt them. And that's why they were so lean that year. The old ice creates cracks, stability, so you don't have much open areas. You have places where seals concentrate, and... that's where the bears are going to concentrate too.

PIN 163, PAULATUK

The relationship between variable sea ice conditions and polar bear condition was also touched on by an Ulukhaktok TKH:

[w]hen conditions for hunting seals for the bear... their ice conditions aren't all that great, piled-up ice and stuff like that, some years the bears are thinner, some years they're fatter.... depending on ice conditions. Even what he hears from his father and his grandfather, it depends on the ice conditions for that year. If the ice conditions are good enough for the seals to be making dens in that area, the bear seal hunting area, then the bears are healthy, in good shape. But when the conditions are bad, the bears aren't fat.

PIN 120, ULUKHAKTOK, Translation

Nonetheless, rubbled, rough ice has certain advantages for polar bears. They use it as a refuge from other bears, a place to eat a recently killed seal without being disturbed, or in the case of females and cubs, a refuge when threatened by males. They also regard it as a safe haven from humans; they may run into it when approached by a hunter and/or his dogs. The following narrative helps illustrate these points:

We went there '73; stayed in a cabin at Pearce Point. It was an old RCMP cabin, so we stayed there, and the next day we went out early, about 9 o'clock, 10. Then we stayed out here all day, put up a tent.... There was no lead that close those years. Young ice, but not frozen, I mean thick enough. Later on, we went out with the Skidoos. We saw the tracks and stopped the Skidoos. Then we ran after it [the bear] and we got it.... It was on rough ice. There was this bear who was hunting seals on the rough ice, just like that one there, where they have the seals. They follow the ridges... When we got that one it had a lot of fat on it; it was a healthy bear.... Later on, when we were coming back at night, there was an eight-footer who got a seal. But we never saw it; the polar bear dragged it off to the rough ice.... they [polar bears] drag it inside the rough ice where they can't be bothered.

PIN 142, PAULATUK

Rubbled, rough ice impedes travel by Inuvialuit hunters and separates them from young ice where polar bears may be present. Photo 15, 16 and 17 show this rough ice. Tony Green of Paulatuk, who took Photo 15 and 16, said at the October 2012 confirmation workshop that he and his fellow hunters, “were trying to find a way to break trail into that other young ice. There was no sign [of polar bear] on this side, and we see there’s another one just out here. So what we do is we take our axe and it took us a couple of days to go through. But we went through and we got all the bears there. It happens sometimes; you have bears just a mile away from where you are.... It takes time. You’re just trying to break through. It’s about a mile and a half, two miles out here.”



Photo 14. A pile-up of ice, probably in a shallow area, February 1995.

Tony Green

Landfast ice/shorefast ice/main ice

What Inuvialuit refer to in English as “landfast,” “shorefast” or “main ice” (Photo 18) forms in the fall each year in the bays and along the coastlines of Banks Island, Victoria Island, the Northwest Territories and Yukon North Slope. As freeze-up progresses, the edges of this ice extend farther out the bays and away from shore until they intercept the strong currents of the Beaufort Sea and come into contact with floating, moving pack ice. Landfast is solid, steadfast ice and is generally safe to travel and camp on, especially if it is grounded by pile-ups. In the spring, however, large pieces of landfast ice may break off and float into the ocean. A Paulatuk TKH explained landfast ice this way:

Say I'm on the radio and I'm talking with somebody from Tuk, one of the hunters, I'm on the radio with them. And I say, "Where you are?" He say he's in the main ice. Right away I pick him up, he's in the solid ice. Polar bears do go into the main ice. You see them get seal pups in the ice where it don't move. That's where they go.... All of us all over the coast we know where to set up a tent; it's in the main ice. Everyone knows that within the coast.

PIN 164, PAULATUK¹⁰³



Photo 15. Rough ice north of Cape Parry that Paulatuk hunters had to cut through, February 1995.

Tony Green



Photo 16. Breaking through rough ice with an axe north of Cape Parry, February 1995.

Tony Green

Due to climate change, the landfast ice no longer extends north of Cape Parry.

There's no more main ice anywhere you go north of Cape Parry. No more. It's finished. This time, March time. It could be main ice out there, it never opened for how many years? The only solid ice we got is, we can't pass the islands, we stay around the coastline all the way now.

PIN 164, PAULATUK¹⁰⁴

A Tuktoyaktuk hunter explained that he establishes his camps on the shorefast (landfast) ice for safety reasons, particularly in shallow places where pile-ups have anchored the ice to the seabed.

Shorefast ice, you stay on it, and you go to ice piles that are being tied to the seabed. That's where you camp. You can hunt from there. If there's a question mark as to [whether] the ice is floating, and ice condition are not too bad, you move back until you find a safe place where you are comfortable to camp.

PIN 43, TUKTOYAKTUK

3



Photo 17. Rubble ice between Herschel Island and Kay Point.
Jonas Meyook



Photo 18. Main ice (solid ice) north of Paulatuk, February 1995.
Tony Green

Polar bears wander the shorefast ice in February and March hunting for seals, but Inuvialuit hunters rarely encounter them there. The best place to harvest bears is where the shorefast ice meets the moving ice, at the floe edge.

You could hunt bears on shorefast anywhere, basically about ten miles offshore, 'cause bears come in the months of February and March to hunt seal pups. They're wandering the shorefast ice. They come in there, ones that choose to come in and hunt on the shorefast ice for seal pups.... The place that you try to reach and [where] you go [to] see bear movement is right on the floe edge. You get to where the shorefast ice meets the moving ice, and you're guaranteed to see something move.... For instance, Baillie Island. When I said I went out on floating ice, fifteen miles out, and got a bear for sport hunters, I was out there for six days, and the first three days, the ice never move. It was just floating. That's why I was at five miles, ten miles and then fifteen miles [out from land]. F'inally got a bear. You see bear tracks all over, but we never saw a bear either going out or coming back. But you see fresh tracks every morning when you're going out, and coming back some more fresh tracks, but you just never see the bears. The bears are out there even though you don't see them.... I would say about ten percent of the population is what you're seeing on the shorefast ice.

PIN 43, TUKTOYAKTUK

Floe edge

The importance of the floe edge to polar bears was explained by a number of PBTk study participants. This zone — between stable, landfast ice and moving ice — is a prime hunting area for polar bears, according to a Sachs Harbour TKH: “[t]he majority of them are either at the floe edge hunting, but when it comes to chasing, breeding, they will travel anywhere” (PIN 132, Sachs Harbour).

An example of a floe edge is depicted in Photo 19. According to the photographer, Tony Green of Paulatuk, “you could see a bear in a minute from here when you see something like that.... That floe edge goes right up to Nelson Head.”¹⁰⁵ Immediately to the right of the jumbled line of ice in the photo is newly frozen ice and to the right of that is the moving ice.

A Tuktoyaktuk hunter said polar bears hunt seals in their breathing holes in fresh ice along the floe edge. *[Polar bears] they like the flowing ice when it freezes overnight.... That's what they love, right on the edge, 'cause seals like to make holes in the edge of that moving ice. You could see their breathing hole sometimes when you*



Photo 19. A floe edge from the Paulatuk area north to Nelson Head. Tony Green

travel. They make a little house and hole in the middle so they could blow and have air.... Sometimes, once in a while, you could see a seal breathing when it's cold weather, making smoke. Or sometimes the water spray of his mouth.... All year round, I guess; in solid ice they got breathing holes and beds.

PIN 28, TUKTOYAKTUK

Another hunter from the community said that denning seals are located under the snow in the “main ice” (shorefast) near the floe edge.

They'll [polar bears] follow the floe edge, but not right on the edge, because they go for the young seals farther up from the floe edge, 'cause the young seals are only on the main ice there under the snow.

PIN 27, TUKTOYAKTUK

A third Tuktoyaktuk hunter reiterated this point; polar bears hunt the ringed seal pups in their denning lairs in the stable main ice.

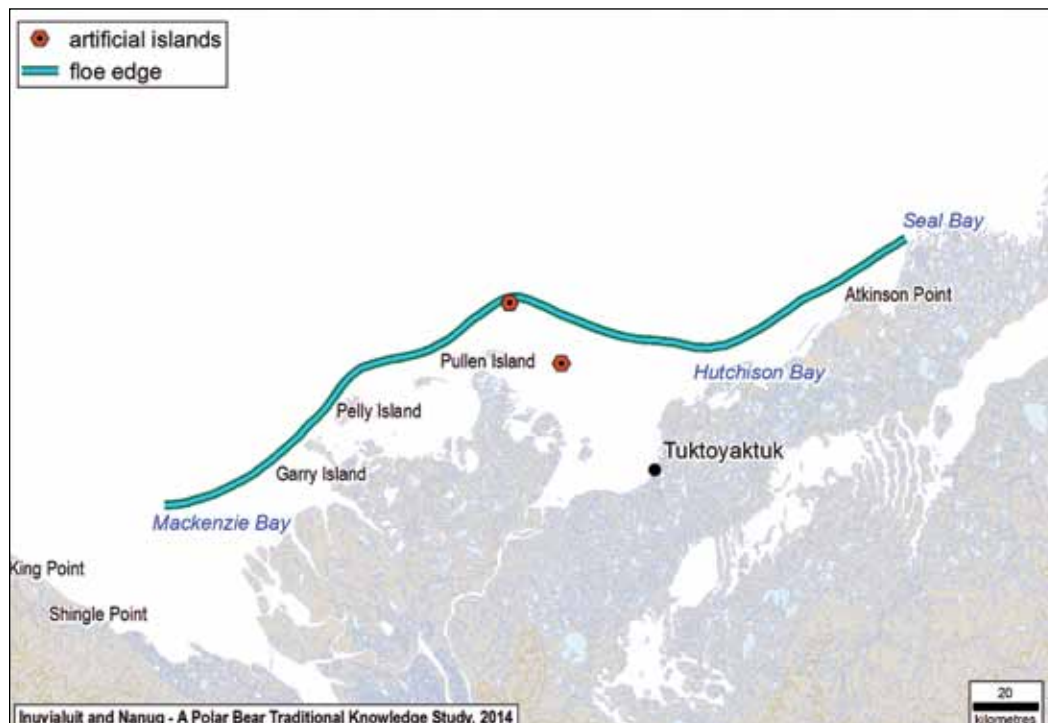
They use the floe edge for hunting and just going back and forth. I haven't really noticed any type of ice that polar bears use, other than travelling along the floe edge, maybe in April when the seals are having pups. Mid-April they start having pups or around the first of April. They [polar bears] start going into the main ice in April to hunt seal pups, where the ice don't move away.

PIN 161, TUKTOYAKTUK

The same hunter noted that the location of the floe edge had changed considerably (Map 12) as a result of the artificial islands¹⁰⁶ built for Beaufort Sea oil and gas exploration; this affected where they could hunt polar bears.

I've noticed from the time I first started hunting, it was just when they were starting to build these man-made islands in the Beaufort, and that really changed our way of harvesting bears, because before they put the man-made island in, the floe edge wasn't that far from town [Tuktoyaktuk]. When they put the man-made islands in, it actually anchored the ice.... and you had to go farther away, because the floe edge moved out farther.... the

Map 12. The floe edge moved farther offshore after artificial islands were built north of Tuktoyaktuk



Source: PIN 161

floe edge is right at the edge of the man-made island. But in the past, before the man-made islands, it used to be closer to the land. [The islands were built] in mid-'70s, probably around '72... At one time, you could see them [artificial islands] on Google Earth where they were, but now you can't. But the ones I know about, I can mark where they are.... This ice is anchored, grounded, and it won't drift out anymore, so if you're on this side, you're okay.... I brought it up in the past, how it's changed the way that we hunted because now it's farther away. You have to go farther away from land to harvest a polar bear.

PIN 161, TUKTOYAKTUK

Inuvik hunters also talked about the great importance of the floe edge to polar bears and Inuvialuit harvesting activities. “That’s where all the bears are,” said one of the TKHs who participated in the Inuvik confirmation workshop (PIN 3, Inuvik).¹⁰⁷ He noted, furthermore, that “lots of bears, when they come in, they get blown in with the ice. And so they’re coming off the ice, and they’re moving to the landfast ice or the ice that’s not moving. That’s where they come hunting.” The shape of the floe edge in this region follows the shallow ocean contours across Mackenzie Bay towards Tuktoyaktuk, and its location varies from year to year, depending on winds, temperatures, currents and other complex factors. Given the great distance from Inuvik to the floe edge, hunters from the community prefer to travel there in search of polar bears later in the winter, when there is more daylight. Some of them prefer to start their search efforts near Pullen Island because of the strong currents in the vicinity, and the nearby open water and floe edge. Wayfinding in relation to Pullen Island and other landmarks is also a factor; hunters quickly lose sight of land when they follow the floe edge west across Mackenzie Bay. GPS units facilitate their return to Inuvik and help hunters conserve their supplies of snowmobile gas.

3.3 Distribution of polar bears and locations of abundance

Throughout the PBTK study interviews, TKH knowledge related to the distribution, movement patterns, and local abundance of polar bears was obtained primarily in relation to several questions. Most of these required the use of the map biography method described in Appendix 2. TKHs were asked to indicate on paper base maps where they had seen polar bears, where people in their community go to see bears, where females with cubs were seen, the numbers of bears in particular areas, the location of seals, whales and other polar bear foods, and where they had harvested bears within living memory. What emerged from their responses was not only a partial spatial record of their knowledge concerning polar bears, but also a large number of narratives related to distribution, movement patterns and abundance. Most importantly, TKHs emphasized repeatedly the dynamic nature of ice conditions associated with seals and hence polar bears, and the great variation in such conditions and in weather patterns, freeze-up and break-up each year. All of these have a direct bearing on where, when and how much they harvested the bears. This variability was noted by one Sachs Harbour hunter:

[p]olar bears aren't stationary animals; they just travel. They find a good feeding area, they'll stay. A few times you run into a good area, like just froze up or something. And the hunting conditions are good, you see a pile of bears around.

PIN 133, SACHS HARBOUR

Despite such variability, Inuvialuit hunters associated particular geographic features with polar bear abundance, and as a result they tended to concentrate their harvesting efforts in the same places. Headlands, capes and points that protrude into the Beaufort Sea are examples of such features. They intersect the coastal currents and associated flow of nutrients, fish, seals and whales, and dramatically shape the formation of open leads, pressure ridges, pile-ups, floe edges and other ice features that are frequented by polar bears.

Sachs Harbour region

Sachs Harbour TKHs reported seeing and harvesting polar bears along the coastline of Banks Island between Gore Islands in the northwest, Nelson Head in the south and Prince of Wales Strait in the east, as well as portions of the south coast of Melville Island when they guided sport hunters there in the 1980s and early 1990s.¹⁰⁸ Females and cubs who denned along coastal and island banks and bluffs are seen in the spring heading out on the ice, as described in Section 3.9. A hunter who had lived in the Tuktoyaktuk area in his younger years observed and harvested polar bears in the same areas as those reported by PBTk study participants from Sachs Harbour. Areas of polar bear abundance in the Sachs Harbour region are depicted in Map 13.

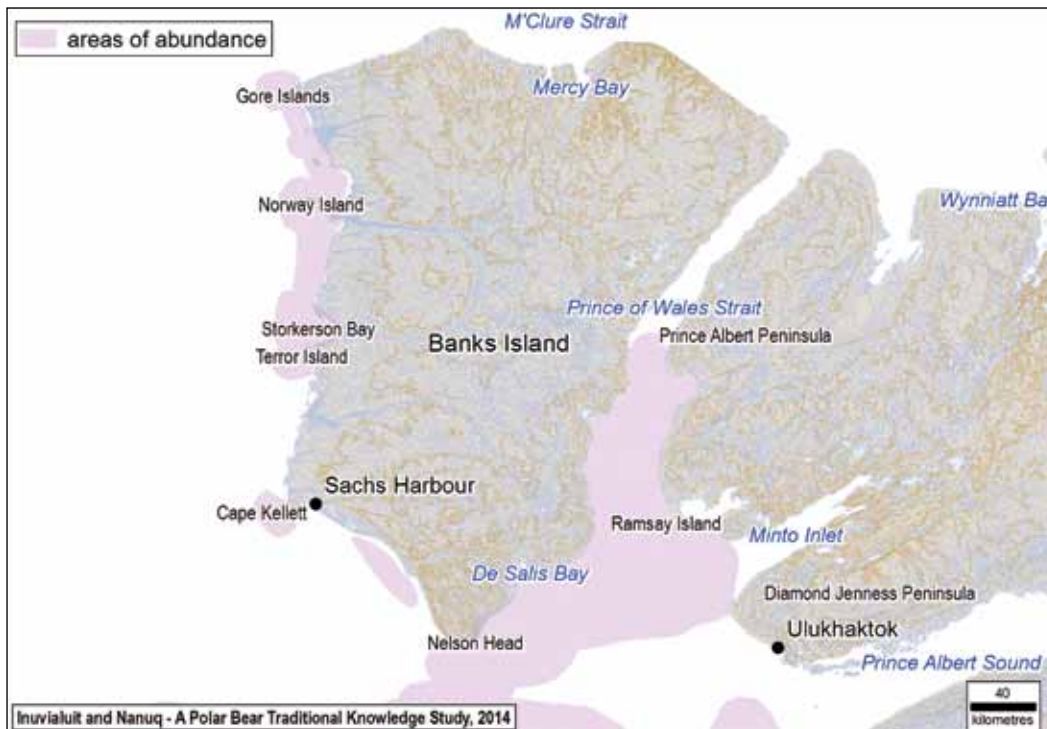
Generally, in the spring, Sachs Harbour hunters observe male polar bears moving in a southerly direction from the northwestern tip of Banks Island, along the west coast of Banks Island towards Nelson Head. They pass Norway Island, following open leads as they go, as noted by this TKH.

Up here, bears always come from the north, big bears.... It's not a migration, but bears always come from the north.... March, April. In the springtime when they are breeding.... They follow the ice and go right by Norway [Island].... they just follow the edge.

PIN 134, SACHS HARBOUR¹⁰⁹

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Map 13. Areas of abundance in the Sachs Harbour and Ulukhaktok regions



The same hunter said these male bears are heading south in pursuit of females, and that the location of the leads they follow varies annually, depending on wind conditions. The Norway Island and Storkerson Bay areas are usually good hunting areas because of the number of travelling male bears encountered there each winter/spring.

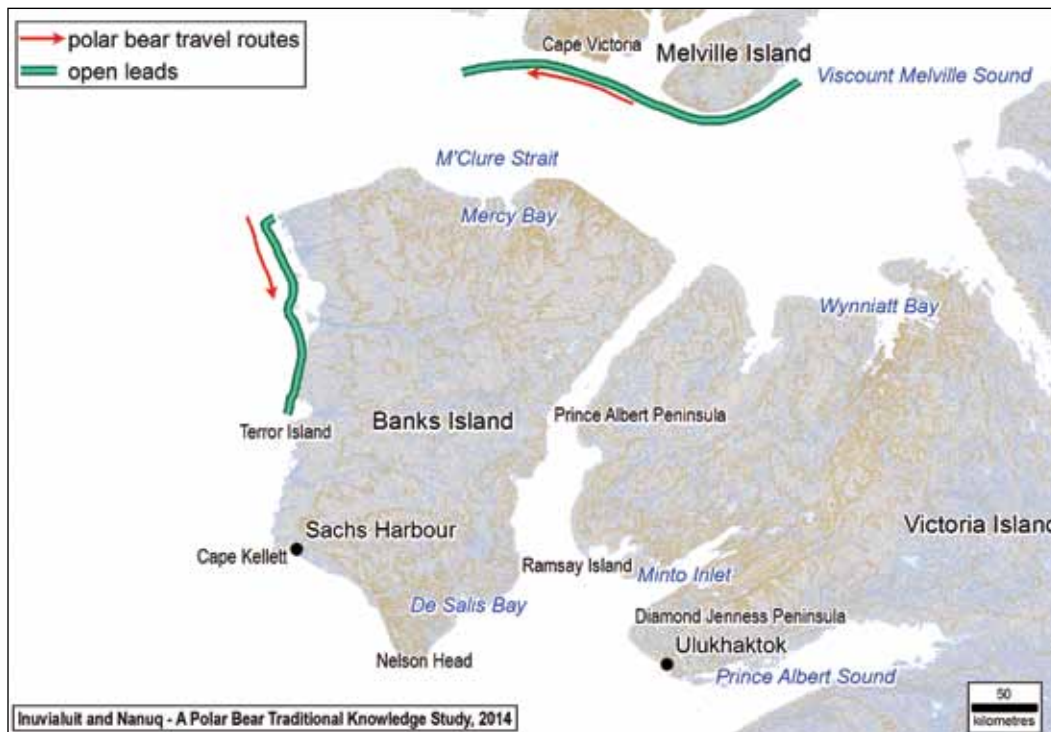
Sometimes you see polar bears up in here [gestures]; see, this is the shore lead, or the lead.... Normally, it goes by here outside of Norway [Island]. Then it goes all the way up north.... This is a good place to hunt. Lot of the times it's [the lead] way out here.... It all depends on the wind with the ice conditions.... And sometimes it piles up like

mountains, as high as the school, if we have too much west wind.... We go here when we first hunt polar bear. It be too rough, we just keep going up [north].... This is our favourite hunting area at Norway. It is very high success because they come from the north.... And in Storkerson Bay.

PIN 134, SACHS HARBOUR

While guiding sport hunters in the 1980s and early 1990s, the Sachs Harbour TKH had observed polar bears or their tracks, following an open lead east to west along the south coast of Melville Island. He pointed to a “polar bear highway” along a section of coastline near Cape Victoria that had been “trampled” because it had been so heavily used by passing bears (see Map 14).

Map 14. Polar bear travel routes along the shores of Banks and Melville islands in relation to open leads



Source: PIN 134, Sachs Harbour

An Ulukhaktok TKH had also guided sport hunters on the coast of Melville Island and reported an abundance of polar bears there in the mid-1980s.

There's this one area that I've gone to. It's an island up north — Melville Island.... They have sports hunting, as well.... There was a lot more bears up there, compared to our area. There's a lot of bear sign there. This was in the mid-'80s. I went up there as a helper. That was one of the first times that I got to use a dog team — chasing a bear with a dog team.

PIN 113, ULUKHAKTOK

A Sachs Harbour hunter said that in the 1970s and 1980s, they used to see lots of polar bears in the Cape Kellett area around freeze-up time each year.

I like that area, especially in the fall time.... They're just coming down, looking for ice, I guess. Walking along the coast.... A lot of people used to go down there in the fall.... when it's freezing over, or after it's frozen over... There's a lot of bears there.... October, November.... Back in the '70s, '80s.... They're migrating down the island, I guess. Or some of them that are on the ice pack, they'll come to the shore, just travel along.

PIN 133, SACHS HARBOUR

Another hunter spoke of the same travel pattern along the west coast of Banks Island in the fall.

I'm pretty sure they're always following the coast in the fall time. They're probably coming off the old ice, the multi-year ice, and doing more travelling. We usually start seeing bears around the community in the fall time and they're following the coast.

PIN 135, SACHS HARBOUR¹¹⁰

The area between Nelson Head and De Salis Bay at the southern end of Banks Island was described as a hot spot for polar bears by several TKHs (Photo 20). A Sachs Harbour hunter saw 25 bears there in one day during the spring of 2002.

When they start travelling, when they start tracking each other. The last time I saw numerous bears was in Nelson Head in 2002.... Me and my son went over there, and I think we saw about 25 bears in one day.... We were there a couple days and there was numerous bears.... I think we got four.... end of April, early May.

PIN 138, SACHS HARBOUR

This Sachs Harbour TKH saw thirty or more polar bears in the Nelson Head area circa 2006. In 2004 he and his companions harvested ten polar bears there during one trip alone.¹¹¹

By Nelson Head here, always be bears over there. One time we ran into over thirty over there, that we seen. But me, I'm not too keen on shooting females. I try to be as professional as I can be. Even though it's money that you're throwing away, for the future you're saving through the female, saving three bears.

PIN 132, SACHS HARBOUR

Ulukhaktok hunters also recognized the Nelson Head area for its abundance of polar bears.

Lots of them go around here, Nelson Head.... There are always bears. Even people from Holman, they go to Nelson Head to hunt bears.... That's the most bears I ever hear, right here, where the guy got five. Timothy [Lennie]... shot a bear, another one come, he got five bears.

PIN 114, ULUKHAKT

Around here, close to Nelson Head, around Cape Lambton area, you'll run into a lot of polar bears, but they don't stay right together. At one time, when I was hunting there, the most I run into together was four of them: one big male, one female and two cubs.... Cape Lambton. I already got a polar bear, so I run into a couple more nearby around there. They don't stay together, not like caribou. Probably 1963, maybe.

PIN 115, ULUKHAKTOK



Photo 20. Nelson Head is a polar bear hot spot. John Lucas Sr.

Another Ulukhaktok TKH thought that an abundance of seals in the Nelson Head area might explain the prevalence of bears there.

I don't know why bears like that area. The shoreline here, it's nothing but cliff — like, from this point, all the way over here [gestures]... Maybe there's an abundance of seal there, because there are usually a lot of seals when we go over there... in April.

PIN 113, ULUKHAKTOK

A third Ulukhaktok hunter said that prior to the 1990s, before frequent open water and unsafe ice conditions made it impossible to travel far out into Amundsen Gulf, he and his father used to travel straight across the ice to the Nelson Head area to hunt polar bears in the period from January to March each year. Currently, polar bear harvesting is mostly confined to the Coal Mine Bluffs area along the southeast coast of Banks Island, Ramsay Island, and Prince of Wales Strait, as a result of worsening ice conditions in the Gulf. He explains:

[w]e used to go straight out, hunt bears; and we didn't have to worry about open water. Even though there was a strong wind, the ice used to never break. Right now, there's animals out there. It's just that the ice keep breaking, and we can't go straight out where we used to mostly catch our bears. And we have to hunt them right now by Ramsay Island, Coal Mine and Prince of Wales Strait, because that's the only place where we could hunt bears where there's no open water, and that's too early for the bears in that area right now [mid-February]. It's too early... March, end of March, April, around there, that's the place where we used to hunt.... Me and my dad used to hunt straight out to Nelson Head in January, February, March, and when... we're done with that in April, we switched over to Banks Island, Coal Mine, Ramsay Island, Prince of Wales Strait. And almost the end of May, this part, there's just a lot of polar bears, 'cause they're migrating, 'cause this part out here is all starting to break.

PIN 117, ULUKHAKTOK

Paulatuk hunters, more than 80 miles (125 km) away on the other side of Amundsen Gulf, know about the seasonal abundance of polar bears in the Nelson Head area, because they hunted there in the days when the ice between Cape Parry and Banks Island was safe to travel on. Nelson Head is a good place to find large male bears, according to this Paulatuk TKH.

In the earlier years, this is [gestures] probably Nelson Head, so I would be hunting out in this area here, from Cape Parry... late '80s early '90s. Harvesting out here. This is a good place, Nelson Head, for finding the big males.... Maybe due to the ice, 'cause where the ice is, there is good hunting areas. That's where you will find the polar bears.... The females are out where the seals are; they are not like the males. They have to look after themselves and the young ones, so they are more concentrating on the food.

PIN 158, PAULATUK

Ulukhaktok region

In addition to Nelson Head, the south coast of Banks Island and Prince of Wales Strait, Ulukhaktok TKHs reported seeing and harvesting polar bears along portions of the south coast of Melville Island. They guided sport hunters there in the 1980s and early 1990s, in Wynniatt Bay, across the mouths of Minto Inlet and Prince Albert Sound, and along various parts of the west coast of Victoria Island as far as Innirit Point in Dolphin and Union Strait. Furthermore, as noted above, they formerly saw and harvested polar bears far out into Amundsen Gulf between Ulukhaktok and Nelson Head and between the community and Clinton Point on the mainland, when ice conditions permitted dog team and snowmobile travel in that direction. (Polar bear harvesting in the Amundsen Gulf areas in relation to climate change and changing ice conditions is discussed in Section 4.1.) Areas of polar bear abundance in the Ulukhaktok region are depicted in Map 13, with the exception of one such area between the community and Pearce Point on the mainland, which is depicted on Map 16.

Ulukhaktok TKHs identified the Prince of Wales Strait as an important travel corridor for polar bears at certain times of the year, with traffic back and forth between Viscount Melville Sound and the southern end of Banks Island. One TKH said he had seen numerous tracks going north in the strait area the previous Christmas.

They [polar bears] don't come from Kugluktuk [south] or nothing, they say, eh? Only bears always come from the north.... There used to be a lot of bears used to come. Even last year, the bears were walking mostly that way [Prince of Wales Strait]. Right after Christmas last year.... I was here, all the bear tracks going north, quite a bit of tracks going north.... So, he must be walking that way from here. They seemed to be coming out from here [Nelson Head].... They had to come out from here [gestures].... Yeah, there were quite a bit of tracks last year going there.

PIN 122, ULUKHAKTOK, Translation

Another Ulukhaktok TKH said he had seen lots of polar bears and/or their tracks in Prince of Wales Strait in April–May in the early 1990s. Many polar bears were harvested there at that time, he said.

But a friend of mine, we had a [sport] hunter, in two days, we shot 22 bears around here [April] [gestures]. It was just starting to get late spring. They start migrating through the Prince of Wales Strait, going back and forth, migrating. That's where, in May, I think, there's really lots of bears in there.

PIN 117, ULUKHAKTOK

A third hunter from the community said that some of the polar bear traffic along the strait occurs during the spring mating season.

They migrate in the Prince of Wales [Strait]. When they're meeting. Rutting or whatever. Those big bears are travelling quite a bit in the Prince of Wales Strait.... Back and forth, looking.... Sometime in May, 'cause that's when they start mating, I think.

PIN 123, ULUKHAKTOK

A fourth Ulukhaktok hunter thought that many of the polar bears they see closer to Victoria Island had travelled there from the south side of Melville Island.

I think when the females are coming out of her den, I guess other bears start to come in from down this way, from the north side.... The same thing over here, looking for a mate, springtime.... I learned out of experience, because I've been all over, even in the Melville Island side.... They come in from the island side down here, from Melville Island. When they're mating, they don't turn anywhere. A few of them around this area, I seen tracks hitting across to the main island, to our island [Victoria Island].... Sometimes they go on top of the rough ice for a while, and look, and start travelling the same way, never turn anywhere, even going north from here.... Big males and females and young males.... May and April.

PIN 114, ULUKHAKTOK

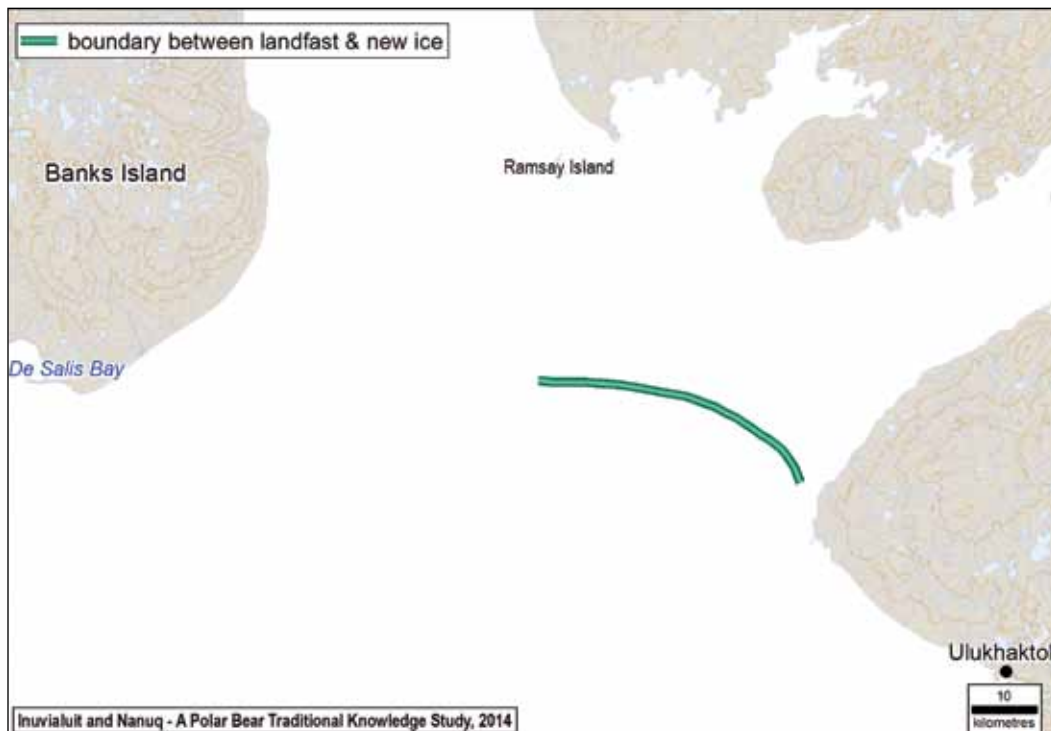
A lot of polar bears and their tracks were seen where the old landfast ice meets the new ice at the mouth of Minto Inlet, according to this TKH (see Map 15).

This is old ice, and this is new ice. It's open, but it's frozen over. It opens and closes, opens and closes. That's the way it is. There were lots and lots of polar bears and tracks that we come across. It is like that; you could come across when you come at the right time as you travel; seems like there are lots of polar bears.... It's just recently, either before 2000 or during the first year of 2000.

PIN 119, ULUKHAKTOK

Although many Ulukhaktok people have been hunting in the Wynniatt Bay area since at least the late 1980s, it was not identified as an area of polar bear abundance by PBTk study participants. Nonetheless, one TKH from the community said he “used to hear from stories from my parents long ago that Wynniatt Bay area, and they stayed here for three years, I think, in Wynniatt Bay Lake. They used to tell us that there used to be a lot of polar bears around here. Also, there's polynyas there, too” (PIN 115, Ulukhaktok).

Map 15. The boundary between landfast and young ice, a good place to hunt polar bears, circa 2000



Source: PIN 119

Paulatuk area

Paulatuk TKHs reported seeing and harvesting polar bears at various locations along the coast of the Northwest Territories, from Clinton Point in the east to Franklin Bay in the west. Polar bears were seen and harvested far out into Amundsen Gulf between Cape Parry and Nelson Head when ice conditions permitted it; that is, prior to the 1990s. Females and cubs who dened along coastal and island banks and bluffs were seen in the spring heading out on the ice as described in Section 3.9. Map 16 depicts areas of polar bear abundance in the Paulatuk and Ulukhaktok regions.

Paulatuk hunters encountered male polar bears in the Cape Parry area in January, moving in from the direction of Alaska in the west and then circling back and forth across the end of Cape Parry.

In the winter season [polar bears] will come back in through this area.... starting from January they are already hitting this area [Cape Parry].... What they do, they go back out there and just keep circling.... [We see them travelling] west to east, from January on; most of them I see, anyway.

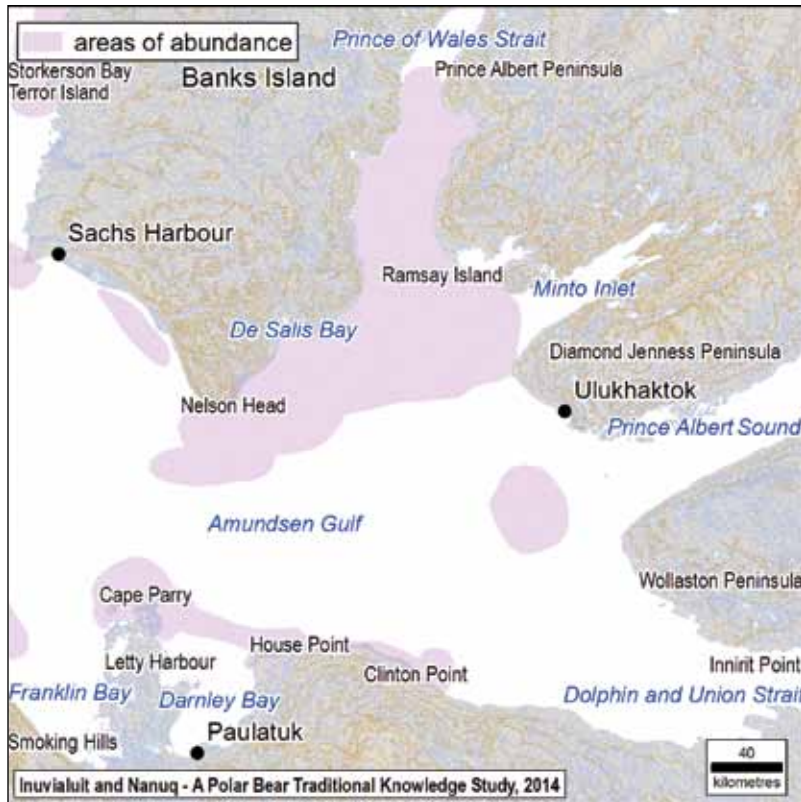
PIN 144, PAULATUK

One Paulatuk TKH said that people saw bear tracks along the beach between Cape Lyon and Clinton Point around freeze-up each year (see Map 17).

If you go from Pearce Point down this way here [gestures] you'll see bears coming in to the beach and travelling along the shoreline.... As long as there's ice there broken up, ice on the beach, you'll see them tracks.... Just always November, December, January you'd see all these bear tracks.... They use the shoreline... there's so much noise closer to the community, they tend to stay a little farther out.

PIN 145, PAULATUK

Map 16. Areas of abundance in the Paulatuk and Ulukhaktok regions



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Map 17. Polar bear tracks seen along the beach between Cape Lyon and Clinton Point



Source: PIN 145

By March and April, it seems that male bears moved primarily east to west, from the Cape Parry to Franklin Bay area, possibly for reasons related to mating. They followed the floe edges, pressure ridges, cracks and open leads, as well as the scent of females. According to one Paulatuk hunter (see Map 18), *[t]here seems to be a lot of polar bears moving this side.... for March, April when they start mating, 'cause a lot of the big males, we're talking tracks like this [gestures]— 12- to 13-footers. They always seem to be moving this way in April. Travelling nonstop.... The bears move in that way. I think it is for mating or something, 'cause these big males are just looking for females at that time.*

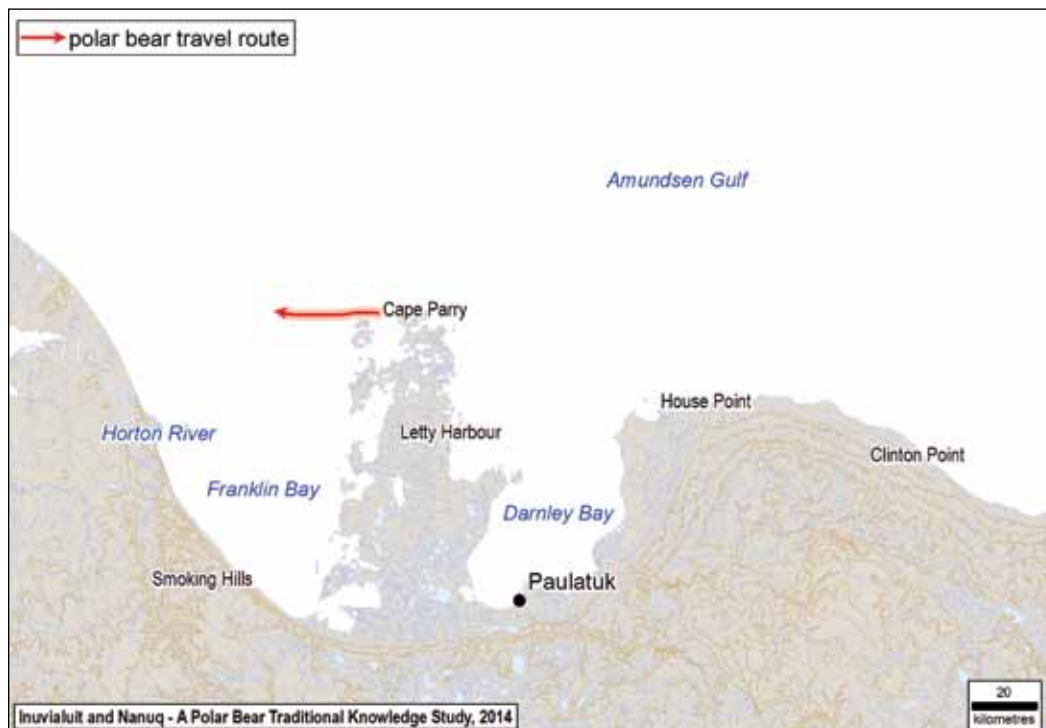
PIN 158, PAULATUK

Another Paulatuk hunter talked about polar bear movements he had seen north of Cape Parry around break-up in the spring of 2000 (see Map 19).

I am always successful, 'cause there's a lot of polar bears migrating through Cape Parry from east to west.... They travel from east to west... outside of Pearce Point to out here, they travel.... Same [time] as the ice go, they start travelling, start migrating.

PIN 147, PAULATUK

Map 18. Big male polar bears seem to move east to west from Cape Parry during the mating season



Source: PIN 158, Paulatuk

Pressure ridges and open leads in association with Pearce Point, Cape Parry and the mouth of Darnley Bay channeled polar bears in various directions, depending on ice-formation and weather conditions in any given year, as noted in Section 3.2. These were certainly the polar bear hot spots as far as Inuvialuit hunting is concerned, according to this Paulatuk TKH, who described a seasonal progression from east to west.

Usually hunt them in early January, February here, Pearce Point area. And then later on in the season you'd be hunting them here.... because they're making probably their migration north. Going through from Pearce Point to Cape Parry, on to Cape Bathurst and probably north from there.... Probably in January, February, we'd be hunting that area there. Around the Pearce Point area, then later on in the season, right to the end of April, we'd be in that area, there.

PIN 163, PAULATUK

Map 19. Many polar bears travel east to west by Cape Parry, starting at break-up each year



Source: PIN 147, Paulatuk

Another TKH observed 23 polar bears near Pearce Point one winter in the 1990s.

We see a lot of polar bears. One day I counted 23 out here [at Pearce Point]. Just with a spotting scope.... One day I counted 23 there in little spots just laying down waiting for seals.... That was in the 1990s.... That was in January and February.... They were lying down; some of them were waiting for seals, you know, on top of the young ice. They were waiting by the [breathing] holes.... you could see them all over the ice.... 'cause the ice was moving and a lot of seals were there.... That's the most I saw in one day.

PIN 142, PAULATUK

Polar bears travelled back and forth across the tip of Cape Parry looking for ringed seals, said this Paulatuk hunter.

They don't get anything, no catch, they keep moving, moving, moving, just going along until they get a kill. Then as soon as they get a kill, you get a nuajvik,¹¹² and boy, I tell you what, the bears they smell it from that direction, from this direction, from here they pile up. All kinds of it all over; that's how they are out there. We know where the good areas are; we just can't reach them anymore.... fifty clicks [km] out. Cape Parry.

PIN 164, PAULATUK

Cape Parry is an area where male polar bears aggressively pursued females during the spring mating season.

Probably in the Cape Parry area is the only place I've seen where bears are aggressively pursuing females. And that was probably in the month of April. And that, of course, was in the early days. Back in the early days, we spend anywhere from a week or whatever out there on the ice until we get our animals.... Camped out right on the ice, right beside that lead.

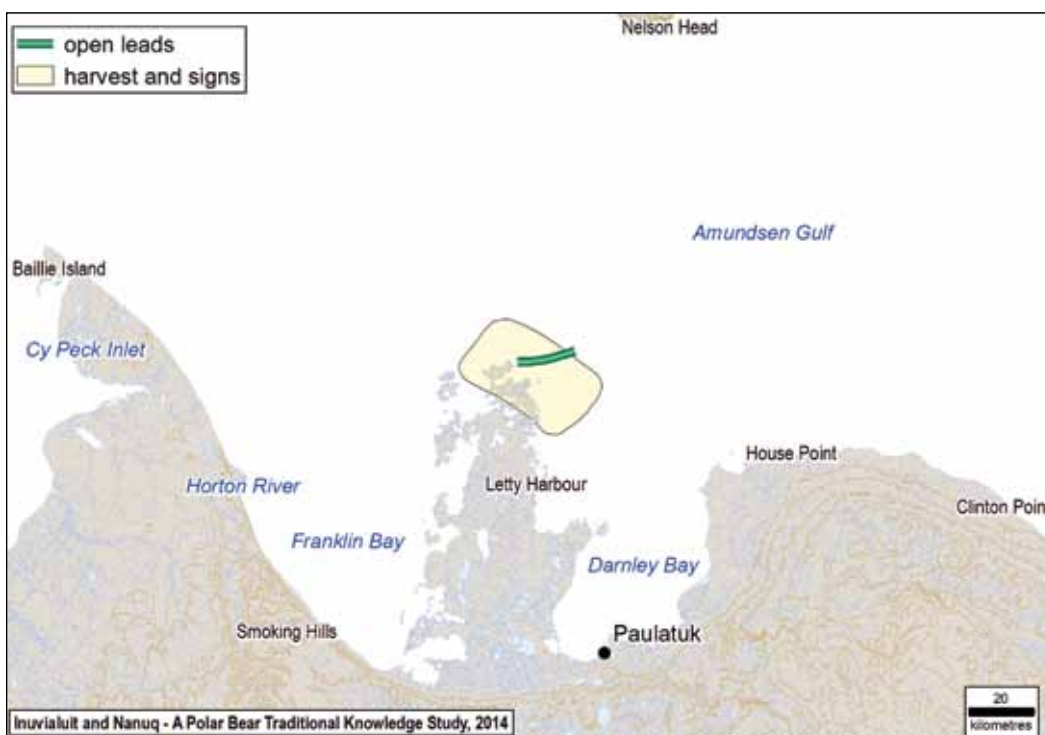
PIN 163, PAULATUK

Another Paulatuk hunter also said that Cape Parry was an ideal place to encounter male polar bears in March and April each year. A regularly recurring open lead running east from the Cape attracted many bears (see Map 20).

If you want to run into polar bears, this would be the area.... in this area here [gestures]. This little block.... the only time of year that you're guaranteed... sightings of polar bears would be in late March and April.... [They are] feeding and possibly mating. I don't know what their mating times are, but that's when you start seeing the big bears coming around.... March, April.... On a good day you could run into three, four.... But if you run into the open leads, you'll probably run into more.... To my recollection, open leads always occur out here [Cape Parry].... The general direction [of the leads] is from Parry Point to east.... In February, March. Come April, you don't run into leads anymore because they're all frozen, except if you run into the polynya.

PIN 160, PAULATUK

Map 20. Cape Parry is an ideal place to encounter male polar bears in March and April each year



Source: PIN 160, Paulatuk

Tuktoyaktuk region

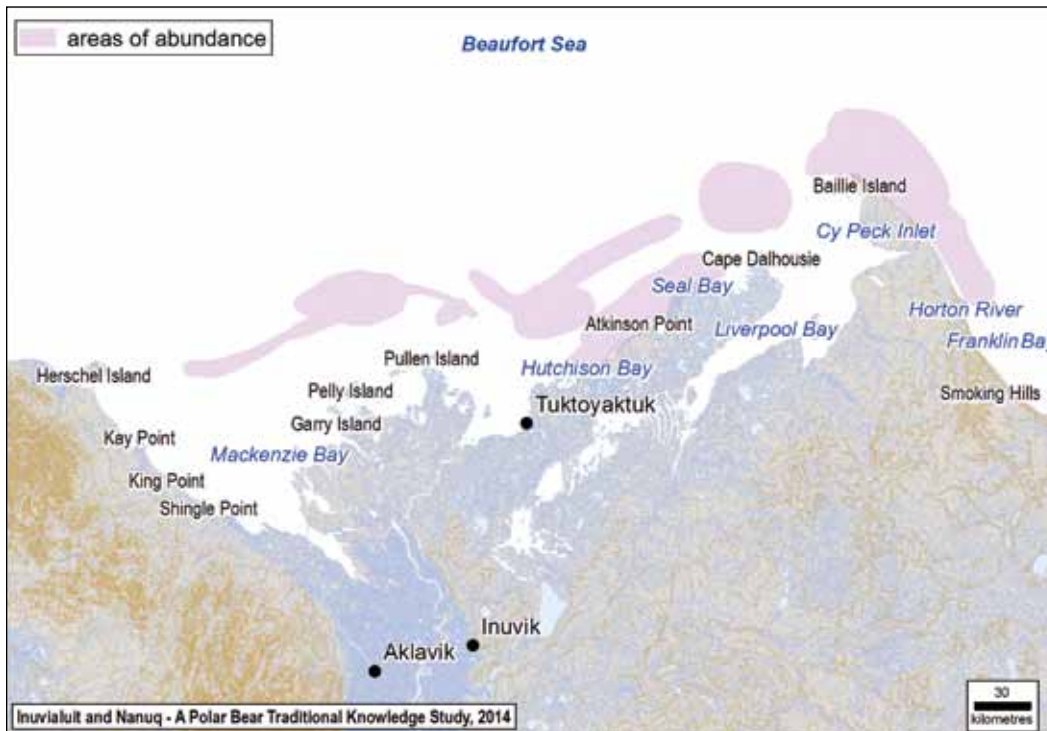
Tuktoyaktuk TKHs reported seeing and harvesting polar bears along the coast of the Northwest Territories between Franklin Bay in the east and Gary Island in Mackenzie Bay in the west. In the spring they saw females and cubs who dened along coastal and island banks and bluffs heading out on the ice as described in Section 3.9. A Sachs Harbour hunter who lived on Banks Island in his younger years had seen and harvested polar bears in the same areas as those reported by PBTk study participants from Tuktoyaktuk. Areas of polar bear abundance in the Tuktoyaktuk and Yukon North Slope regions are depicted in Map 21.

The polar bears seen in the Tuktoyaktuk area early in the winter may well originate far to the west in Alaska, in places such as Point Barrow, where Inupiat harvest bowhead whales. According to this TKH, polar bears travel towards Tuktoyaktuk:

...when it gets a lot of ice. Like January, February, March. Before that, you can't travel there. [If] they have water they can't, they swim slow.... Take a month from here to Alaska to swim across... January, February, March, when it's good and thick.... [I] hear about those bears in Alaska, like Point Barrow, where they hunt bowheads; that's where they hang... 'cause one time, once or twice, I got collared bears, they were collared, I can't remember, in Alaska, I think.

PIN 33, TUKTOYAKTUK

Map 21. Areas of abundance in the Tuktoyaktuk and Yukon North Slope regions



Echoing an observation made previously by a Paulatuk hunter, this Tuktoyaktuk TKH thought that polar bears travel through his area in a circular pattern that depends entirely on weather and wind conditions. *I think the bears usually go in a circle. That's what I believe. They go pretty much in a circle. I think.... They're always travelling, pretty much, heading northwest. I think they head northwest. They must circle back, somewhere out there where the water is, and come back towards the Horton [River], and they're going back that way.... I think it just depends on the weather and the wind, too.*

PIN 42, TUKTOYAKTUK

Another Tuktoyaktuk TKH said that they would see smaller bears along the floe edge — what he calls the “shearing” — that is, the interface between landfast and moving ice. Larger males would turn up later in February.

[W]hen it first freezes, bears start coming in, but they're always small ones this time of the year. They start following the shearing. It's always right close to the shore when it's this time of the year. Before it get too thick, that's when they're coming in, but usually they're hard to see. Those big ones, they don't come in with them right away. Most of the time you'll start seeing the big ones is mostly in February when they start looking around for females. That's when you start seeing the big ones start coming through the shearings over there. Most of the year, from January to February anyway, you hardly see any big ones at all.... When they start mating, that's when you see them start coming around. In late February you start seeing big tracks in the shearing.

PIN 23, TUKTOYAKTUK

Offshore of Atkinson Point and Seal Bay is an area known to Tuktoyaktuk hunters for its seasonal abundance of polar bears. Many bears have been seen along a recurrent floe edge by that section of coast, and this is where local hunters head, according to this TKH (see Map 22).

They don't get too close [to land], the bears. Always be about twenty miles out for sure. He don't want to go to land. A lot of bears, if they see land or the shadow of the land, they head back out.... They don't want to hit land.... That's where you gotta go to get bears.... [The edge of the main ice is] thirty miles, and it gets closer as you reach Atkinson.... Every year it gets about like that... right close to Seal Bay and then goes out again.... Every year is about like that.... That line I just drew now, it was a perfect line for twenty years ago; that's the way it used to be most years in February.

PIN 33, TUKTOYAKTUK

The same hunter described this area as a “big highway” for polar bears in good years when ice conditions are ideal (see Map 22).

Right in from Atkinson out, used to make round trips a lot of times to Tuk to here. I go out from Atkinson, go outside of Seal Bay, take polar bears right at the open water edge when it's frozen about six inches thick, like young ice. Always a big highway in that area.... for polar bears.... Some years I used to see, every half a mile, there's a bear in the edge of the young ice. Some years there's so much there.... they follow each other.... in April.... they'd be travelling, making their rounds going east. That's when it's a good year, when there's a lot of bears, open water line and they're travelling east. That means a lot of bears, right at edge of young ice.

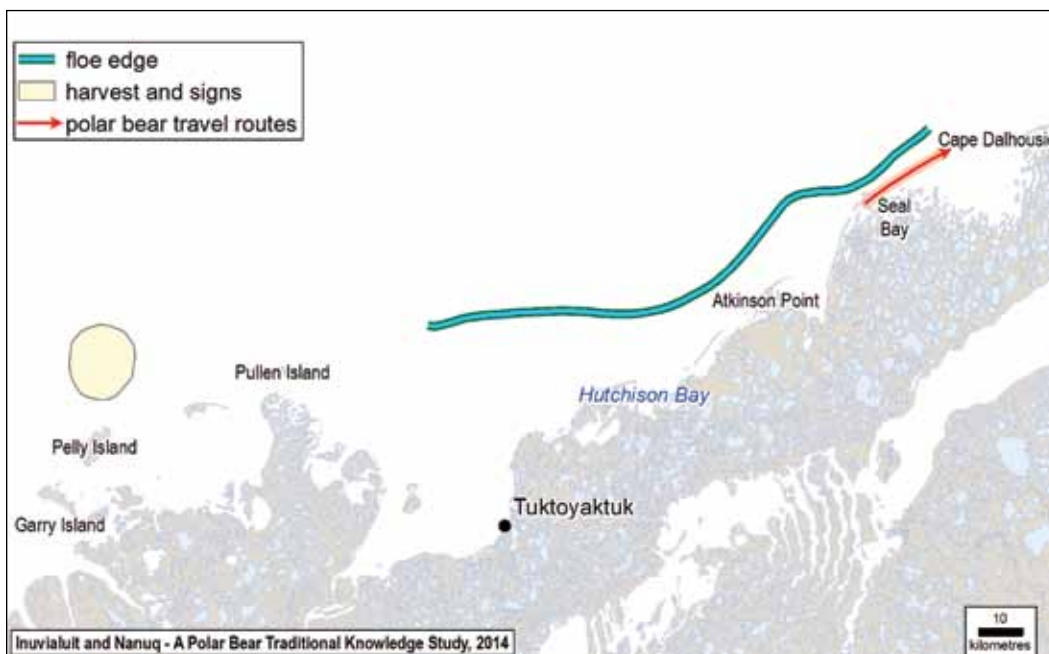
PIN 33, TUKTOYAKTUK

In April one year, a short distance north of Pelly Island to the west, he and his hunting partner saw 16 polar bears following the floe edge (see Map 22).

One time me and [my hunting partner], we see 16 bears.... We get four bears in three days.... It was about the twentieth of April. We didn't have to chase them; only the ones that went to the camp. We sit at the camp and wait for them.... 16 of them.... They were following the floe edge.... That's where we had a camp, a few yards from the edge, along the open water line.... Males, we just wait for the males. We got four males.

PIN 33, TUKTOYAKTUK

Map 22. A recurrent floe edge near Atkinson Point; 16 polar bears were seen one April near Pelly Island



Source: PIN 33, Tuktoyaktuk

Baillie Island, northeast of Tuktoyaktuk, is another bear hot spot. The floe edge is close to the shore in this area. Polar bear hunting is generally excellent here, but is always subject to seasonal and annual variation in ice and weather conditions (see Map 23).

Many times I remember, around the '70s, that's when I did most of my bear hunting, and I just went full out. We did get a lot of bears those years, because I think the bears were plenty then. They were plenty. [As soon as you got to the floe] edge, either you'd see tracks or you'd see a bear right away. A lot of times me and one other hunter we'd go out and we didn't have to stay long because there was so many bears. But then again a lot of times you'd come home with empty hands. It's just a big gamble.... It was always good bear hunting. Most of the time you'd come back with a polar bear, but then again, you come home with nothing. It all depends where you go and how long you stay out and how lucky you are.... Baillie Island...we call "rendezvous place for polar bears." What I mean is plenty of polar bears there because it opens up right by the beach, I hear. The floe edge is right there. It goes along the beach, [for] how far, I don't know.... The Wolkis, they know that place like the back of their hands. They'll tell you. That's the reason why I think it's a good place to hunt polar bears, because it opens up right by the beach. Here, you [don't] have to go 25, 30 miles out. [Polar bears] go right to the island.

PIN 27, TUKTOYAKTUK

Map 23. A "rendezvous" place for polar bears off Baillie Island



Source: PIN 27

According to this hunter, March is the best time to encounter polar bears in the area between Baillie Island and Horton River in Franklin Bay.

March is really good, February. Anything after December, when the season opens. December to March. March is about the best time for bears in that area.... That's where the polar bears are. You get the odd [one] in between where there is nothing for week or two.

PIN 42, TUKTOYAKTUK

Back in the 1960s and 1970s, temperatures were much colder than they are now, which meant good ice conditions on the west side of Franklin Bay early in the winter. According to this TKH, there were large male bears in the Whale Bluffs area one year, when ice floes had persisted throughout the summer in the Beaufort Sea.

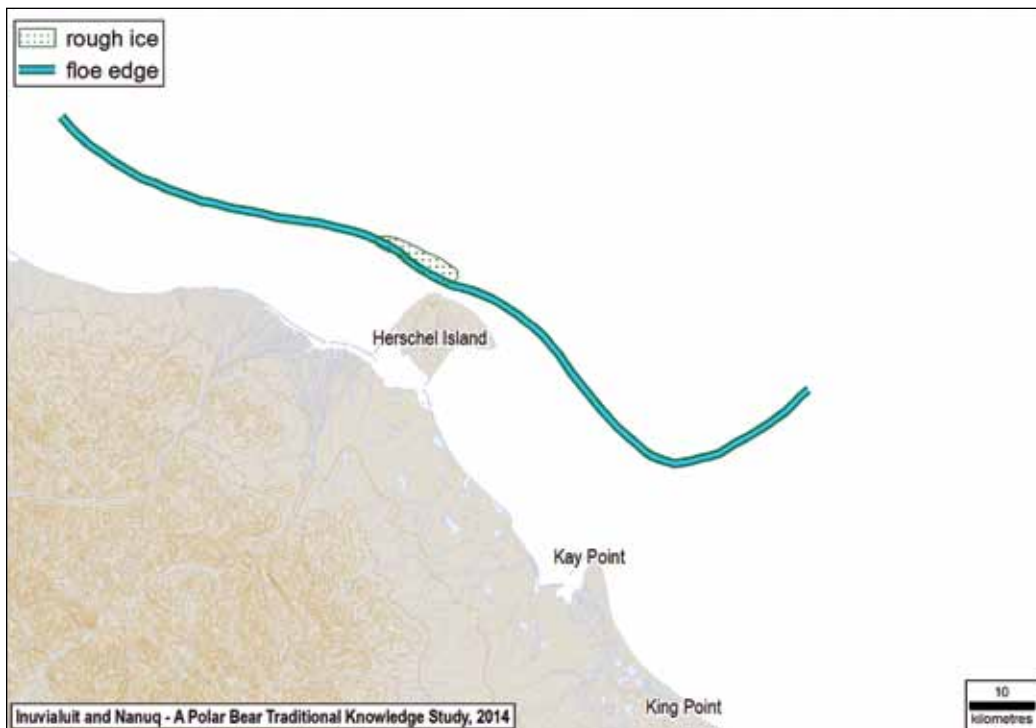
Big ones, they don't come very close to the shoreline. You might get some good ones in the fall time. In the Whale Bluffs [area] one year, there was lots of big ones because it was the only place where it had ice, and they were hitting the shoreline there. I guess they must have come from across, because there was lots of floes that summer.... It was hitting the Whale Bluffs area, the big bears, when it just started to freeze that fall; that's when we were there.... Lots of 12-footers there; big ones.... It has to do with the condition of the ice, because there was lots of floes in those years. It's so cold, even summertime, you have to wear parka when we used to be over there; so much ice. And people have a hard time travelling to Banksland [Banks Island].... So much ice, gotta go between the ice some years, lots of ice. It make a lot of difference in some years, depending on the current or the wind.... About that area, '60s and '70s; that's the good bear hunters' hunting in those years.

PIN 23, TUKTOYAKTUK

Yukon North Slope region

TKHs from Inuvik and Aklavik reported seeing and harvesting polar bears between Kendall Island in the east and the Yukon-Alaska border, near Herschel Island in the west. However, none of the PBTk study participants spoke of polar bear hot spots or areas of abundance anywhere in this area. Bears were harvested in the vicinity of Herschel Island and even more were seen there, given its proximity to the floe edge that runs close to the north end of the island (see Map 24). One Aklavik TKH said he had frequently seen large polar bears offshore of Herschel Island, but they were always on the opposite side of rough ice that was impossible to cross by snowmobile.

Map 24. Approximate location of an area of rough ice and the floe edge near Herschel Island



Source: PIN 13 and PIN 15, Aklavik

We always see big polar bears. We always see big ones way out this way. But they always be out across the open leads, so we can't get to them. It's so rough out here that we can't drive a Skidoo out there. It's really rough.... in between the open water and here.... They always come along here, and they always stay in the open water. They're smart. Sometimes, they go close to the island, but they always stay on the rough ice and close to the open water.

PIN 13, AKLAVIK

The same TKH said the offshore area between Kay and King Points also used to be a good place for polar bears.

In between Kay Point and King Point, my uncle used to always go in between there, and sometimes we'll see maybe three or four bears in one area in that place. And they used to be big bears, like eight-footers, nine-footers. And my uncle even told us to go there one time, and sure enough. He told us to go about five miles out, ten miles out, and as soon as we went that far out there, we started seeing polar bears all over — polar bear tracks all over the place there.

PIN 13, AKLAVIK¹¹³

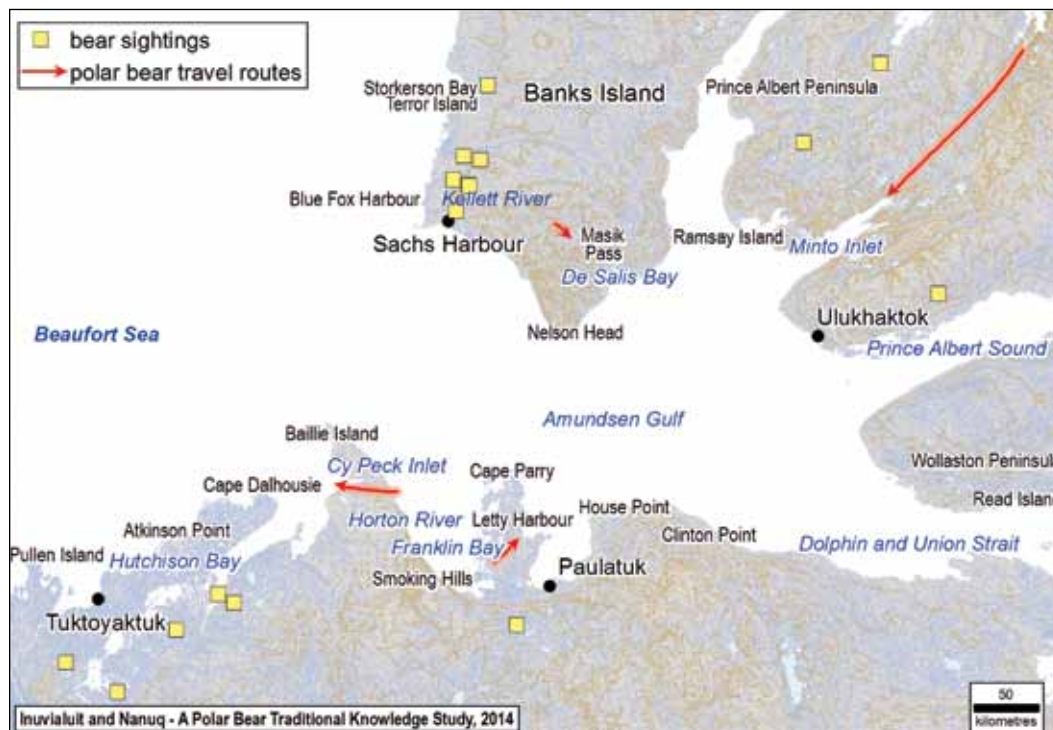
Inland and on-land sightings of polar bears

TKHs interviewed for this study reported relatively few inland sightings of polar bears (Photo 21), with some notable exceptions. These included a peninsula crossing and a travel route between Minto Inlet and Wynniatt Bay on Victoria Island. The former is a shortcut taken by some polar bears in the fall across the Bathurst Peninsula between Liverpool and Franklin bays. Inuvialuit hunters travel the Victoria Island route in the late winter and early spring, and encounter polar bear tracks there (Map 25).

[p]olar bears, they migrate through here, too, coming through Wynniatt Bay, going through [to] Minto Inlet.... We seen a couple of those tracks in, it must be the late '90s, around there when we're going sport hunting, March. Even when we're travelling through here, even the middle of the land, we seen bear tracks, 'cause they're going back and forth. They've been travelling — they know where to go.

PIN 117, ULUKHAKTOK

Map 25. Polar bear travel routes and inland sightings of polar bears or their tracks



Other inland sightings of polar bears or their tracks are listed in Table 4; they are also depicted on Map 25, along with the overland polar bear travel routes mentioned above.¹¹⁴ Inland sightings include tracks seen one April by an Inuvialuit trapper near Masik Pass in the southern portion of Banks Island. The tracks were made by a bear taking a shortcut, he said.

When I was in Banks Island too, you know, polar bears sometimes go across land, make shortcut. I've seen polar bears in my trap [line] lying around here. Probably cutting across, I guess, but I never bother with it.... It was in April, middle of April.... There was a pretty big bear, too, so it must be about nine [-foot], ten, maybe.... it was a male.

PIN 115, ULUKHAKTOK

A Sachs Harbour TKH said hunters sometimes see polar bears inland while fall hunting.

This time of the year, during freeze-up, sometimes you see polar bears inland or [while] fall hunting. Sometimes you see them along Kellett River or at Blue Fox Harbour.... They're waiting for the ice to freeze, to walk on it.

PIN 139, SACHS HARBOUR

A second hunter from the same community said polar bears encountered inland in the fall and late winter seem to taking a shortcut heading south.

Sometimes when we hunt caribou along the bluff, we see polar bears all along here on land this time of year... From Blue Fox [Harbour] to Siksik [Point]... Right off the coastline... About ten days ago¹¹⁵ we went out; we seen polar bear tracks, right in Lennie River heading south.... Sometimes they shortcut. Like quite often, we see polar bear tracks way inland. I run into polar bears in [Storkerson] River... in March. They're shortcutting somewhere.... They're heading south. One time we were hunting wolves at Storkerson River and saw a black spot. "Oh, I see a wolf." And we went to it, and "Oh, that's a polar bear." About a ten-footer.

PIN 134, SACHS HARBOUR



Photo 21. A polar bear walking the shoreline at Safety Channel southeast of Ulukhaktok.

Jean and Pat Ekpakhohak

Table 4. Inland locations where TKHs saw polar bears and/or their tracks

PIN	Date	Location	Notes
113	December, n.d.	Prince Albert Peninsula	saw three tracks together while trapping
114	April 1992	Prince Albert Peninsula	saw tracks inland
117	March 1990s	Minto Inlet to Wynniatt Bay	saw tracks of bears
114	October 2009	Diamond Jenness Peninsula	saw tracks heading inland, single bear
163	March, late 1990s	Lake Binam	tracks heading in an easterly direction
163	April 2009	Parry Peninsula	saw tracks of a large, 11-foot male
23	Fall, n.d.	Bathurst Peninsula	polar bears travelling across the peninsula*
24	February or later?	Eskimo Lakes area	other hunters told the TKH they saw a female with cubs coming from the east headed towards the ocean; must have denned inland
24	n.d.	Jonah Lake	saw smaller polar bear tracks
24	November, n.d.	Eskimo Lakes area	observed path of bear going from inland to the coast
161	November 1999	Parsons Lake	tracked polar bear, thought it was a grizzly bear at first
134	March 2007	Storkerson River, Banks Island	saw polar bear tracks
134	October 2010	Lennie River, Banks Island	saw polar bear tracks
135	Early July, 2009	Lennie River, Banks Island	saw polar bear laying on a tall hill
135	October 2008	North of Kellett River	saw polar bear while inland hunting caribou
139	October 2009	Lennie River, Banks Island	saw polar bear scavenging a muskox carcass
136	Summer, late 1950s	Big River, Banks Island	saw polar bear walking inland
133	Summer 2007	Egg River, Banks Island	spotted large polar bear
115	April, n.d.	Masik Pass area, Banks Island	nine- to ten-foot polar bear seen while trapping

*It is not clear if the TKH saw polar bears or just their tracks.

The same hunter said that in October polar bears walk the coast in the Meek Point area of Banks Island “looking for anything they can get.”

Right now they are just waiting for the ice to freeze, so they are scavenging on the coast. And they walk around here. This time of year you always see tracks, [but] we don't bother them. We go out by quad [all-terrain vehicle] and see some tracks travelling down on the coast here.... This time of year they are pretty lean.

PIN 134, SACHS HARBOUR

Kellett River is where a third Sachs Harbour TKH saw a bear while hunting caribou in October 2008.

That one was in the fall time; would have been about the same time as now.... We were going up looking for caribou.... We just got over Kellett, the hills on top of Kellett. It was actually up in the hills above. Right around there. Just got up and we saw it. And as soon as he saw us, he took off running.

PIN 115, SACHS HARBOUR

More recently, in early July 2009, the same hunter spotted a bear lying on the top of a tall hill in the Lennie River area.

It was laying down when we first saw it. It was laying down on the top, tallest hill. We were travelling along the river, and we looked up and see this white thing and wonder what the heck it's doing. “What's that up there?” At first we weren't sure it was a bear, and then it got up and started walking. It started walking down towards us. He must have heard our ATV, turned around, took off back up.

PIN 135, SACHS HARBOUR

In general, there have been more sightings along the coastline of Banks Island near Sachs Harbour, as well as visits to the community, since the PBTk study interviews concluded in the fall of 2010.¹¹⁶ Visits by

polar bears to Inuvialuit communities and camps, and whether the frequency of such visits has changed over the years, is discussed in Section 5.4.

3.4 Interactions with other animals

Section 2 notes that the sea ice is home to a variety of animals in addition to polar bears, and that Inuvialuit hunters watch the behaviour of some of these animals for clues about the movements of polar bears. Clearly, polar bears interact with these animals in various ways, or live in some kind of ecological relationship with them. Apart from the animals that they kill for food — ringed seals, bearded seals, the occasional beluga whale and eider duck — these animals include grizzly bears, wolves (Photo 22), wolverines, foxes, crows and gulls.

The presence of foxes, wolves and wolverines on the ice is a sure sign that ringed seals have whelped and that polar bears are probably hunting the newborn pups and their mothers.

We always watch for foxes. Once we see foxes, sometimes we'll follow their trail for awhile, then we'll see their fox trails, and we'll follow their trail for awhile, and we always run into a polar bear trail. Foxes stay with the polar bears. So, we always watch out for foxes and that. That's how come the wolves and that always head out in the springtime, in April. They always head out to the ocean — and the wolverines — because they know there are going to be seal pups. There's going to be pups out there, so they always head out towards the ocean, and they always start hunting seal pups.

PIN 158, PAULATUK

Foxes feed off the remains of seals killed by polar bears.

I used to hear stories [about how] some of the bears would turn the seal skin right inside out. They'll just eat all the fat and leave the meat and the skin.... That's why usually the foxes are following them. Wherever you see foxes, there's always bears around.... That's one of the indicators, because they follow the bears all the time and eat off their scraps.

PIN 12, AKLAVIK

Foxes provide other clues about polar bears. Where they urinate can indicate the location of a polar bear maternity den.

They [the bears] have their little breathing hole, some of them the size of pencil. They make a hole with their nose, and you always know it, 'cause the foxes always urinate on it.... I learned that from the elders that I used to travel with.

PIN 134, SACHS HARBOUR



Photo 22. An arctic wolf travelling across the ice indicates there are polar bears in the area.

John Lucas Jr.

Ravens (crows) also may point the way to polar bears.

Even though I'm travelling out on the ice, if I see a crow coming to me, and I go to that place he came from, he knows where the food is. So we use him to find the polar bears too. But it is just another way of using your knowledge.... He is not flying really high. Sometimes they go so high just to look over the scene. But you know he has eyes; he can spot blood the higher he goes. So as soon as they see blood, they "shsssss," down below. And when they are full coming back, they are not even a hundred feet above the ice. You are using that crow to find that kill site.

PIN 158, PAULATUK

While their close cousins, grizzly bears, have long been established along the coast of the Northwest Territories and the Yukon North Slope, their history in Ulukhaktok and Sachs Harbour regions is not well known. The earliest evidence of a grizzly bear in these regions, based on the PBTK study interviews, dates to 1949 or 1950, when Fred Carpenter shot one at Masik Pass on Banks Island.¹¹⁷ Since then, grizzlies have been killed by Inuvialuit hunters at Gore Islands, Nelson Head River, Sachs Harbour and Minto Inlet, and the animals and/or their tracks have been seen at Polar Bear Cabin (west of Mercy Bay on the north coast of Banks Island) and at Johnston Point (Prince of Wales Strait). According to PIN 38 from Tuktoyaktuk, grizzlies are turning up on Banks and Victoria islands, where they kill muskox and end up fighting with polar bears. Ulukhaktok people know when a grizzly has passed by because of the damage to their cabins. Polar bears may also inflict damage on such structures, but the Inuvialuit are more inclined to suspect grizzlies when damage occurs.

We just had one [a bear] three weeks ago in a cabin down by Cape Ptarmigan. It might have been a grizzly.... The windows were all broken and the doors were broken in.

PIN 117, ULUKHAKTOK

Much to his surprise, a Tuktoyaktuk TKH encountered a grizzly bear hunting seal pups out on the ice in April sometime around 2001. He had never heard from his elders of grizzlies hunting on the ice in this manner.

I've seen grizzly bears out in the ice hunting seals, so for some reason it's gonna change to that, I think. I don't know, maybe they've always done that, but while I was tracking a polar bear one time, and [it was] kinda foggy, when it cleared up, it was a grizzly bear.... Somewhere around here [gestures].... I thought I was tracking a polar bear.... By the time I got to it, it was scared of the Skidoo. I seen where it get them pups though, got them pup seals, pulled them out.... It probably always happens, but I never, never run into any until then.

PIN 161, TUKTOYAKTUK

Aklavik Inuvialuit have seen grizzlies in the coastal zone along the Yukon North Slope when they are at their camps during the spring and fall. Fish and beluga whale offal attract the bears to the shoreline.

Beside Shingle [Point] or Running River; then you get the grizzly bears coming out, just from the keen sense of smell.... And generally during the fall time, they tend to follow the shoreline — fall time/springtime. Follow the shoreline and end up on the carcasses. On Shingle Point here, we have three main camps: Down the Hill, Middle Camp and the Point. At any given time in July or August, you get families down there, hunting beluga whales, getting their catch, and harvesting the fish, and they're just putting their guts on the shoreline. You get these grizzly bears travelling and [they] get tuned in to these food sources.

PIN 19, AKLAVIK

Grizzly bears frequently walk the beaches in the Shingle Point area scavenging dead seals. Some of these are seals that were killed by polar bears and either not retrieved or not eaten. When the ice melts in the spring, these dead seals float ashore and provide sustenance to other animals.

That's the ones that the polar bears miss all the time. Once they miss them, they're dead, and then they come along and wash up along the shore. We always have grizzly bears walking along the beach, because they're

looking for the seals that polar bears had missed. They [polar bears] miss the seals all the time. Like, some of them they catch, but some of them, they just break the top of the head. And there's just a thin plate. They've really got a thin plate. You've just got to hit it and it just smashes — smashes right away. You could even hit it with your hand and you'll smash the top plate there.

PIN 13, AKLAVIK

The gulls pick away at the remains of the seals that the grizzlies leave behind.

We always find them in the summertime, when we walk along the beach there. We find seagulls eating them and bears taking them — dragging them out. Like, we always go to Running River, too, and get our main water supply from the mountains. And then we always see — even in the fall time, we see grizzly bears dragging up seals from the — like, small seals. We see them dragging up the seal from the ocean. Then we know that's from the polar bear — the ones that the polar bear missed. Whenever a polar bear misses a seal, a grizzly bear will always get it in the springtime.

PIN 13, AKLAVIK

This Paulatuk TKH said that hunters from his community are seeing more grizzly bears on the ice in the Keats Point, Pearce Point, Horton River and Langton Bay areas in April and that they are scavenging seals killed by polar bears.

Even the grizzlies, they're out on the ice looking for leftover polar bear kills come April. 'Cause the bears they just eat the fat, the oil from the seal. The grizzly smells the seal carcass and he goes out and scavenges whatever he has. So, we're seeing more grizzlies out along the coast... Even this area here. This Langton Bay area. They're seeing more grizzlies going out on the ice, compared to scavenging inland or along the shorelines.

PIN 158, PAULATUK

Inevitably, the fact that grizzlies and polar bears share the same coastal zone for part of the year brings the two animals into contact with another. Their encounters are frequently violent. In a confrontation between a grizzly and a polar bear, the former invariably dominates. An Ulukhaktok hunter said he had seen a polar bear mother and cubs killed by a grizzly in the Wynniatt Bay area,¹¹⁸ and sometime around 1994, Ulukhaktok hunters found the remains of a polar bear that had just been killed by a grizzly in the same area. Its back legs had been torn off.

I seen one that was killed by a grizzly bear. Someplace about thirty miles from land out here somewhere. Around there. I used to have a video of it, but I don't know where it is. Pictures too.... Dead. We were tracking it for about three or four hours, and that's when we see different tracks following. It was a grizzly bear tracking the bear we were tracking.... Then, we were out sport hunting, first part of May. Second week of May, we were out there and we seen it.... The back legs [of the polar bear] torn off. Right off. Lots of hair all around from a big fight.... A young boar. About three [years old], maybe. Must be about seven-foot or something.... The one we saw, we figured it was about nine-foot when we seen it. It just went out in the open, in the rough ice, and disappeared back again. And we never see it again after that.

PIN 123, ULUKHAKTOK

The badly mauled grizzly in the following description may have been the one that killed the dismembered polar bear.

[circa 1993] I know there was a grizzly bear eating polar bears in that area [Wynniatt Bay]... I caught up to it all right.... Boy, it [grizzly bear] was looking really in deadly shape, no-good shape. I think from fighting all those bears, and fighting the male bear. He had a big, torn lip, and his ears were pretty well hanging down. He looked like a mean-looking animal. Boy! I never want to see it again. I didn't even know I was supposed to kill it. After I find out I was supposed to kill it when I was down there, I radioed in. We thought he was killing bears.

PIN 117, ULUKHAKTOK

Not all relations between grizzlies and polar bears are acrimonious. They will at least tolerate one another when feeding at the same bowhead carcasses.¹¹⁹

You see them along the coast, too. We have beached bowhead whales that die from natural causes. They come up to the beach and you see grizzlies and polar bears eating on them in the summertime. Say around Pearce Point. These bowheads, they last for a couple of years. They are big animals and you have grizzlies and polar bears eating together. There is no conflict. There is so much food that they're just eating, eating, eating.

PIN 158, PAULATUK

Furthermore, male grizzly bears are known to mate with female polar bears, thereby producing the famous, or infamous, "grolar," or "polar grizz" hybrid bear. A Paulatuk hunter found evidence of interbreeding between grizzlies and polar bears one April on the ice near Pearce Point.

In April we see grizzlies following the polar bears so they're interbreeding.... We see quite a bit out here, each following the polar bear, going from inland, going straight out following the polar bear.... From out here [Pearce Point]. Wherever they come out of their dens they're walking the ice, then we used to see them; they [grizzlies] run into polar bear tracks, and they follow it.

PIN 142, PAULATUK

On another occasion, in March 1996, the same hunter witnessed a polar bear and a grizzly mating on the ice.

We used to travel out on the ice, and at one spot we saw a big mess on the ice, and there was grizzly hair. That was in '96. I took the hair, 'cause that bear was following with the polar bear.... I thought it was just a regular bear, but when we looked at the skin there was brown bear and grizzly mixed with it, and they were both laying together, and probably rolling around.... It was way out here somewhere.... in March.... When I looked with the binoculars, I saw both of them. They were both following each other. So that could have been what happened; that bear could have been mixed with a polar bear. It never came inland; it just kept walking on the ice.... The other one was right beside it. It had long nails, and the polar bear had short little ones. Me and my brother were looking at the tracks and knew it was a different kind of bear.... Later on, how many years ago, they got one in Sachs Harbour.... I think this one could have been the first one they would have got, but we didn't know about it when they were breeding that time, 'cause this bear could have been a big female and there was a male following, the polar bear.... it could have been a [grizzly] female and a male polar bear was following, 'cause that time they were in season.... Mating, some time they mate early March and April.... I was surprised when I saw them together laying, rolling around, 'cause I was ahead of my brother, and when I saw it I didn't know. I pointed [my gun at] one, was gonna get it, but we left them. Then we find out when we saw those tracks it was a grizzly and a polar bear; they were walking together. So they were rolling around on the ice probably just starting to mate, and you know how they can make a big mess when they are rolling around or playing.

PIN 142, PAULATUK

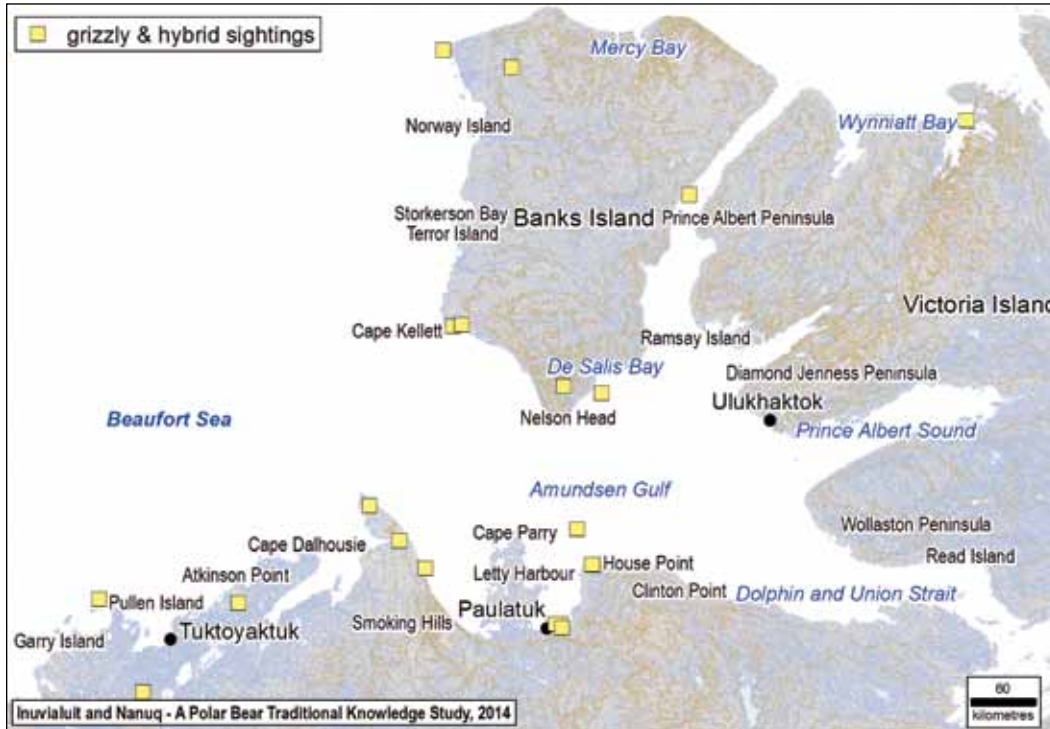
In recent years, an Ulukhaktok hunter encountered a hybrid grizzly-polar bear (Photo 23) near Nelson Head on Banks Island that was mating with a female polar bear (Map 26).

I seen a half grizzly-half polar bear.... I think there was two of those bears that same year. Me and [my companion] caught up to the other one. That one we caught up to was a big one. The one [PIN 138] caught was not that big.... The [sport] hunter was going to arrow it, but he [the bear] couldn't stop. Even the dog bite it, we couldn't get it to stop. [The hybrid was a] yellow bear. But the female was really white, his wife.... He was mating with a female. The female took off really fast, but that half-grizzly or whatever you call it, we caught up to it. He went in the pool, and we have dogs on it.... He couldn't even stand up. The dogs were at it. So, it got to the rough ice, and we couldn't get it. That's the time we lost our dog, and then, Paulatuk people found the dog a year later. But the bear we had was a big one, a big male bear. He was with a female....[near Nelson Head] The female was the polar bear. The male was the big half-breed.... It really was breeding with that polar bear. So, we might have another

young polar-grizzly out there, hanging around.... [One can tell a bear is a hybrid from] the way it looks. It had a big hump on the back and big ears and his eyes were different. And also his claws. And also, he was not really white. But he was a big one.

PIN 117, ULUKHAKTOK¹²⁰

Map 26. Places where TKHs harvested and/or observed grizzly and/or hybrid polar-grizzly bears or tracks



3



Photo 23. The hybrid bear that David Kuptana shot in 2010.
David Kuptana

Hunters from Sachs Harbour, and/or their sport-hunting client, also killed a hybrid bear near Nelson Head.

We did get a hybrid bear. That was in 2007, during Easter. Easter weekend. It was right around Nelson Head, by the shore.... You can call it what you like, but I have exclusive rights for my trademark, the "Polar Grizzz".... What happened, in the morning, I was out [with] my helpers ... about 5:30 in the morning. They came to my tent and they said they saw a bear. And what happened at that time was the bear ran up a bank, about a quarter mile away from us, quarter mile to half mile. It stopped on top of a point, like a ridge, and just sat there. And it started looking out into the ocean, towards the ice there. And what had happened is, it was chased by a much larger bear into that area, [by a] polar bear.... By its characteristics, I could tell its mother was a polar bear. The way she acted. It didn't act like a grizzly bear or anything. It acted like a polar bear. Or it learned the ways of the barren land, the way that it walked. Where I tracked it for a ways after we got it, its characteristics was polar bear. You could see the way it hunts; it's exactly like a polar bear. It was taught by its mother.

PIN 138, SACHS HARBOUR¹²¹

3.5 What polar bears eat

If you ask Inuvialuit TKHs what polar bears eat, they will all tell you that they eat ringed and bearded seals, and scavenge the carcasses of the occasional bowhead and beluga whale and other animals that float up on the beaches surrounding the Beaufort Sea. Some will say that they also eat seabirds, grass, seaweed (kelp), Arctic char, sculpins, and if extremely hungry, garbage, dogs and camp supplies. No one has ever seen or heard of polar bears eating caribou, berries, geese or their eggs.¹²² Inuvialuit know what polar bears eat because they observe them killing and eating seals or scavenging on the shores, they see the evidence of bear-hunting, such as blood and seal carcasses on the ice, and they examine the contents of the bears' stomachs as well as their feces.¹²³

All the TKHs interviewed for the PBTk study agreed that the most important polar bear food is ringed seals, although bears appear to prefer the larger (i.e., 800- to 1000-pound) bearded seals. In both cases, it is primarily the seal fat that the bears consume. Inuvialuit use the words "fat," "oil," and "blubber" interchangeably when speaking in English about this energy-rich food.

The polar bear will eat exclusively seals, if they can. They eat mostly the fat only, and they'll leave the meat behind.

PIN 115, ULUKHAKTOK

At times, you see where they've dug up the seal there, beside their seal holes. At times you see where they didn't get any seal pups from digging around. At other times, you see where they'd get the seal pups, and the bear is in really good shape, and all he'll eat is the fatty part, the blubber part, and the skin. In other cases, you'll see where they had dug a hole where the seal lair was or the seal hole was, and you'll see blood all over the place. You wouldn't see a thing around, because the polar bear had eaten all of the seal.

PIN 19, AKLAVIK

Bearded seals (ugruk, ugyuk) are heavier and fatter but harder to kill, particularly by smaller polar bears. One Tuktoyaktuk TKH said polar bears, "like that bearded seals all right, but it's hard to get them. The small bears...they get the ringed seals" (PIN 38, Tuktoyaktuk). When asked if polar bears have a preference for ringed over bearded seals, one Sachs Harbour hunter said that polar bears "go where there's hundreds of seals and hundreds of ugyuks. Polar bears prefer ugyuks over [ringed] seals; I know it. But a [ringed] seal is easier to hunt. The blubber is probably the same strength as an ugyuk. That is where they get their nutrition from, the blubber" (PIN 132, Sachs Harbour). They probably prefer bearded seals, he said, because they have more fat than ringed seals.

A second Sachs Harbour hunter said that polar bears preferred bearded to ringed seals. However, "they will get whatever they can. If you were out there and had nothing, you would get the first thing you see"

(PIN 138, Sachs Harbour). Another hunter from the same community, when asked if polar bears preferred bearded to ringed seals, said “they prefer them both; whichever one they could catch.... It doesn't matter to them [as long as] they get something to eat” (PIN 139, Sachs Harbour).

The Sea Otter Island area on the west coast of Banks Island is a very good place for bearded seals, according to this hunter from Sachs Harbour.

Good hunting spot is up around Sea Otter. I don't know why, but it's always full of ugyuk there every spring and summertime. I don't know if it's good feeding for them.... Must be a lot of clams or whatever around there.... One year we went there, in June, July. And there was still ice in the bay, and there was just tons of ugyuk on the ice. Must be good feeding, 'cause couple of years ago when we went up, we found some nice big shrimps in the stomach, fresh ones. So it's got to be good feeding up there.

PIN 133, SACHS HARBOUR

Bearded seals (Photo 24) are less prevalent in the Ulukhaktok area, which is why ringed seals are the polar bears' primary food source. According to one Ulukhaktok hunter, there are “more ringed seal around here. I never seen any polar bear catching a bearded seal” (PIN 123, Ulukhaktok). Another hunter from the same community said that people would hunt bearded seals in the William Point area at the southwest corner of Victoria Island.

In my younger days, we used to go from Read Island... past Williams Point to get ugyuks.... Bearded seal. That's why we used to go from Read Island to get ugyuks... for dog lines and anchors and rope around the sled with an ugyuk skin.

PIN 125, ULUKHAKTOK

Near the mainland, bearded seals are found in large numbers all around the north end of the Parry Peninsula, near Booth Islands, Cape Parry and Browns Harbour.

They both have strong currents, Cape Lyon and Cape Parry.... I think that is why it is a real good place for ugyuks on Cape Lyon and Cape Parry, 'cause of the currents and the food available in these areas. There is more food down below so there's seals, and where there are seals, there are polar bears. They kind of congregate in this area.

PIN 158, PAULATUK



Photo 24. Inuvialuit hunters harvesting a bearded seal.

Tony Green

Booth Islands... it's a good place to hunt the ugyuks, the bearded seal... This place always had young ice. It was always moving, never the same, so that was a good place for hunting bearded seals. It is not so much to stay away from, it is where to go and get the food.... Before the '80s.

PIN 158, PAULATUK

While bearded seals are certainly present in the Cape Parry area, a Paulatuk hunter said that they are outnumbered by the smaller ringed seals.

To my knowledge...when we run into bears, and we find where they're sitting is basically out in this area here [northeast Cape Parry]... Waiting for seal.... Because the ice is thin and there are fresh leads from storms the day before they get out, and short, small open places where seals haul up.... There is an abundance of ringed seals compared to ugyuk. Here, there's not so much, but if the bears get a chance to get an ugyuk, I'm pretty sure they'd eat them, because they have more body fat.

PIN 160, PAULATUK

A short distance to the west towards Tuktoyaktuk, the Whale Bluffs area is also a good place for bearded seals.

I see most of them [bearded seals] all the time out on Whale Bluffs area there, like on edge of open water. There's open water.... You see them hauled up. There's thirty, forty, fifty in bunches there, hauled up, and there's lots. Outside of Whale Bluffs... where open water is, edge of the open water.... Some years, it's different.... but wherever open water is, like sometimes it's a mile out, sometimes it's a mile and a half out, open water, they're all up there.... Lots and lots.

PIN 42, TUKTOYAKTUK

In August 2010, bearded seals were so abundant that Tuktoyaktuk TKHs were seeing them in the creeks near the community.

This year [2010] in August there was quite a bit of bearded seals in around the community, the creeks. But that don't usually happen every year. Just that you notice them some years, there's more in August, 'cause there's so many of them, I guess.

PIN 161, TUKTOYAKTUK

Polar bears strip the fat off a seal using their razor-sharp claws (Photo 25). A Paulatuk hunter said the diamond-shaped tips of the claws are so sharp that they will easily penetrate human skin.

And they have sharp claws. The minute you touch their claws, they just poke right into you. And they always have that little diamond shape, like a little diamond.... You always feel that, and it always just pokes right into your skin.... They're sharp compared to grizzly bears [who] have long hooks, all right. But polar bears have really sharp [claws]. It's like a diamond; sharp for me.... Holy cow! I like to feel them.

PIN 158, PAULATUK

Polar bears shred the seal hide into strips as if they were using a knife in order to get at the layer of fat underneath.

Some of them, when they cut the seal, all they use is their nails, just like a knife. They cut in strips, and after that, they pull that. Where they make strips, [they] put it out like that and really clean.... some of them just eat the blubber, but hungry ones, they eat the whole thing. They're pretty smart, those bears; almost smarter than me. I think they're smarter.

PIN 28, TUKTOYAKTUK

When bears are in good condition, they normally eat only the fat, mixed to some extent with shredded hide, leaving the meat and other body parts for the foxes and other scavengers.

Most times when you're tracking a bear, when the bear's healthy and in good shape, when he gets a seal, he usually just leaves the meat. All the blubber is taken right off. Skin and everything, but the meat's all still there.

PIN 42, TUKTOYAKTUK

Seal oil is their main diet — seals [Photo 26] and bearded seals.... They don't eat too much meat, not unless they have to, I guess. Sometimes I used to see when they get a seal they eat the oil, leave the meat for the foxes.... They always eat the oil.... They prefer bearded seal 'cause bearded seal are more fatter.... They clean it right out. They leave the meat too.

PIN 33, TUKTOYAKTUK

We watched a polar bear for a couple of days outside Storkenson Bay. It had a seal. We never shot the bear, 'cause it was a small one. But we went to where it was sitting, and there was a seal with ice. Thin ice, and piled up, and that bear stayed there for two days. In fact... when we got out of there, it went back and sat down, and after a few days we went around by there. All the oil from the [seal] was gone.... not the carcass. Just the oil.

PIN 132, SACHS HARBOUR

The seal fat is rendered into oil in the polar bear's stomach as soon as it is consumed. Bear stomachs may contain large amounts of this oil, which can ruin mitts if a hunter is not careful.

They clean out the whole thing, the fat and all from the seal. Some of their stomachs, there would be 10–15 gallons of just oil. Soon as they eat the fat, it turns to oil in here, and the skin, it is ripped up in chunks anyway, so the skin is mixed in there with the oil. So when a polar bear is running, you will see him shit all this black stuff, and it is just the oil. And they get pretty big and pretty heavy, to about 150 pounds — a big, big polar bear's stomach. But it's a dirty thing when you grab the oil, say on wolf mitts; the wolf mitts are ruined.

PIN 158, PAULATUK



Photo 25. Polar bears have razor-sharp claws.
Jean and Pat Ekpakhohak

Inuvialuit hunters note the seasonal variability in polar bear diets from one year to the next. In some years and seasons, more of the seal meat may be eaten, as noted by this Sachs Harbour TKH.

They usually go for just the fat.... I've seen them clean out the oil and leave the carcass, and even last year when me and my son ran into a couple of seal kills. It's whatever is around; wherever they get the most fat, I guess. But whatever is easier to get.... [Last year] the ones we saw, there was bones with some meat on them... so they've eaten some of the carcass, but I've seen them when they just eaten the fat off.... If they're hunting [ice] ridges, depending on what time of year, they'll be mostly getting [seal] cubs. But that would be towards the spring, for sure.... But during the winter I'm sure they will be getting whatever they could.

PIN 135, SACHS HARBOUR

The seasonal variability in polar bear diets extends to sea birds such as eider ducks, grass and even garbage, as noted by a hunter from Tuktoyaktuk.

I've seen polar bear, when I cut them open, a lot of its blubber [has been] rendered already because of the digestive system. I've seen duck feathers in the stomachs.... When you're hunting out in open water, there's always birds out there, seabirds, even in the dead of winter. And unless you're really hungry, you don't shoot a seabird out in the ice, because sometimes the bears use them for food. So, in order to show them respect, "No, I'm not gonna touch that food that you might need some time".... Seabirds, like eider ducks, and different ducks.... They [polar bears] go from underneath and grab them.... bears with grass in their stomach, but I never seen that personally. So, every animal that you see, if you open up the stomach to see what they got.... I've seen bits of those plastic garbage bags from a bear that was grabbing something.... Remember I told you not to throw the orange peels away [speaking to co-researcher]? That's garbage we got to bring back.... Bear came by and ate it, and [someone] shot it, and there's the orange peels [in the stomach]. So I told her, whatever you leave behind, there's a good chance a bear will get at it.

PIN 43, TUKTOYAKTUK

While he had never seen polar bears eating eider ducks, one Paulatuk hunter thought it quite possible that they might scavenge them at certain times of the year, depending on the weather conditions.

I think it was in April, we had a whole pile of eider ducks come in. We were finding them all over on the land, frozen and dead, and some of them walking with clumps of snow and ice on their feet. Maybe that's how they [polar bears] can eat them in the springtime around April, other than catching them in the summertime.... If it



Photo 26. Ringed seals are normally a big part of a polar bear's diet.

Jonas Meyook

happened inland here, I could see a polar bear out there scavenging on dead frozen eiders, because the ones we got were all dead inland in April. So, they might be scavenging.

PIN 160, PAULATUK¹²⁴

This Ulukhaktok TKH said that hungry bears might eat garbage and even try to kill foxes.

Sometimes you could tell by tracks, a poor bear or a healthy bear, when you're going after them, when you're going after them for a long time, like tracking them. Sometimes, you have to track a polar bear for miles and miles before you catch up to it, and you could tell, a problem bear or a healthy bear... a problem bear is a mean bear, you know, you could tell that.... And a healthy bear, it eat lots. [A mean polar bear] isn't really careful; [it's] going after junk like paper in an old camp or stuff like that in camps... when they're hungry, they could go after anything, like paper and cans and stuff like that. When you're tracking them [mean bears] sometimes, they're getting after foxes or things like that. You know, when they're healthy, they go for only seal meat, the bears.

PIN 114, ULUKHAKTOK

Polar bears are likely to be hungrier in the summer months, particularly in areas where they cannot use sea ice as a platform from which to hunt seals, or catch hauled-up seals. At this time of the year, they scavenge the shoreline looking for carcasses of bowhead, beluga whale, muskox and other such food sources. Rotting whale meat is extremely smelly, which attracts bears from great distances.

Sometimes you see dead beluga whales close to shore, or bowhead whales. Then the polar bears would smell that, and some of them would be there.

PIN 103, INUVIK

There was a dead muskox around King Point, and the polar bears kept coming in for it because they could smell it.

PIN 13, AKLAVIK¹²⁵

Sometimes in the fall the male bears that are out walking around try to find something to eat. They'll find a dead carcass or sometimes there'll be a bowhead whale washed up on the land, and sometimes they'll feed on that or dead beluga whale. I haven't [seen them feeding on belugas], but I've seen people talk about it, though.

PIN 139, SACHS HARBOUR

Everybody knows they eat seal, hunt seal, but when they find anything that drift somewhere on the beach, that's what they eat. Like bowhead or whatever.

PIN 149, PAULATUK

One Sachs Harbour TKH suggested that more whale carcasses were washing ashore in the Inuvialuit region compared to former times, but he was the only one to do so. In his view, “more and more, you're finding or hearing about bowhead whales washing up. All over. Around Paulatuk, around Holman, around the island” (PIN 133, Sachs Harbour). In contrast, a Paulatuk hunter said that beached whale carcasses in his area are a rare occurrence. He and his fellow hunters found three bowhead carcasses near Pearce Point in March sometime around 1992. They hoped the rotting carcasses would serve as bait to attract polar bears that they could then harvest.

One year we had three. Might have been in '92.... I forget what year, but there was three washed up, and before that there was nothing.... Since I could remember, there had been nothing up until then.... bowheads.

PIN 163, PAULATUK

Scavenging a whale carcass “can be more like a live-or-die thing” for a polar bear, he continued — its “last hope” to eat. Nonetheless, the bears that fed on the dead whales that year did not make repeat visits, due perhaps to the local abundance of other food sources.

Polar bears, they'd come in and they'd eat, and they'd never come back to it again. You'd see the different-sized tracks come and go. They weren't really concentrated. I guess it was good feeding, the same year that this was going on.... You'd expect to see the bear back, but you never did see the tracks even come back.... We were camped

at Pearce Point, and we'd go out and check it out each day. Never did work for us, though. We thought we had it made with a big ten-thousand-pound bait there. But never did work.

PIN 163, PAULATUK

A Sachs Harbour hunter observed polar bears feeding on a bowhead that they had dug out of the snow at Nelson Head.

Nelson Head right on the sands spits there.... Is, was how many years ago? Back 2006 April. There was a dead bowhead whale washed up on the shore there and polar bears were feeding on there. They dug it out from about nine feet of snow and there was four or five holes where they dug it out and several bears feeding there.... Male and female.

PIN 139, SACHS HARBOUR

Aklavik Inuvialuit talk with their Inupiat friends and relatives in Kaktovik, Alaska, from whom they learn of the bowhead whale harvests there. The remnants of the harvested whales are towed to the airstrip area, where they attract large numbers of polar bears.

When they harvest their bowhead whales, they drag them to the end of their airstrip, and their airstrip is pretty much right attached to their town. Like Barter Island — Kaktovik is an island — right at the edge — like Herschel Island, right at the edge of the coastline; and they do their bowhead hunt there.... It's not uncommon to see 12–15 polar bears in and around that area.

PIN 19, AKLAVIK

Another Aklavik TKH (PIN 13) told the story of a bowhead carcass that was stuck in the ice near Herschel Island. Numerous polar bears were feeding on it. He associated the relative scarcity of polar bears in the area the following spring with this carcass, because it transported all the scavenging polar bears with it when it floated away on the ice. His narrative about this event is reproduced in Section 5.4.

Although bowhead whales are certainly too large for polar bears to kill, their smaller cousins, belugas, are occasionally prey for the wily predators, especially when they get stranded in small polynyas. Inuvialuit know this because they harvest belugas or find beluga carcasses that have been badly scarred by polar bears.

One summer, I got a [beluga] whale there. It must have been a good picture, because right down his back was a bear. You could see his claw marks; and then, just before the flipper, there was a piece about this big [gestures] that's healed up. That bear took a chunk out of it. And then, just before the flipper, he grabbed it one more time. That whale got away.... that's in the summertime. I got it at Kendall Island.... You could see the scars of the bear right down the back, right down...about this big, and it was just like [taps on wood] — that part was like this, because it had healed up.... It must have been at an open lead or something. A whale passing by, and the bear was hungry, I guess.

PIN 3, INUVIK

We will travel out to Cape Parry, but if we miss the beluga, we will start travelling towards Cape Parry. We know what time to go there now in the summer.... When we get the beluga whales, and you will see some of them. Scarring and you can tell some of them bears tried.

PIN 150, PAULATUK

Many participants in the PBTK study noted that polar bears will eat grass and/or seaweed (kelp) at certain times of the year, in addition to whale and other carcasses.

I've seen them eating like seaweed along the coast. Lot of time they're scavenging on old carcasses, whatever they could find.... this time of year [October].

PIN 134, SACHS HARBOUR

It's a lot more tough for them to get seals [in the summer]. They will go without seal meat for a long time during the summertime. What they usually do in summer is walk along the shore and look for drifted up seal or whale.... And some times they will eat seaweed.... Anywhere.... there is no one specific area, anywhere along the beach.

PIN 138, SACHS HARBOUR

I know they mostly eat the seal; they eat the seaweed in the summertime, scavenge along the coast in the summertime. So mostly seal oil and seaweed.

PIN 158, PAULATUK

When there is no ice out there, soon as it starts freezing they hunt to get all their weight back 'cause they live off kelp in the summer along the beach.... Kelp, you know, those long weeds.... As soon as it freeze, they start going out to look for seals.... I would say in the summertime when they start losing their weight they start eating the kelp and all that stuff, to keep them healthy, I guess. And whenever they find a dead carcass they will eat it.... Just following the beaches. They find a dead seal they will eat it or a dead whale they will eat it.

PIN 142, PAULATUK

Some TKHs thought that female bears and/or their cubs are more likely to eat grass in the spring, particularly when they emerge from their dens.

They eat bearded seal and ringed seals. In the spring [female bears], they'll eat grass. Their main diet though is seals.

PIN 139, SACHS HARBOUR

But the ones with the cubs, while they're still in their dens with their little ones, before the little ones are starting to come out into the open area once in a while — now and then — the ones that are in the den, the females would eat grass from the land.... While they [the Inuvialuit] were camping, a female bear with cubs — small cubs — come out of its den [Nelson Head] and dig while they were there camping. It dug into the snow like a caribou. It dug out the snow from the top of the land and eat some grass from around that area.

PIN 126, ULUKHAKTOK

One time I seen tracks at Hooper Island. Bear been eating grass on top the island. I seen where it was chewing off grass. Maybe that's when they get too fat, and looking for place to make a den and have a rest, maybe.... A female with two cubs, eating grass.

PIN 29, TUKTOYAKTUK

Speculating about the bears' reasons for eating grass, a Sachs Harbour hunter thought the water-laden vegetation might ward off dehydration. A polar bear he harvested at Norway Island, in April, sometime around 2004, had a lot of grass in its stomach.

In spring, when it is mating season, we run into polar bear with lot of grass in his stomach. But I think to me that probably just stop it from dehydrating, that sort of thing. Like you know, plants got water in it.

PIN 132, SACHS HARBOUR

Two other hunters noted that polar bears, dogs and grizzly bears all eat grass in season, perhaps because of health benefits. A Sachs Harbour TKH spoke of a polar bear killed by his father at Harrowby Bay on the mainland one July in the 1950s.

My dad kill one around here on the land. It was in July, I think.... He was just sleeping, get up once in a while, eating grass. Bears always eat grass in the summer.... That's how they grow up. Those green grass though, really fresh ones, not dried up ones. That time he was a six-footer, and he was eating grass when he get up.... I think he might be a male.... It was a really healthy one.... Even sometimes my little dog in the summer, when it's really green grass outside of the house, he start eating grass, too.

PIN 128, SACHS HARBOUR

A Tuktoyaktuk hunter thought that grass might be good for their stomachs, perhaps with medicinal properties like those of Tylenol.

Only come in night time. Night time they come in. They go on the land night time, and that's what... three pieces of little grass.... To pick up about two to three and eat them. Then walk out again. Even the dogs, they eat grass. Husky dogs, too.... I think any type of animal like grass.... Not every day. Polar bears cubs come up and they pick up two to three little leaves like that, but this small. You see them eat grass. They go pick up for a little bit of leaves, then they go back out to the ice.... They climb the bank and they just find the grass. They jump out of the ocean and go back in the ocean.... This is how far he could go that time in the land, just to get the little grass. I saw with my dog, it is the same way they eat. Every so many weeks, she got to eat grass. It maybe get like Tylenol for them or for their stomach. Like eating, yourself, it just like animals are like that. You never know if animals are doing that too for themselves. Dogs when they travel, I never saw them eat grass, not every day. They need it once in a great while, they eat the grass. They ain't puppies, dogs. You go for them and they chew on it, and next day not even care to do that for a long time. I seen many use that, different thing they like to eat.... Grizzly bears, before they go in their den, they eat grass. That's what they said long ago; to get it, fill it with grass. I think polar bears take a little.

PIN 22, TUKTOYAKTUK

Virtually no one interviewed for the PBTk study mentioned polar bears eating char or other fish. For example, an Inuvik hunter said, "I never heard of them go in the creeks like grizzlies and brown bears, who live on fish and char. They eat mostly seal, bearded seal and ringed seal" (PIN 100, Inuvik). However, three senior TKHs with knowledge of Victoria Island said that polar bears eat fish. A Sachs Harbour elder witnessed a polar bear eating char when she was in her youth (Map 27). The place name she refers to (Kayalihuk) is on Victoria Island.

She has seen a polar bear eating a fish at Kayalihuk. At the waterfalls, by the waterfalls. As they were boating, they saw a polar bear that was eating a char, part of the char. She remembers seeing that the polar bear had eaten the stomach part of the fish. That's the only one she'd seen. This was over summer. July. We know that the fish travel along the shore in July.... Way, way back, before she got a spouse [1930s]. At the time, they were spending the summer at Kayalihuk. That is the one she seen. Her parents, her uncles and grandparents were living there for the summer.

PIN 101, ULUKHAKTOK, Translation

Another elder, now based in Sachs Harbour, remembered polar bears eating char from rivers on Victoria Island during her youth.

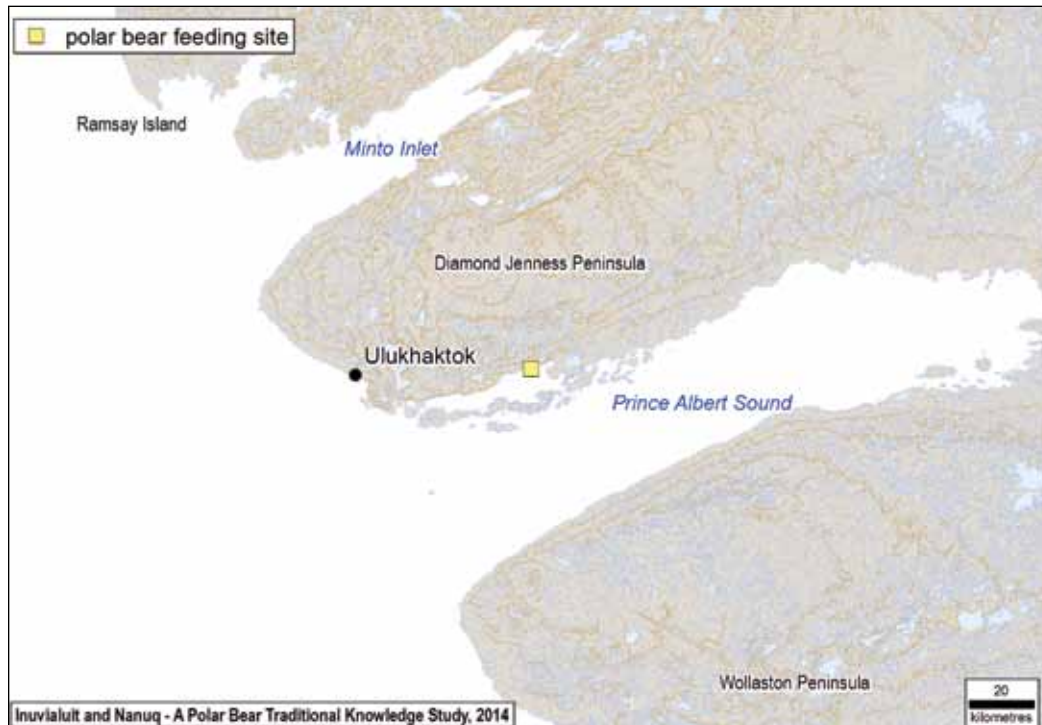
She said she know polar bear eat seal, seal meat, fish oil, 'cause when they're hungry, starving bears, they eat anything, any kind of game they're hunting.... Yeah, they eat fish.... In the river where the fish go by in a gravel place: char.... She said she never know when polar bears hunting fish in deep water, just in the shallow water, shallow river.... She say when she was small, she knows. She said she never know about bears eating [char] in Banks Island, but in Victoria [Island].... Around there in the river, she said she seen them.

PIN 129, SACHS HARBOUR, Translation

While he had not seen it personally, this Ulukhaktok hunter learned from his father that polar bears will sometimes eat sculpins.

In the stomach, it's usually only seal, seal fat, seal meat and seal skin, seal flippers; the whole seal.... That's all I've ever seen inside the stomach of a polar bear.... Just some stories of the stomach contents; devil fish, of fish with a lot of horns on their heads, sculpins. When they're hunting out in the shallow area, and there's some of those sculpins, they would eat those sculpins, also. The polar bears would. Personally, I haven't seen anything like that, but just as it's passed on, generation to generation from my father. Because at that time, they hunted bears throughout the whole year.

PIN 120, ULUKHAKTOK, Translation

Map 27. Place where a polar bear was observed eating Arctic char (by the waterfalls at Kayalihuk)

Source: PIN 101, Ulukhaktok

3.6 Polar bears eating other polar bears

There is nothing particularly unusual in the fact that polar bears occasionally eat other polar bears. It is in the nature of polar bears to sometimes eat their own kind.¹²⁶ Of the 43 study participants who were asked if they had seen any evidence of polar bears eating other polar bears, 11 had seen direct evidence of it. (for example, they found remains of dead bears, signs of the struggle that lead to the death, etc.); 31 had not seen evidence, but 12 of them had heard of it either from other hunters, a polar bear biologist (Andy Derocher), scientific reports, television, reading one of Ian Stirling's polar bear books, or from a magazine article on polar bears in the Churchill, Manitoba, region. Three participants had heard of polar bears scavenging the carcasses of bears killed by hunters; another participant saw the direct evidence of this. A fifth participant saw a polar bear that had been killed by hunters and left for retrieval the next day, but overnight a second bear had eaten its oil-rich (fat) stomach contents, but nothing more.

The majority of cases where TKHs saw evidence of polar bears eating their own kind are from the north coast of the NWT, on the sea ice offshore of Pullen Island, Atkinson Point, Baillie Island, Cape Parry and Pearce Point. Two cases were reported for Norway Island and Storkerson Bay on the west coast of Banks Island; no cases were reported from the harvest areas of study participants from Ulukhaktok, Inuvik and Aklavik (i.e., Victoria Island, Mackenzie Delta, Herschel Island). Map 28 shows locations where TKHs documented such cases. The earliest reported case, offshore of Baillie Island, dates to the 1950s, while the most recent cases, offshore of Pearce Point and Atkinson Point, date to the early 2000s.

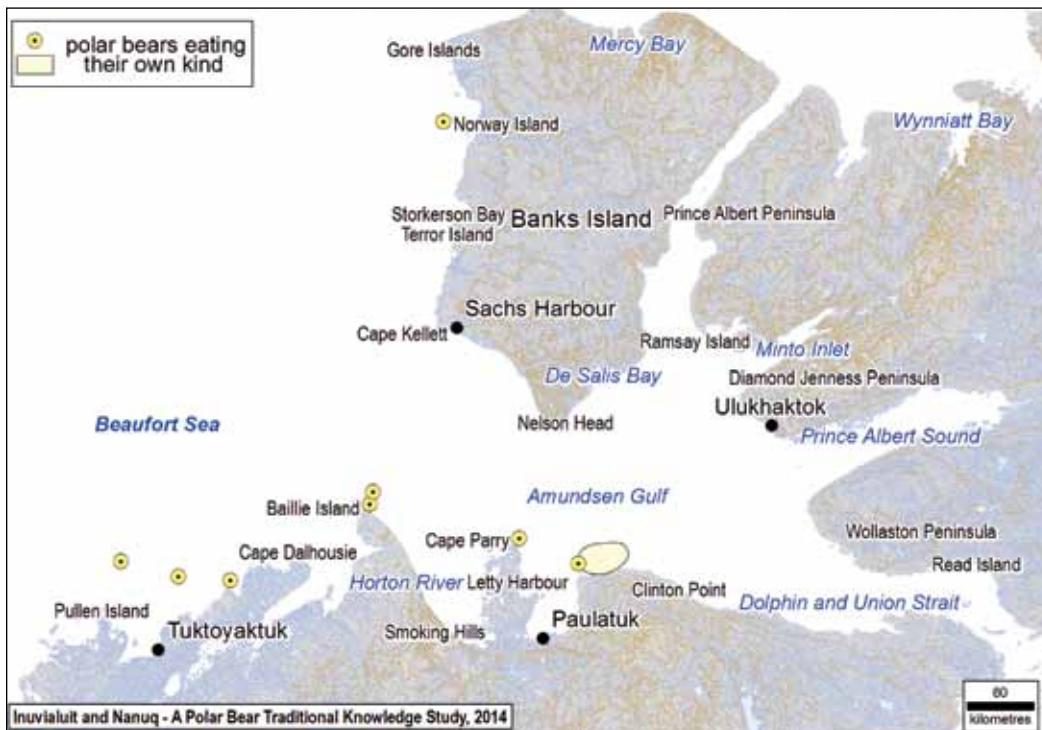
According to the PBTK study participants, polar bears will eat their own kind primarily in one of two ways: males will kill and eat cubs or their mothers during the mating season; or large, hungry bears will kill smaller bears. The life-and-death struggle of two male polar bears can be horrendous, with terrible wounds inflicted on both combatants. In the case below, a fight between two males that may have started

over possession of a recently killed seal quickly escalated and resulted in the death of one bear. The victor, although badly wounded, ate both the seal and much of the vanquished bear.

One time me and [PIN 25] ran into a bear just outside of Baillie there; a big bear, about ten-foot, I think. Been getting a seal. It must have been at open water. We could see the bear pulling that seal from the young ice. Young male been going there, and they got into a fight, and they were fighting, fighting, fighting. They make the ground so hard, they been fighting for so long, the whole ground was just trampled where they were fighting. Finally that big one got it, but that bigger one was wounded too; blood just pouring out.... Maybe other bears went there too. I don't know. He been eating that polar bear, and just left the head of that bear. After he kill it, that big one was wounded. We could see he is not walking too good; he took off, his blood just pouring, too, dripping with blood.... What happened was that small one must have got that seal and was waiting for it to cool off a bit. Bears, he don't eat it right way; they let it cool off before they start eating it, and before it get cooled off, a big bear been going to it, and they fight over it, I think.

PIN 23, TUKTOYAKTUK

Map 28. Locations where TKHs documented cases of polar bears eating other polar bears



In this case, two polar bears killed and ate another bear in the Storkerson Bay area on the west side of Banks Island, sometime around 1990.

Long ago in Banks Island, two big males been meeting one single polar bear. They both attack it, kill it, and eat it, but never eat that liver. Just nothing left; never touch polar bear liver. And those the ones attacking the single one, when they took off, dripping blood, maybe wounded, too. That was twenty years ago.

PIN 29, TUKTOYAKTUK

Polar bears require stealth, patience, speed and agility when hunting seals. If polar bears lose these skills, they get hungry, and may resort to killing their own kind for food.

Just like dogs fight, and once they kill another dog, they wanna kill another one sometime. Same with bears. One time I was trapping that area, Baillie Island area, Horton River, around there. When I first started bear hunting, it was a lot of bears that year. I went out with my two brothers ... and we see a bear, where they been fighting in the ice. One good-size bear, and he been killing the other bear. About ten-foot bear, I think. My brother got that anyway. He was a starving bear, that one there, and its skin was right down to his meat. No fat, nothing. And he been eating the other bear. I think what he does was, that bear, sometimes they lost their touch for hunting. Sometimes a hunter lose it. Maybe wounded a little bit, and he lose his touch on seals. Sometimes even a little noise they make, the seal is gone. When they waiting gotta be really quiet. So I think they lose their touch.

PIN 28, TUKTOYAKTUK

Polar bears may scavenge the offal of bears killed by Inuvialuit hunters or their sport-hunting clients, and consume the choice oily stomach contents.

I remember, one of my friends caught a bear. We went back next morning to check.... Another bear opened his stomach; ate all the contents, which was all blubber, and then it went to sleep.... It was right outside Pullen Island in this area He only ate what was in the stomach, and that was all blubber.... Apparently that dead bear's stomach was full with blubber, and he cleaned it out. You could see it. He just cleaned it right out, the stomach.... My other companion, he shot it, 'cause the bear was right there, and he didn't wanna run away.

PIN 27, TUKTOYAKTUK

None of these accounts by study participants referred to any change in the frequency of bears eating bears within living memory. Participants noted the ferocity of the fight that led to the death of one of the bears in cases not involving cubs, but nothing in their accounts suggests that they considered them exceptional.

3

3.7 How polar bears hunt

Inuvialuit greatly admire the intelligence of polar bears and their agility, strength and stamina. Nowhere are these traits on better display than in the various methods they use to hunt ringed and bearded seals. Polar bears employ stealth and great patience when hunting; they hunt cooperatively at times in order to maximize their chances of killing a wary seal in its breathing hole; use the cover of rough ice when sneaking up on prey; and cover their black noses so they aren't spotted. Female polar bears teach their cubs the skills needed to become successful hunters; one cause of a younger bear's poor hunting is an incomplete education. They are like humans in that important life skills must be acquired socially, by observing their mothers and participating in joint food procurement activities.

Young polar bears... start to hunt [separately from their mothers] when they're two-year-olds. They learn from their mother, and the young little ones, they don't go hunting [by themselves]. They learn from their mother when they're growing, like a human being.

PIN 114, ULUKHAKTOK

Once newborn cubs emerge from their dens in the spring, they must learn quickly how to wait patiently beside seal holes.

The [mothers will] leave their cubs on the side and go out to the seal hole and wait. Their cubs are watching and keeping real quiet, like well-behaved children.

PIN 138, SACHS HARBOUR

This Paulatuk hunter said polar bears learn to hunt cooperatively. In places where there are multiple seal breathing holes, making noise at some holes drives the seals to other ones, where the mother may be waiting for them.

And the young ones, you can see that they're trained. When they're about that big [gestures], they don't travel same time with their mom. They travel about fifty yards behind.... Little cubs. They stay behind, and when their mom stop, they stop. They're trained. When they go find a hole to wait, that's the one that makes all the noise digging around, so the seals can move around. I've seen a lot of them.... some of them never get apart for two years. They're the same size of their mom, still together. One female, one male.

PIN 149, PAULATUK

Another Paulatuk hunter thought that such cooperative hunting involving mothers and cubs may be a form of adaptation to a changing environment.

I guess the females are more successful hunters than the males, 'cause they're smaller, they're more agile, they're quicker than a larger male. You see, the bigger you get, the clumsier you are. But the female is more compact, not too small, not too big. That's just my theory, though.... I would say the female would have a higher success than a male for getting seals.... With that being said, there are other bears that walk along, and keep the seals from going to this one hole where the [polar bears] are waiting. The other cubs are walking along trying to get this seal where he is waiting, so they are not being quiet like their mom. They are out walking. They are slowly adapting, because the seal has so many holes he could go to. It's one way they do it; they have the younger ones walk in order for them to get the seal. Something is going down right there, 'cause their hunting practices have changed. Something that I have noticed over the years is that they're hunting more together, not just the mother alone; the other ones [cubs] walking to bring the seal back to the hole.... You can see that from the earlier 1980s... just by looking at the tracks. You can see where young ones went for a walk, say five hundred yards from the hole, making noise and that, and sure enough, the seal comes back, 'cause he knows there's polar bears walking. But this one is quiet; he is waiting for [the seal]. So there something happening there.... Not only us, that we're adapting; they are adapting too.

PIN 158, PAULATUK

By the time they are two years old, the cubs know enough to be able to hunt by themselves; however, they continue to learn and improve their skills through their own hunting experiences.

Young bears have to depart from their mother; they start going by themselves and learn more to hunt seals after they part with their mom.

PIN 128, SACHS HARBOUR

A keen sense of smell is an important asset when hunting seals.

Polar bears will smell a long ways away. I seen that myself, quite a distance going to a seal, and, he made a straight stretch going over to the seal. From a long ways away, I followed it on my Skidoo, but he never looked around. He just go straight out to the seal, a long ways away.... So, they've got a good nose, those bears, for a long distance.

PIN 2, INUVIK

Polar bears will use rubbled ice as cover when sneaking up on seals.

Kind of bad ice and some ice sticking up... good to sneak right by, the piled-up ice, when they're sneaking to seals.... When they start to get close, they get low, end up, pulling their body over the snow, so that animal can't see them hardly. When it's really low, blend with the snow a little bit, and then when they get close enough, it really run to the seal. Sometimes they got it, sometimes the seal got away.

PIN 128, SACHS HARBOUR

A black nose stands out in a field of whiteness, which is why some bears cover their noses when stalking seals.

Really low, and when they put up their heads here, they keep still. And they do this [gestures] so they [the seals] won't see their nose, black nose, eyes. They do this, and cover their black nose and things like that. And so seal won't see it, eh? Really cool. When they get close enough, take off! Sometimes they catch it, sometimes they lose it, yeah.... I never see [that], but that's what my mom said. They cover their face like this so seal won't see the black.

PIN 136, SACHS HARBOUR

A submarine attack is a good method of sneaking up on ringed seals when they are hauled up on the edge of the ice.

June, July when we're out boating, and we're going to a chunk of ice, and one year we were watching a polar bear. The ice would be starting to break up and there'd be holes in the ice in the springtime. Or there'd be little rivers in the ice. And they'd go in there, and they'd just sneak along there, and when they get close enough, I think they go under water, come out. I've seen them kill four [ringed] seals like that.... 'Cause there's a lot of seals on that ice.... Just outside Kellett there. And they're pretty successful.... Of course, seals are easy prey at that time of year 'cause they're not going to leave the ice. But the way they do it, just go into the water, and sneak through the puddles and the cracks and the holes. Sometimes they go under and come out, little closer. It was pretty interesting. Must have watched them for about an hour and a half, two hours.... This would be '90s — '92, '93, maybe. That was when we still had a lot of ice coming around in the summertime. And you'd see polar bears anyways, 'cause a big ice pack anyways. You're always guaranteed to see polar bears.

PIN 133, SACHS HARBOUR

Sunning, hauled-up seals have little chance of surviving an attack by a cunning polar bear.

The whole year round, yeah, because there's icebergs out there, too. And the seals are on the ice, and then, in water sometimes, they just go and swim around, and they're very easy kills.... [The seals] they go on the ice; they sun themselves. And then the bear would go by the edge, and when he gets close to it, he just goes up.... No chance at all, those seals, sometimes. The bear will come up really slowly.

PIN 2, INUVIK

A wily polar bear can kill unsuspecting seals by pretending to be a piece of floating ice.

As long as there's ice, bears [are] going to be there. That's what they use to hunt. They can't hunt seals in the summertime without ice. In the summertime, they act as icebergs at times, [as] pieces of ice where seals would climb on; then that's your ambush time. They act as ice. They'd lay over, turn upside down. My father told me he used to see them out here in the summertime turn over. Stay still and [ringed] seals would come up to them.

PIN 160, PAULATUK

The larger and heavier bearded seals¹²⁷ fall prey to polar bears primarily when they are hauled up on the ice or in the water near the ice edge.

In one story I heard, there was little open water. Ugyuk was on a large piece of ice.... [The polar bear] got two small ones. Females teach them to stay back. When it try to get something, it go in the water, try not to make a splash so it won't get heard. So after a little while to see that ugyuk rush in the water. I think the bear must have shown up just in front of the ugyuk, inside the water. It been killed. That female bear, big one. People were watching with binoculars. After a little while, that female start pulling it up top the ice, that big ugyuk.... As soon as they get close enough to the head, they crush them when they bite her. Instant death. So strong, those bears.... This is a story I used to hear [from] the hunters, long ago old-timers.... That female it never look too big, all right, but he been getting really big bearded seal.... As soon as he get close to the head, he bite the head.

PIN 128, SACHS HARBOUR

This Tuktoyaktuk hunter observed polar bears hunting bearded seals along the floe edge in March.

Anywhere around the coast in the open water area they pull them out of the water and pull them up and eat the oil.... Nothing for them to pull it out. They go under water and when the bearded seal is hauled up on top the ice, they go right in front of them and kill them and drag them up.... A lot of time I seen ugyuk on the edge. It was hauled up on the edge of the main ice. They come right outside of them and kick 'em right there. They have no chance at anything. It was so fresh, sometimes you could still see the claw marks and where he come up.

PIN 33, TUKTOYAKTUK

Larger polar bears are so strong that they can “slap” large ugyuks right out of the water.

I've seen and heard stories of polar bears catching ugyuk.... Equal to their size and weight and actually hauling them out. Slapping them out of the water instead of just hauling them out. What people's conception of hauling out a ugyuk is grabbing it by the jaws and pulling it out of the water. What they actually do... if they kill the ugyuk, and they catch them, or they're in the water, they slap them out of the water. They go under, climb up, shoot up, slap them over, under the ice, they don't haul them like they haul out, they don't do that. I'll give you an example of my father-in-law and his son.... They tried to haul up an ugyuk. It was a big nine-footer or so. Nine or ten feet. And they couldn't. They couldn't pull it up with the Skidoo or themselves and they couldn't get it on the ice. So they left it. And when they were going back.... to try to get it out, there was a bear at it. They watched the bear. Three times it swam under, slap. The first try, it couldn't get it out.... I think it was the third try the bear slapped it out of the water.

PIN 160, PAULATUK

A Paulatuk hunter once saw evidence of a polar bear dragging an 800- to 1,000-pound ugyuk across the ice.

One track I see, I think they getting ugyuk. He bit it and he walk with it. I see its track, the ugyuk, you could see in the dragging, hard ice I think.... Right around Cape Parry, I think. Getting ugyuk, and big, about 11-, 12-foot bear. He bit it, and you know how ugyuk are about 1,000 pounds or 800 pounder. Polar bear walk with that thing. Bit it and walk with it. I never see it, but I see the track in the snow.

PIN 162, PAULATUK

Only the larger polar bears can kill bearded seals, and when they do, they may strip their pelts inside out.

Ugyuks are big.... I never see smaller polar bears go at that kind. Gotta be three big ones; that's the one that always go after that kind. And what they do is just tear it up, the skin around the head... the others holding the flippers, bite it, and they turn the skin right out just like you turn your socks. It's not easy to turn, and it's not easy to pull. You see about three ten-and-a-half- to eleven-, twelve-foot [polar bears]; that's the kind [that hunt bearded seals]. Too heavy for the small bears to get that kind, I guess.... After they eat the blubber, they always lay around right close to it.... About late '70s, Cape Parry, before we move here. I see three. I can tell they're three big ones. I back the sled this way. And I move really slow.... And there was little wind, east wind, just outside of the Booth Island here.... I stop for a while, take a fast look with my binoculars. Little east I see two more really running towards this three. And I started seeing black stuff not far from these big ones. It was ugyuks turned inside out [see Map 29].

PIN 149, PAULATUK

This Paulatuk hunter said that male polar bears, not female, will hunt ugyuks at their breathing holes or along a fresh crack in the ice. He observed polar bears killing large bearded seals 40 or more miles (70 or more km) north of Cape Parry over a twenty-year period from the 1970s to the 1990s.

They wait for them [bearded seals] in a hole. In their hole, or they get them in a little fresh crack maybe. They could, but most of the time I believe it's in a hole.... I never seen a female with an ugyuk. Although they can probably get them, I am sure, because they are powerful enough.... Out here sometimes you get a male, female nine-, ten-footer... about to get an ugyuk.... Mostly the males are getting the ugyuks. It's always males.

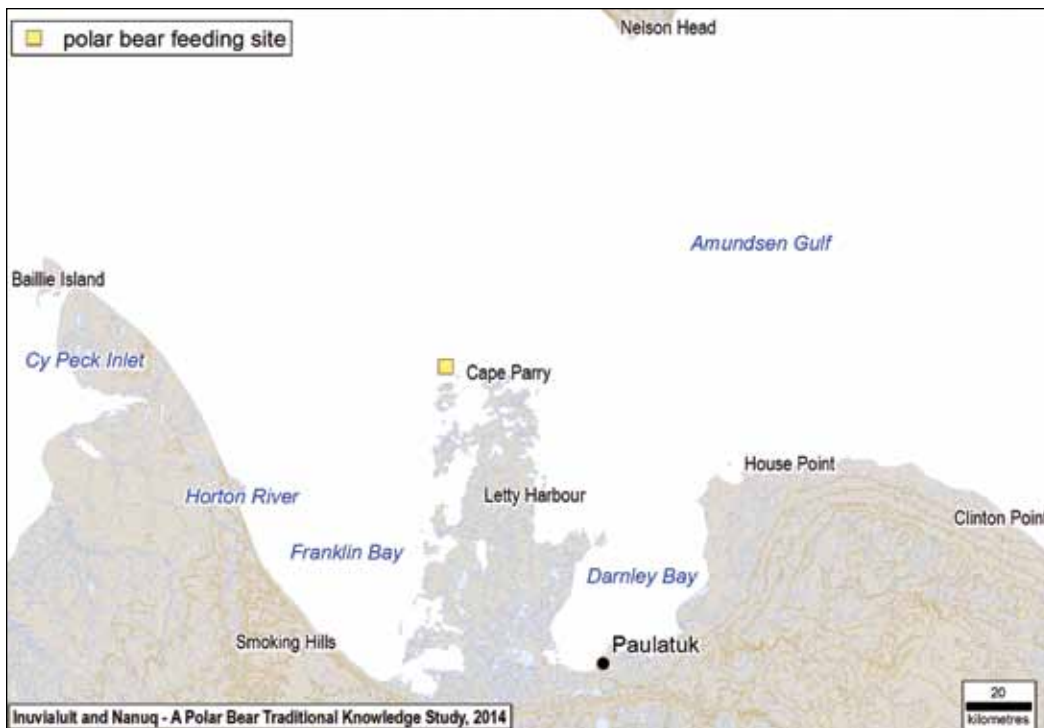
PIN 164, PAULATUK

A polar bear's hunting repertoire includes knowing how to kill ringed seals in the snow-covered lairs (dens) they build above their breathing holes. In April, polar bears will grab ringed seal pups out of their snow-covered breathing holes in the landfast (main) ice. Earlier in the winter, they hunt at holes in the thinner, young ice along the floe edge.

Most of them, when they pull the pups out, the seals kind of have a little hut under the snowbank, and that's where the bears grab the young ones from, pull them out.... mostly on the main ice, where the ice don't shift around.... I think in April, you see more polar bears pulling seals out of their little breathing holes or their little shelters under the snowdrifts. When you hunt polar bears in wintertime, you notice that right near the floe edge where the ice is very thin, they hunt off that thin ice. I don't think they hunt in open water, but they hunt in very thin ice. We call it young ice.... They just sit by the [breathing] hole and wait for the seal to [surface].

PIN 161, TUKTOYAKTUK

Map 29. Place where polar bears killed bearded seals near Cape Parry in the late 1970s



Source: PIN 149

This Paulatuk hunter said that during the spring, ringed seals are more likely to have dens in Franklin and Darnley bays because the snow is deeper there, which is better for den construction.

You got lots of snow towards the bays, towards the mainland. You got lots of snow and rough ice, so that's where seals make young ones. And polar bears, they are looking for those young seals [in] deep snow. Them young seals got big house inside of snow.... So polar bear, when he get there, he listen to their breath; he could hear it. And when he hears breathing, he hit that snow, and that snow go down, plug the seal hole and everything. That's how it get young seals in the spring. You see some tracks once in a while going to the bays, going to mainland. So that's where they get young seals from, polar bear. And when it get a seal, he eat the blubber. He don't eat the meat. I don't know why. I used to see some meat with no blubber on top. You know, tear the skin off.... Old-timers tell me, you see polar bear toward the mainland from the open water, you know way out. That's why get small, young seals in towards the mainland. It got deep snow, and not like way out. That's what I see for myself in past life.... Used to have open water out there, and you see [polar bears] sometimes coming into Franklin Bay and Darnley Bay. That means they're looking for young seals, where it's got deep snow.

PIN 162, PAULATUK

Polar bears can smell the seals when they are inside their dens.

Bears are really smart...They know how to hunt. And when they get the right distance: "pstchoo" [sound of a splash], they really go fast and get him [the seal]. He starts to go down, but he pulls him up.... And they get young ones [seals] inside a snowbank and they could smell them. And then, they break in, big snow, and there's young ones, and they get the young ones, and they eat the seals. Polar bears are a smart animal. They know how to hunt.

PIN 2, INUVIK

A seal might build a den in two feet (0.6 m) of snow with a chamber four feet (1.3 m) in diameter.

[In April] in the old ice a polar bear would find a breathing hole, and dig it out, and just lay there and wait for it... could be usually under a layer of snow, like about two feet of snow, and could be a seal den, I guess. It would be a hole under the ice; it could be like four feet in diameter where the seal would come out of the water and spend time in the den there.

PIN 139, SACHS HARBOUR

This Ulukhaktok hunter explained how ringed seals make their birthing lairs and how polar bears will hunt them at such locations, especially along pressure ridges.

Polar bears will use probably landfast ice or even opening up ice, young ice. They wouldn't use any old ice, like multi-year ice. They can't get seals. Seals don't live in the multi-year ice. Polar bears will use for hunting seals anywhere — I don't know, just thick enough for them to walk. As soon as the open water freeze up, seal will make a hole while it's thin. Then he'll use that seal hole for a long time. That's what the polar bears do; they hunting in that. Also, in the old ice, too, like you know, when the ice get thick. Maybe four, five, maybe six feet thick, and then, the seals will have seal holes and pressure ridges for this rough ice, for the ice breaking. In that kind of ice they make their pups. They have their own young, seals, and they will use that kind of ice that maybe will have... anywhere from two feet thick of snow. They usually make a snow house in that kind. They have holes really close together to train their pups, maybe about fifty feet, one hundred feet apart.

PIN 115, ULUKHAKTOK

A Paulatuk TKH described how he followed an eight-foot (2.5-m) pressure ridge a considerable distance and saw how a polar bear had been unsuccessful in catching seals in their breathing holes on four separate occasions.

They'd for sure, definitely, follow pressure ridges. And I've followed bears where there's an eight-foot pressure ridge... and there was this one bear that was following this ridge. And four times he managed to dig into a seal hole and make blood, but no, just make blood, that was it. That was in four different holes. On the fifth hole we finally came across the bear, probably 16 hours since we started tracking it. We came across the bear and on the fifth try, it finally managed to take one out of the hole. So he dug into eight foot of snow and got at four. Four different seals. Made blood on there. So it definitely made contact. And couldn't get the seal. [The pressure ridge] ran from House Point.... This was like, '84, the year right before sports hunting opened.

PIN 163, PAULATUK

Inuvialuit hunters know that polar bears will hunt one side of a pressure ridge or the other, depending on the wind direction.

When they're walking by a pressure ridge, and if there's an east wind, they stay on the west side of it. If there's a west wind, they stay on the east side of the pressure ridge to catch the scent of the seal.

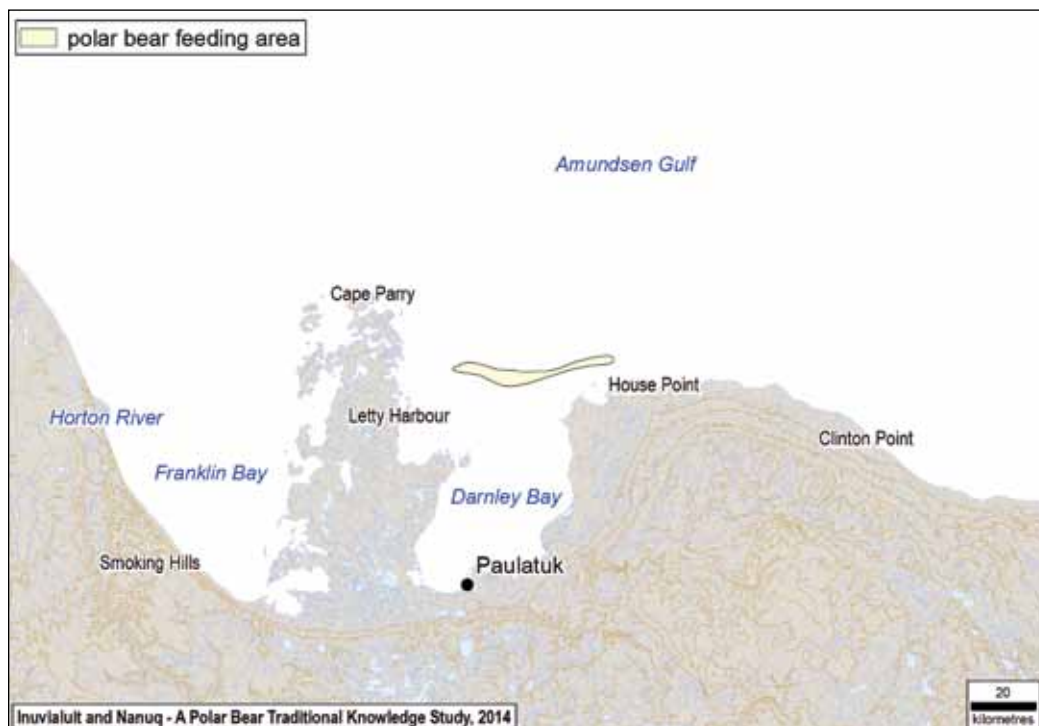
PIN 120, ULUKHAKTOK, Translation

Seal pups are easier to catch than their mothers, because they are less wary of the wily ways of the polar bear. According to this Paulatuk hunter, during March and April in the early 1980s, this is what he observed:

the majority of the seal kills would be, like, my father used to take me straight out on the ice, going from outside of House Point or Cape Lyon [see Map 30].... We'd go out and start seeing the seal kills all along this area. They'd use the ice ridges, and they'd be killing seals every so, so long.... and then they're, like, not on one spot, but when they get a seal, there's no more seals that's going to go back to that hole.... They would be taking young ringed seals. Majority of the time they'd take the young seals, 'cause the mother knows what a polar bear's doing; when it's going to jump on their hole. As soon as it hears a noise, it dives under and the young one stays there, and the polar bear just pushes it down, and blocks the seal hole, and dig them out.

PIN 145, PAULATUK

Map 30. Area of pressure ridges offshore from Cape Lyon where polar bears hunted seals, early 1980s



Source: PIN 145, Paulatuk

This Sachs Harbour hunter said that polar bears have had to change their hunting methods due to the absence of pressure ridges.

In the olden days they used to follow the pressure ridge and sniff out a hole, until they got one, lot of them they miss too. Like go after a seal and miss. Nowadays, you just see them sitting out on thin ice hunting seals, waiting by the holes.... There's no more old ice pressures ridges to follow anymore.... They just don't have much ice anymore.... Polar bears are expert seal hunters. I learn how to hunt seals watching a polar bear waiting by the hole.

PIN 138, SACHS HARBOUR

If they have little success hunting at one seal hole, polar bears will move on to other holes in pursuit of seals.

They could walk on ice and start hunting; they could do this, reach a seal hole.... Then they could lay there and get it and keep doing that; whenever they find a seal hole they will wait there. They don't get a seal in that same hole, they will move to the next one.... Probably be doing that right now, November, depending on the ice; would be hunting out there right now.

PIN 142, PAULATUK

Nonetheless, waiting for seals to surface in their breathing holes takes no end of patience on the part of the polar bear.

Polar bear go in young ice, too, looking for seal holes. They're waiting in seal holes too, polar bear. I used to see them waiting in the hole. Waiting for hours. Waiting.... They hunt them both, ugyuk, [ringed] seal. They're waiting in the holes, make no noise, sitting there for long time. You could hear breathing, got it right away. I didn't know how thick, what the ice like. All I know is polar bear go to some deep snow where he could find young ones.

PIN 162, PAULATUK

Spending hours and hours by a seal hole is one polar bear hunting strategy with a big payoff.

It is just a waiting strategy, I would think, like when you wait, and wait, and wait, wait and wait. You gonna make a million bucks, you wait, wait, wait, wait for the right dollar, right? But for them, it's their way of hunting. I guess he's got to wait and wait at the seal hole. You might get lucky and seal come out. Seals got a lot of breathing holes. Don't just have one hole; they have 12 of them. They breathe here, go over here and breathe here, but it don't just have one. If he only have one, it's going to be so easy for bears to hunt.

PIN 132, SACHS HARBOUR

A Tuktoyaktuk hunter saw a bear wait for days beside a seal hole.

Those bears are really patient. They could wait for days for seals to pop out. One time I watch one for three, four days, still sitting in the same spot, good weather, bad weather, still waiting. Boy! They sure could hunt.

PIN 28, TUKTOYAKTUK

When they finally catch a ringed seal, they may throw it about like a rag doll, or a cat with a mouse.

They throw those seals like a rag doll, like it's nothing for them. Sometime they throw them in the air just to kill 'em, slap 'em around, make sure it's dead.

PIN 28, TUKTOYAKTUK

A Sachs Harbour hunter said that polar bears may bury a portion of their catch in the snow, so they can eat it later.

A lot of times, too, the bear catches a big seal. It eat half of it one day, and it will bury it with snow to keep it from freezing. It would sleep beside it. And after the next day, it would eat the rest of the seal. So polar bears are pretty smart to do that kind of thing.

PIN 139, SACHS HARBOUR

Some polar bears wait so long by a particular seal hole that the ice melts under their feet.

Some of them, you can see they wait a long time. Their foot even melt right through the ice. That mean he wait and wait and wait, and when [seal] finally make noise, they [polar bear] jump, and make noise, and lost his animal.

PIN 149, PAULATUK

Television programs about polar bears do not properly represent the amount of time they have to spend hunting by seal holes.

You see them on TV, you see them doing that. In five minutes you can see a bear hopping on a hole, crushing the hole, and basically at the same time crushing the young pup that would be there. But if you're out there and you're watching, it takes time. You have to sit and watch a bear for at least three or four hours to actually see him find a hole, jump on it, and catch the seal, if it does. 'Cause they say on Discovery Channel, on average, it's... once out of ten tries they get a seal. But when you're out there and watching, you'd be lucky to catch one actually getting the mother and the pup at the same time. If you're lucky to see it.... I'm certainly not going to spend time out there watching one bear trying to kill a pup. You have to be lucky to do that in April. My father... he's lucky, he'd always be doing that in the springtime; he'd always be out there hunting polar bear and catching them hunting seal. You know we don't do that no more. 'Cause.... end of April, early May, we're out geese hunting. He'd be out bear hunting.

PIN 160, PAULATUK

Polar bears can be so focused on their seal hole hunting that they ignore or fail to hear an approaching Inuvialuit hunter.

I remember, the first one I got was in 1983. My first polar bear... We were kind of out about half way in between Pearce Point and Ulukhaktok out there, out here anyway and we were travelling on this one pressure ridge. We were following a pressure ridge that was kind of going eastwards just like that, and we run into this one polar bear that was hunting for seals. February, it is quite a way out, 1983, [compared] to today. But this polar bear was hunting seals and he was digging and sniffing out seal holes, and we finally seen it. It was laying on a pressure ridge waiting for the seal. And he didn't know or he didn't want to. We got about a hundred yards until he finally realized, "oh, there is something here now." I think they're so focused, just laying still and waiting. I got that one with a .222, an eight-foot male, a young male.

PIN 158, PAULATUK

They may not move from a breathing hole even when they do hear an approaching snowmobile.

Usually run into them [polar bears] when on young ice waiting for seals by breathing holes. Or on the young ice, on the edge where there's a little opening, maybe. You know how the ice breaks... not in a straight line, but... where it's not frozen or not covered with thick ice yet. So, they wait by those too. And they can't move or they don't usually move, even when they hear snowmobiles. Lay down, wait.... Only until you get right close to them, that's when they get up.

PIN 131, SACHS HARBOUR

While this Paulatuk TKH had never observed a polar bear kill a seal in its breathing hole, he had watched them sitting motionless waiting for seals to appear, and had seen where they had scratched the surface of the ice in order to peer into a hole.

They sniff out the holes, and once they sniff out the holes, they sit there and wait for that seal to come. They will come. I've even seen a hole where a bear didn't get a seal, but I've seen where he waited. He was sitting at the hole. And you could see where the bear used one fingernail like this, and scratched a hole in the centre of that; the ice was probably an inch thick on that one. Used one nail and scratched a hole in the middle of that hole. Just to see, you know what the seal was going to come up, eh? And then you could see the paw marks, their indents right in the ice just from sitting there for so long. Just waiting for the seal.... I've never really seen the kill before, but I've observed them for hours on end, just sitting there motionless, waiting for that seal to come out. Never actually seen a kill before, though.... just watch them waiting.... Always, they just wouldn't even pay you no mind, they'd be so concentrated on that seal.

PIN 163, PAULATUK

Once it finds a den, a crafty polar bear may excavate it, and spread a thin layer of snow over the breathing hole.

They find a breathing hole, they go there and open the thing, and put a thin layer of snow on the breathing hole. They wait, and as soon as they see snow start coming up, they give them a whack, and that's dinner on the table.

PIN 147, PAULATUK

Sachs Harbour hunters, on the opposite side of Amundsen Gulf, have observed the same technique.¹²⁸

Polar bears walks along the young ice, and they find a breathing hole on the edge of the young ice, and the old ice. They'd find a breathing hole and dig it out, and after a while, it would put a little thin layer of snow over there where it dug it out. So, it would be open, maybe, just have a little cover on the top of it, and the bear just lay there and wait, wait for the seal. When the seal would come up for air, the bear would come along and grab it with its paw. That's how they do all of their hunting; dig out a breathing hole and bury it a little bit. Then after they catch a seal, they pull it out of the water.

PIN 139, SACHS HARBOUR

This Sachs Harbour hunter likened the snow-spreading technique to a bulldozer scraping the ground. The polar bear may do this so the seal cannot see its shadow or other suspicious signs above the hole.

Polar bears when they get into a seal hole, and there is fresh snow there, they cover it very, very thin. I would think that they [seals] don't see them upwards; kind of cover it with a thin layer of ice. Thin layer of snow, right on top of where the seal hole is. Maybe it is to kind of shut the glare, or shadow, or something. To me, it's got to be pretty smart. I've seen this before, and always wondered how come they do that. It's a thin layer of very, very powdered snow, just like you come along with a Cat [bulldozer] and just scrape it like this smooth. Just like it is about that thick. Maybe if you leave it open, it is going to see you. To me I think it kind of shut the glare off. You could see the hole up there, but you know you won't be able to see shadows. They're [polar bears] very smart.

PIN 132, SACHS HARBOUR

When seals have breathing holes in the newly frozen leads, polar bears may scratch the ice off the holes and wait for seals to surface.

They do well hunting an open lead. They like the young ice, like the very thin ice. Lots of seals have breathing holes in it... and the bear scratches the ice off and they wait for the seal to blow.... That happens any time of the year. They wait for the seal to come up and get some air and they just [swipe them].

PIN 145, PAULATUK

Nelson Head, at the southern tip of Banks Island (Photo 27), is a good place to find polar bears because of the recurring crack and the abundance of seals there.

They always have a crack there by Nelson Head. And it freezes a bit, and the seals come and make holes in it; and they watch them, and when they come up [thumps].

PIN 2, INUVIK

Polar bears will lie patiently beside the floe edge as well as breathing holes, waiting for seals to surface for air.

On the open leads, too, you could see them just laying still like they are sleeping. But they're just waiting, waiting for a seal to come up on the open lead. So they can't really move. They're just staying still. [You] can come up with them with the Skidoo, and they wouldn't notice you until you get at least a hundred yards. After that, just like they snap out of it and look at you, or just run away. I think they are so focused on waiting.

PIN 158, PAULATUK



Photo 27. A hunter and dog team heading towards Nelson Head, Banks Island.

Jean and Pat Ekpakhohak

Polar bears have acute hearing. They listen for the sound of seals scratching the undersurface of the ice in order to keep their holes open.

We always see seal holes, and it's just smooth. If you ever fell in there, you're going to go down there, guaranteed.... Those are dens. Those are the seals. They got to keep that open year-round. So, they're always scratching and using their teeth. Like on TV, you see them using their teeth, and they're always clawing. That's how come you always see some people that go hunting, they carry a caribou horn or something, so that they keep scratching on the ground — rough spot, like on ice, make it look like a sound of a seal that's scratching on the ice.... Some people, you see them when they carry bones or a caribou stick or something, they're scratching on the ice, when you see polar bear. They're scratching on the ice, so they would sound like a seal scratching, trying to keep the seal hole open, because they're always trying to keep their seal hole open.

PIN 13, AKLAVIK¹²⁹

Female polar bears will work hard to dig out numerous seal holes when hunting for themselves and their cubs.

They [females] hunt aggressively when they have the young, for sure.... Because you follow a female track and you definitely come across a kill site, for sure. And I've experienced that many times. You know they're really aggressive when they're hunting with young.... They have more digging. Like, seals don't just have one hole; they have lots of holes in a good feeding area. And so some bears would come along and maybe try this one hole. Dig it out and it won't work, and move on. Where a female would be digging just about every hole. And probably finding the freshest one, or the best one for her, and that's probably where she'd make her kill, and just about every time female with young have a kill.

PIN 163, PAULATUK

This Ulukhaktok hunter described how polar bears dive into holes and cracks in the ice in pursuit of seals.

They usually look for open cracks, in March, April. They look for open cracks to hunt seal.... I'm not good at fall time hunting bear, because when there's open water, I know they like to look for breathing holes in the young ice. That's when they grab the seal.... Even in the wintertime or springtime, when there's open [water]. It's always open water, almost whole year, even just out here. That's when the bear like to see that young ice. They look for seal holes or look for old ice with snow on it. They've got good nose, not like Inuit. So, they know how to look for a bear in the old ice, too. The way I see it, in my younger days, they like to hunt seal in the young ice when there's little bit of open cracks and things like that. And sometimes they go into a seal hole; dive in and look around. Because I've seen a few of them come out from the seal hole to walk around and look for more other seal holes.... Dive right in, come out, even in the little cracks.... I've seen quite a few of them in my young days. Mind you, I'm not that old yet.

PIN 125, ULUKHAKTOK

Some hunters from Aklavik once witnessed a polar bear dive into a seal hole immediately beside an iceberg that they were glassing from near Herschel Island.

All the time, we're climbing onto this iceberg there, and looking around with binoculars. All that time, maybe five feet from us, there's a seal hole right inside there. We didn't know about it because, we can't see. And then, finally, a polar bear came from around the island. Sure enough, beside where that crack was going onto that ice that we're on, a polar bear just shot right and ripped.... never took the seal out, but he missed the seal. But he dove in to try to get that seal, and you could see a big hole right there. And then after that, we found out there's a seal hole just five feet from where we were walking up all that time. There's this seal hole right there that we didn't see.

PIN 13, AKLAVIK

In addition to their other skills, such as agility, speed and patience, polar bears can walk on ice so thin that far less weighty humans and their dogs would fall through if they tried.

And sometimes a polar bear could walk on really thin ice and a dog can't walk on it. There's two different things on that. A dog might be lighter and smaller, but there's a difference — they crawl — the polar bears spread out and crawl, but the dog could go through without the polar bear going through.

PIN 117, ULUKHAKTOK

Polar bears will cross thin ice to escape Inuvialuit hunters.

You gotta see some bears some time, on the young ice, walking with their arms and legs way out — very smart. And they can't fall in the water.... They're smarter than me, I tell you that. I've seen quite a few bears that I track, and they walk on the young ice, just way far apart — smart. They know I'm not going to go there.

PIN 125, ULUKHAKTOK

Polar bears catch and kill seals by gripping or biting them with their teeth or claws and then by what the Inuvialuit describe as “hitting,” “smacking,” “swiping,” “slapping” or “kicking” them with their paws. Ringed seals have a very thin skull plate¹³⁰ that is easily smashed in using this smacking method. Aklavik hunters often find dead seals along the shores of the Yukon North Slope with their heads smashed in by polar bears. They sank beyond reach of the bears, and then floated ashore some time later.

When we go home to Shingle in the summertime, we always walk along the beach. We always find seals with their heads smashed in. That's ones the polar bears miss... [T]hey have so thin a plate on top of their head. The first time I ever saw that was when my uncle Ned tried to get [one at] Herschel Island, when the seals walked up into the creek. He just ran up to it, and he just hit it with his hand, and smashed the top part of the seal. It took me a little while to figure it out, but later on, we found out whenever the polar bears miss a seal, when they swipe it, and they miss it, but they smash the top part, that seal always sink down and drown. But it always comes to shore in springtime. We always come to the shore and when we walk along the beach, we always find dead seals along the shore.

PIN 13, AKLAVIK

Ice is the primary platform from which polar bears hunt ringed and bearded seals. The PBTk study participants had contrasting observations and views about whether bears can kill seals in open water. They evidently have no problem catching ringed seals along the floe edge, as described by this Paulatuk hunter for the Pearce Point area.

Sometimes I used to see the bears swim in the water reaching the ice. They just shake the water off and start walking on the ice. Ten minutes later, another one show up in the water.... They follow the edge of the ice looking for seals. I seen a few of them run on the ice and jump in the water, dive, couple minutes later it did same thing; finally pull out a small seal.... take it right out of the water.

PIN 142, PAULATUK

When asked if polar bears catch seals during all seasons, this same hunter replied,

yup, all seasons, even in the summer they catch them. They will get them in the water.... They just travel and see a seal, they keep doing that [heads bobbing up and down in the water as they swim toward the seal].... If a bear reach a seal within fifty yards the seal is doomed. The polar bear is a pretty fast swimmer [Photo 28]. Within fifty yards the seal is doomed.... I heard stories my grandfather used to tell me. If a polar bear reach a seal within fifty yards, the bear will get the seal. 'Cause sometimes the seals are looking that way and the bear been diving and grab it under water.... They are good swimmers, they could swim a hundred yards, a hundred miles.

PIN 142, PAULATUK

Polar bears have been observed hunting seals in open water in the Ulukhaktok region, although it seems they were using the ice as a hunting platform. One hunter said he encountered a polar bear in April 2007 that had killed a seal in rough water.

A few times, I see some in the open water. I don't know how they kill the seal. One time, I got a bear from behind the island.... It was a polar bear laying on top of its kill. He'd just been killing a seal out on the open water. Kind of rough, too, the water. He must have killed it in the open water on an ice floe. Maybe it doesn't matter for them, because I see so many on the open water [seals and polar bears].... They could kill it in the open water, too. I see some pulling it from the open water, big open water.... He just killed it, he eat a little bit of it. Just right there somewhere; he was making it cool so he could eat it. Lots of ravens, seagulls, flying around, mostly ravens. The polar bear was sleeping on top, protecting his kill. He eat just a little bit; he eat from the head to there [indicates with hands].

PIN 121, ULUKHAKTOK

Another hunter from the same community observed a polar bear hunting seals in an open lead by Berkeley Point in February 1947.

I go with my buddy a lot by Berkeley Point.... Open water, right by the shore. We're climbing up to that really big, rough ice. My brother, he's got a spotting scope. Looking around and looking around. He said, "Oh, there's a polar bear there in the water, swimming around".... So, after looking at this for quite a while, he gave me the spotting scope, and I was watching it for a long time. They go out and come out. They go out. He stay there. For quite a while he stay. He come out with that seal in the mouth. He got a seal in the water! Way easy for him, not like ice. In the summertime, the polar bears get really fat. In the wintertime, it's kind of hard to hunt them [seals], because a lot of times, you miss them. You wait for seal hole, breathing. Polar bear, he try to get it, but he missed it lots of times. Some bears in the wintertime, they get skinny, but in the summertime, they get really fat! He looks slow, but he could get seal really easy. Just like somebody else. He know how to hunt. He still go out and he come up with the seal in the mouth. I told my brother, "He got a seal".... Some people said if there is no ice, lots of them is going to die, but it's not true. I know it myself. I saw it right there. I see quite a few times there. Even in the summertime, I see one polar bear where there's no ice, busy eating a seal in the water. It's really easy for them.

PIN 126, ULUKHAKTOK



Photo 28. A polar bear swimming in Safety Channel near Ulukhaktok.

Jean and Pat Ekpakhohak

In contrast to these observations, a Tuktoyaktuk hunter said that polar bears seldom catch seals in open water.

Very seldom, bears are going to catch a seal in water. It is going to be a hauled-up seal that they snuck up to, it is going to be in breathing hole, or it will be wedged between ice. Seals are very fast and bears have a hard time catching them in the water, so they pretty much have to be out of the water or in the breathing hole. I have never heard of a bear catching seals in the water itself.

PIN 44, TUKTOYAKTUK

No matter what method of hunting they employ, polar bears differ in their hunting abilities; this is reflected in differences in body condition. When asked about the condition of a smaller bear he harvested north of Hutchison Bay in April 1976 or so, a Tuktoyaktuk hunter said it was in good condition:

'cause it was a really good hunter.... That was in April, and he was killing seals, young seals he was getting... A little male, just separate from its mother, I guess. Those are more dangerous than big ones 'cause sometimes they're hungry, because other bigger bears take their food and they get kinda mean sometimes.

PIN 28, TUKTOYAKTUK

Skinny, starving polar bears may be poor hunters because they are careless or too excited when stalking seals.

And lots of times, the bears are fat. Not too often you'll see a skinny bear; the only way they get skinny is they never catch a seal for so long. They get careless and they starve, because instead of sneaking up to a seal, they'll run to it from a long ways. And the seal see it and go down. And even these old people tell me about a bear, when he's starving, he can't even catch a seal, because he's excited and he wants it more. As soon as he sees it from a long ways, he started running and the seal sees him and goes under. But the other ones, they're really careful. And when they [the seal] put their head up, they'll stop. They know it. If the seal put his head up, the bear stop, too. And then, when he goes back to sleep, he starts going again slowly. It's good to watch. I seen one really catch it, and I could see that bear smashed the head. So, they really know what to do with a seal. I wanted to see a polar bear getting a seal. On Nelson Head, that's where I seen it. He sit there for a long time. Me and one of the guys, we watching him. And it was a big seal, too.

PIN 2, INUVIK

At times, polar bears will kill numerous seals along a pressure ridge or floe edge without eating them. A Tuktoyaktuk hunter described how he had tracked a polar bear offshore of Toker Point in April 1976, during which time the bear killed six or seven young seals, but ate none of them. The hunter speculated about the reason for this:

...saving them for a hard time, I guess. He been killing a real fresh one, so when I got the one he last killed, it was a good, really fat seal.... At the beginning the seals were frozen until we start getting fresher, and then they were real fresh.... Just leave them like that; just kill them and leave them [with their fur on, not even stripped the fat off].... maybe was looking for a fatter one, I don't know. They like fat anyways, those bears.

PIN 28, TUKTOYAKTUK

A Paulatuk hunter had observed a similar phenomenon in April 2002; a male polar bear had left a trail of intact or partially eaten ringed seals it had killed. April is mating season, and the hunter thought the bear may have been baiting females, and would backtrack later in the hope of encountering them as they feasted on the frozen seals.

That was a nice sight to see, 'cause when I was tracking, he was making kills on the way.... It was about the first week of April [2002].... he made four kills overnight. He made one about here and another one about five miles, and so on like that.... This was really good, solid ice.... Ringed seals. What happened was in the first kill he made, it was a little frozen, but he didn't eat a piece out of it. The second one he killed was half frozen when he just took one bite out of it. Third one was more just the flippers were frozen, and he took one bite out of that one. The

fourth one was soft, but he didn't even touch it.... The fourth one here was a good one to see 'cause he was on top of an ice ridge, maybe about this high [two metres]. And what he did was he jumped from there, jumped about maybe ten feet from the top down, before he made the kill.... I don't know how he was doing that. In April they usually start mating. And I started thinking to myself, maybe he is making kills on the way so he can backtrack himself and there might be a female on the kill. It was really interesting to see. And that was the only thing, that was on my mind, 'cause usually bears will eat everything, all the blubber and all that. Only two kills had one bite out of it.... I never did see that before.

PIN 144, PAULATUK

It is not just cubs and their mothers who hunt cooperatively. At times, fully mature bears do this as well. Group hunting increases their chances of killing a seal.

That's why when you see a group of polar bears hunting seals; that's the best way to hunt, is a group together [over an area] ten miles by ten miles.... When you're hunting for seals in seal holes, the more bears in different seal holes, the more success they got.... One younger bear get a seal, well, then you just get up, if you're a bigger bear, go over there, and get it. You eat as much as you could, but he won't stick around when a big bear comes along.

PIN 43, TUKTOYAKTUK

Larger polar bears will sometimes steal from smaller ones. A Paulatuk hunter once witnessed a big male steal a large ringed seal from a smaller bear that ran away when the larger one arrived. Stealing in this manner can lead to serious fights that result in the death of one of the combatants, as noted previously.

I have seen a lot of polar bears, they get a seal and another big male go and take it next thing they are fighting over the carcass on the ice. Sometimes they kill each other just for the food.... I've seen it out here, somewhere out here, anyway.... Can't be that far from Pearce Point. You know where they have a kill, they got a seal, and... there is another bear coming in to get the meat. Next thing they're scrapping on the ice. Some of them, they're just about killing each other for the food.

PIN 142, PAULATUK

Polar bears (Photo 29) also hunt beluga whales and seabirds, but to a minor extent. According to the TKHs, polar bears may grab hold of a beluga when one is trapped in small polynya, and attempt to drag it up on the ice. Inuvialuit hunters have harvested beluga with severe scarring on their backs, which attests to a close call with one or more polar bears. Polar bears hunt seabirds such as eiders by submersing and swimming up under the unsuspecting bird.



Photo 29. Four-year-old male polar bear near Browns Harbour, February 2006.

Tony Green

3.8 Polar bear condition

The word “condition” is an broad term for a number of polar bear qualities, including size and physical health. Inuvialuit hunters pay close attention to polar bear condition from the second they sight or start to track a bear, because they must make decisions quickly about whether to harvest it, and the condition of a bear can help a hunter predict its behaviour. Polar bear hunting safety depends in part on this assessment. Skinny young bears can be very aggressive, extremely fast-footed and agile, and therefore more dangerous to hunt. Bears in poor condition, or too small, have little appeal to hunters or their sport-hunting clients, who are interested in valuable pelts or good trophies. Furthermore, with the quota system and its limited allocation of tags, hunters prefer to pass over smaller bears in favour of larger ones with more meat and more valuable pelts.

The TKHs talked about the condition of polar bears (Box 4) and how they evaluate it, primarily in response to several questions:

- Do bears look different? Are they bigger or smaller or better or worse condition?
- Have you seen changes in the condition of bears over your life, if they've been getting skinnier, fatter or the same or bigger or smaller?
- Do bears look better or worse or the same as when you were younger, in terms of their size and condition?

Box 4. Polar Bear Score Card

Many TKHs were shown graphics of polar bears from a Polar Bears International (PBI)/World Wildlife Fund (WWF) diagram, Polar Bear Score Card: A Standardized Fatness Index, that is included in the ENR polar bear tag kit. The diagram shows five polar bear conditions: skinny, thin, average, fat and very fat; each condition is numbered. During many of the interviews, research participants were asked to rate the bears they had seen or harvested according to this index.

Almost none of the study participants used the PBI/WWF descriptors unless they were prompted by the interviewers. It appears, therefore, that the rating index and its terms are not part of their everyday thinking or discussions concerning polar bears, even though the index is a management tool. This is obvious in the interview transcripts; where only one person used the term “average” to describe a polar bear (unprompted).

Inuvialuit hunters employ a variety of other criteria to assess the condition of polar bears:

- body shape, and whether bones are showing;
- amount and location of fat on the body (e.g., lots of fat on the rump means good health);
- the ease with which the bear can be fleshed;
- fur condition (e.g., length, colour, thickness, shininess);
- stomach contents (e.g., type of food, amount of seal oil in the stomach);
- the shape and depth of the tracks in the snow, and whether claw marks are showing;
- the way the polar bear walks;
- the bear's stamina (e.g., how far it can run when being chased by dogs and hunters);
- the bear's behaviour (e.g., aggressive, not afraid);
- how much the bear bleeds when shot (skinny bears bleed less);
- the colour of the meat (e.g., pale if the bear is in “bad shape”);
- condition of the teeth (e.g., torn or broken ones indicate age or starvation);

- facial scarring (great scarring indicates age); and
- circumstantial evidence (e.g., local or seasonal abundance of ringed seal).

TKHs provided many examples of their use of these criteria to evaluate the condition of polar bears, although no single hunter employs all of them at any one time, and some may be used by only a minority of hunters. In addition, ENR's requirement that hunters take tissue samples and measure a bear's fat may have changed evaluation practices. For example, it is highly unlikely that Sachs Harbour hunters measured polar bear fat in centimetres before this co-management requirement was established.

When we go polar bear hunting, we take samples from the bear. Lot of times we have to measure their fat, on the polar bear. Most of the time we get probably about, what, eight centimetres?

PIN 132, SACHS HARBOUR

This Ulukhaktok TKH said that the practice of checking organs is new to the Inuvialuit.

Just recently, they start opening organs and checking out what's there. Sometimes they would bag a piece of skin and a piece of meat for — what do you call it, biologists?... Back then, they didn't open the organs or check it out to see if there's something wrong with it.

PIN 124, ULUKHAKTOK, Translation¹³¹

The most common indicator used by PBTk study participants to assess the condition of polar bears is body shape and whether any bones are showing. A starving bear will have a small stomach, long legs and long neck.

When a polar bear is healthy, I could notice it. When it's skinny, has no stomach hanging, long legs or long neck, I know it's not safe or not healthy.

PIN 121, ULUKHAKTOK

Ribs, hip, shoulder and backbone are clearly visible through the hide when a polar bear is starving.

If you see a real, real skinny bear, you'll see the back lump; you'll see its bone. You can see the shoulder.... When you see it walking away, you'll actually see the shoulder really stick out when it walks. And their head tip is a lot bigger than their neck, which is not supposed to be.

PIN 145, PAULATUK

No ribs showing or bones or ridges on the back.... healthy bear it's just one round.... covering on it; it's healthy, shiny. The skinny one was matted a little bit, really yellow.

PIN 131, SACHS HARBOUR

In the Siglitun dialect, a starving bear is called *kayaaniq*.

It's really easy to tell when an animal is starving. He turns into bones. I see a lot of those. They call them in Inuvialuktun, kayaaniq; means "starving bears." We see them once in a while. We got them once in a while when they come to the camp, or when we're travelling. They come to the camp, we kill them. But they're just bones; they're skinny, their big bones stick out in their back here, in the rump. That's because he never eat for a long time. Starving bears. They'll kill anything to eat, those bears. That's why we kill them. Too dangerous to keep them alive.

PIN 23, TUKTOYAKTUK

You can kind of tell fat bear or skinny bear, starving bear. You know them starving bear, their bones sticking out.... In the front part he got no hair, from what I see. When they get a starving bear [it's] because he can't get a seal.... That's what old-timers used to tell me; that's why you get the starving bear. He never get seals; nothing to eat all the time.... You call it kayaaniq, it's starving bear, can't get animal, can't eat, can't get a seal. You call it kayaaniq, starving bear. Really boney.

PIN 162, PAULATUK

A Tuktoyaktuk hunter encountered a very large old polar bear one summer in the early 1980s, deep inside an inlet that empties into Harrowby Bay. Even though the bear was obviously starving — “skin and bones” — and very feeble, he turned up his nose at some caribou meat they offered him.

Another one over here in early '80s, way up here, right at the end of this inlet there. He was starving. Could have been, what looks like to us he was starving. He was on his last bit of a strength even though he was a big bear. But he was pretty much skin and bones by that time.... looks like old age.... We thought that we could help him, so we give him some caribou meat to eat, but he just sniffed it, and it wasn't a seal.... We thought we'd try to let him survive until [it] froze over, 'cause it was pretty close to freeze up. He could stand up and walk a little ways, but he couldn't stand up anymore, he was so weak and pitiful, old bear like that.

PIN 24, TUKTOYAKTUK

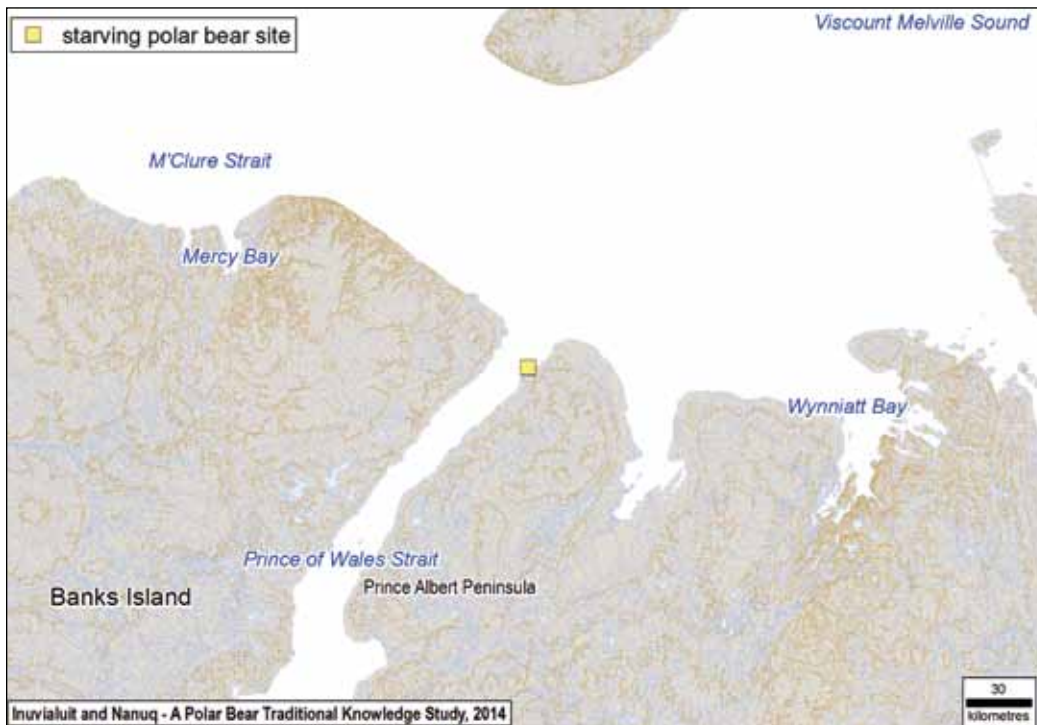
A skinny, starving bear that turns up at camp is dangerous and must be shot for safety reasons.

You could find skinny bears once in a while. Only a few I seen skinny, no fat. I seen a mother bear and a little cub — about two years old, I guess. Someplace down here; real skinny bears. They come to the camp.... They have to shoot those bears because they're bothering their camp around that area.... Really starving bears, these ones. Just nothing but bones.... It must be the beginning of the '80s, somewhere around there [see Map 31].

PIN 114, ULUKHAKTOK

3

Map 31. Place at the north end of Prince of Wales Strait where two “starving” polar bears were harvested



Source: PIN 114, Ulukhaktok

Polar bears that are in good condition have no protruding bones, they “have a lot of fat,” their hides are “rolling” in fat and they “bulge out.”

If you're looking at the bear, [and] there are no protruding bones, [then] generally, the bear is in good shape. On the rump part, as he's moving, taking off, you could see there's a lot of fat on his rump area, on the body area.... Colour of the fur, is it white or is it yellow? Do you see any bones? Do you see the ribs? Do you see the back of these shoulder bones or the hip bones?

PIN 19, AKLAVIK

Bears that are in good shape, they are going to be really rolling with [fat]. You can actually see wrinkles on them. They bulge out.... I have never ever seen a bear that was in such bad shape that I noticed the difference. I never seen a bear that was in such poor shape that I could actually see its backbone sticking out.... The only thing I can say is that all the bears that I have seen and harvested, they have always been in good, good shape.

PIN 44, TUKTOYAKTUK

Their backs, you could see the fat on them. And their fur's all good, not stained up or nothing. And they're mostly fat, eh?... You can notice when they're good bears.... [Fat] in their stomach and [on] their rump.... Mostly when their rump's big, you know it's fat.

PIN 151, TUKTOYAKTUK

As you're skinning, you're going to see if the bear has got fat on his back.

PIN 19, AKLAVIK

A fat polar bear that is in good condition is easier to flesh. Fleshing is the process of trimming off the fat and subcutaneous tissues from the hide of the animal using an ulu.

When the bear is not very good, the fat is not very good, and it's really hard to flesh. Your ulu get dull right away.

PIN 129, SACHS HARBOUR, Translation

It's hard to flesh the skinnier ones, with not very much fat on them. The ones with a lot of fat are easier to flesh. I do a lot of fleshing, also. Even if it's a male bear, if it's got a lot of fat, it's easier to flesh.... It's almost like skin, but it's not fat. It's usually hard fat, but when it's really rich and that, it's just really nice. It's really easy to flesh, even if it's a big male bear.

PIN 117, ULUKHAKTOK

Skinny ones are hard to skin; the skin is stuck to the meat.

PIN 33, TUKTOYAKTUK

In the following account, a starving bear killed a female dog and her pups, and stripped their hides inside out. When the Inuvialuit hunter was finally able to kill it, the bear's flesh was stuck to its hide, a sure sign of starvation.

On Banks Island, about 13-footer, starving bear, been going inside my parents' porch. They had a female dog with four pups fully grown. That bear been killing all those pups and must be eat one while it was still hot, that pup, and vomit it out. And after he kill all those pups and mother, that bear put them outside; skinned them inside out. All of them, took the skin off, put them side by side, cooling them off. My dad, my mom, couldn't go out. My dad's rifle, though, was on top of the porch.¹³² Couldn't go out, so when my mom light the stove, cold air. When it start smoking awhile, maybe that bear been walking off. That's the only time my dad went out. Shot it. He said when he skinned it, that skin was stuck to the meat. No fat, starving. I don't know many years ago that one. Before I was born.

PIN 29, TUKTOYAKTUK

Another way to evaluate the condition of a polar bear is to look at the thickness and colour of its fur. Thin fur around the neck is a sign of poor condition, according to this hunter from Ulukhaktok.

Some of the bears we're seeing there are starting to get thin hair on the neck part or on the feet and the ears. You could notice they're starting to get thin hair. Those are the ones we just leave, we don't bother with them. They look like there's a lot of fat on them, but for some reason, they were thin. The polar bears, when they have yellow hair — long hair — you could notice, but they had some thin hair on the neck part. I don't know if it was from global warming or whatever the changes are, but some of them were pretty thin. Even though they looked fat... you could notice that their fur was not in good shape, some of them. But those we got last year, those were all good.

PIN 117, ULUKHAKTOK

A “rangy,” “scarred-up” bear with yellow fur is not in good condition, according to this Tuktoyaktuk hunter.

You can tell by their hair too, the colour of the bear. Most times if a guy’s out there and see a rangy,¹³³ yellow, scarred-up bear or whatever, most guys wouldn’t shoot it. It’s not worth nothing to them if you shoot it. So, that’s one way of finding out a healthy bear, I guess.

PIN 42, TUKTOYAKTUK

Not all Inuvialuit hunters examine the stomach contents or internal organs of the polar bears they harvest.¹³⁴ As noted previously, examination of the internal organs appears to be a recent innovation in response to Inuvialuit-ENR polar bear co-management. Examining stomach contents, however, appears to be a far older practice. It is an important source of information about what the bear has been eating, or not eating, and its condition. “In the skinny ones there’s really nothing when you open their belly” (PIN 142, Paulatuk). However, seal remains in the stomach does not point automatically to good condition, because a lot of seal meat and bone content strongly suggests the polar bear had been starving prior to its last meal.

Once I get the skin off the carcass, I like to open up the stomach contents, just to see inside the stomach; like, what are you eating? Are you successful in your hunt?... On this one polar bear that I had opened up, there were these strips of fat that were still attached to the skin, and they were just sheared like this [gestures]. All the pieces that I took out from their stomach were all within two inches and less and four-to-five inches long, with the skin and the blubber still attached. So, if you think about it, if you ate that, how long would it take you to digest that skin and that blubber? It will take you a loooooong time! So, if you think about that polar bear eating that and how long he’s going to be full on that in there. Other times, you see bears where they just consume the whole seal, and you can tell that the bear is starving. He wants food. Eating not just the skin and the blubber, but the whole seal, the bones and everything, the meat and bones.

PIN 19, AKLAVIK

Not only were the ribs of this starving polar bear visible, and its meat stuck to its hide, its stomach contents consisted primarily of a kind of “grey water.” The bear was killed at Atkinson Point near Tuktoyaktuk in September 1991.

I was the guide and the monitor for cleaning up that site there. There was a little bit of ice. I had some people there working from 8 [a.m.] to 8 [p.m.]. They got excited; they come running, three of them workers. After work, went along that... long sandspit.... They been running into a bear. That bear was so unbelievably starving, it just reach the beach Could see the ribs. The skin was stuck to the meat. And I open the stomach; nothing, grey water and blood, hardly any blood. Probably it starved.... You could see the ribs. Skin was stuck to the meat. Good size; it was between seven and eight foot.

PIN 26, TUKTOYAKTUK

In comparison to these bears, which were clearly in poor condition, polar bears with large amounts of oil and shredded seal skin in their stomachs are in very good condition.

When I first opened a polar bear’s stomach, I was really surprised to just find oil. Straight oil, nothing else but oil, well, maybe those tidbits of seal skin or seal hide. They’re only about this big.... like the size of a nickel and within the stomach contents. But I was thinking, if I tried that, I’d probably fill a ten-gallon keg with straight oil. And it’s straight oil, it’s nothing else. Oil and tidbits of skin and hide. I didn’t see any bones or other matter, just oil.

PIN 160, PAULATUK

A polar bear's behaviour is another indicator of its condition. Those that show no fear of humans and dogs are probably very hungry and therefore extremely dangerous.

There's some, I guess, they lose their mother too quick or something, and they don't learn how to hunt very good. That's the ones that don't get very fat. They're dangerous, those kinds. They go after you — pretty hungry every time.

PIN 17, AKLAVIK

Yet another indicator to assess a polar bear's condition is its tracks. These provide information about the qualities of a polar bear long before visual contact is made, as explained by this Ulukhaktok hunter.

A skinny polar bear, its tracks could be easily known in the snow. It could go through the snow. A heavy, fat bear, you can barely see the tracks, because it's not bones.... You look at their tracks. The other day, we saw the tracks out here. They're really nice. All the bears look like in good condition.

PIN 117, ULUKHAKTOK

The same hunter described how he teaches younger hunters how to read tracks for information about the condition of polar bears.

I'm going to show them — if you see a track, I'm going to show them how they're supposed to [read the tracks to determine] if it's a skinny bear or a fat bear.... If it's a skinny bear, its footprints, it's going to be easy to see them on the snow, even if [the snow is] hard; because all these joints, you could easily see it when you step on something on the snow. But if it's a fat bear, your footprints are not going to be showing much, 'cause it's going to be flat, no matter how much weight it's got, unless you're on the powder snow, then you could see it. Polar bears, they may be heavy, big, but if it's a fat bear, the elders always say, "It's hard to find their tracks." But if it's a skinny bear, you could easily see it going through, even on a little bit of hard ice or snow.... So, their claws are not really showing if it's real fat, but if it's skinny, you could see their claws.

PIN 117, ULUKHAKTOK

Once hunters make visual contact with a polar bear, an important indicator of its condition is the way it walks. A limping bear may be injured or sick.

The elders used to tell me that when the bear is not healthy, they walk slow. They're kind of limping or not walking properly. That bear is sick. And they say if you see that kind of bear, don't eat it. You can have the skin, but don't eat it.

PIN 125, ULUKHAKTOK

On the other hand, a fat "healthy" bear walks or runs slowly.

Even before you shot it. The way it walks around, you know it is a healthy bear.... if he can't run more than hundred yards, you know it is a healthy bear. Slow, but fat.

PIN 147, PAULATUK

Skinny polar bears can run farther and faster than fat bears, which tire quickly when being chased by hunters and/or their dogs.

Polar bear, when it's running away, it plays out really quick. If it's fat bear or skinny, young skinny bear can go more distance, and you got fat bear, it play out right away.... it get tired quick.... Those skinny ones, they go more distance.... There's two different types; there are fat ones and skinny ones. Skinny one go more distance, more far than fat bear.

PIN 162, PAULATUK

Some of them, they could run fast when they're skinny.... They can't get tired when they start running away. It's really hard to catch up to them with dogs. The fat ones... when they're full, they're easier to get tired and they're easier to chase with dogs.

PIN 121, ULUKHAKTOK

An elder hunter from Tuktoyaktuk said that polar bears in poor condition “hardly bleed” when they are shot. “It hardly bleeds, those bears.... hardly bleed when you shot them.... no more blood, hardly, must be never eat for long time” (PIN 38, Tuktoyaktuk). In addition, the colour of the meat and fat of starving bears may be different than that of bears in good condition. The meat is a pale, bluish colour if the polar bear has been starving.

You could tell by the fat, how much fat is on the bear and the colour of the meat.... It's always like more reddish, I guess; reddish meat under the fat there. It looks like someone pour water over it, and it's a paler colour. Just like when you get a caribou or something and you rinse it out, gets the paler. Blue, bluer pale colour.

PIN 42, TUKTOYAKTUK

This Ulukhaktok hunter was told by his elders never to eat polar bears whose meat and fat is yellow in colour.

Only way we could find out that bear is sick is after we skin it. See if it's got yellow marks or big boils anywhere in the body. If you see that, the elders told me, “Don't even take the bear meat out of it. Leave it. Just take the skin.” And I believe that. Because if you ever eat that bear meat, you'll probably die. Elders are right. They know. I know they're right because they're born with it.... Yellow meat and fat, right through the meat. Yellow — don't eat it.... In my language, they probably say ayuaktuk [abscess]. It means “sick bear.”

PIN 125, ULUKHAKTOK

A Sachs Harbour hunter said that he had only once encountered polar bears whose condition was extremely poor due to starvation. The bears were skinny, their meat was off-colour, they had no fat on them, their meat was stuck to their hides, two of them had empty stomachs, one of them had plastic in its stomach and they were absolutely fearless when approached by the hunters. It happened in the Storkerson Bay area one February in the late 1970s when he was running a trapline.

One time we got three polar bears in Storkerson Bay out here. When we were trapping.... mother bear and two cubs same size as the mother. They were starving.... We shot all three of them because we thought we were going to be using the meat. But once we start skinning them, even the meat was something like this colour [gestures].... They were so skinny... their meat was a different colour. We never even took a piece of meat out of it. 'Cause they were so skinny... they're starving. We just kept the hides and threw the meat away 'cause we couldn't feed it to dogs. 'Cause it's too poor, sick.... [P]eople like my dad and other trappers said you might get sick from it.... I seen some thin bears, but lot of them still got a little bit of fat on them. But these ones have nothing. The skin was right against the meat. No fat in between or any kind.... They were starving; they are not scared of nothing. And when we opened them up all three stomachs, two of them were empty. One of them had a little piece of green plastic inside his stomach, that's it.... Thin piece of plastic. We never really recognize what kind of plastic it was, but it was a piece of plastic. That's the only time I ever run into a really starving bear.

PIN 132, SACHS HARBOUR

Older polar bears are likely to have worn and/or broken teeth, as explained by this elder hunter based in Inuvik.

If you get an old bear, you could always tell, his teeth are not as long as younger bears.... I never seen lots of broken teeth, you know. Well, you could see shorter ones. Worn out teeth, but you never see broken up ones.

PIN 2, INUVIK

The condition of the teeth is not a reliable indicator of the overall condition of a polar bear. One Paulatuk hunter said that a bear with broken teeth is likely to be a skinny, dying one.

If you open its mouth, and you see really good teeth, you know that that one is a good-shape bear. But if you see one with broken teeth, you know it's a skinny bear; it's not as fat as it's supposed to be. That's a dying bear. It won't make it through the next few years or so.

PIN 145, PAULATUK

But another hunter from the same community said that he (or his sport-hunting client) had harvested a thirty-year-old bear with worn teeth that was “healthy.”

I think they aged that bear too, about thirty years old.... For that age is more starting to wear down, did not have the big fangs anymore. I guess at thirty years it starts to go down for them.... Just his teeth were starting to decay, but he was a healthy bear.

PIN 144, PAULATUK

Not only do older polar bears have worn and/or broken teeth, they also have a great deal of facial scarring, particularly if they are big males. “All the big bears have scars,” said one Inuvik hunter (PIN 2, Inuvik). The scars are the results of wounds from spring mating battles with other males.

When you’re going after them, before you shoot them, you could know right away a fat bear or a poor bear or something like that. Sometimes when you go for selling skins, you have to look around for good bears. For the hide condition, you have to look at the face. Sometimes they come in — males mostly, big males, old males — they’ve got so many scars. Some scars, got no fur, from fighting. Males like to fight in springtime. Some no fur in springtime. You have to watch for that, late spring. No fur around here or no fur on the mouth.... You really have to watch when you want to sell the hide or when you’re looking at the money side. Once in a while, when you’re looking for food, you don’t really care for the hide. A lot of times I did that, because I’ve got a lot of people around there eat that polar bear meat, the old-timers.

PIN 2, INUVIK

Various types of circumstantial evidence are also used by Inuvialuit to assess the condition of the polar bears they are hunting. For example, when hunters encounter numerous seal carcasses on the ice, they know polar bears are probably eating well and in good condition.

And we could always see seal carcasses by where the bones are, and you know they got a seal all the time.... And the more seals I see out, the more better chance for polar bear to hunt seals. If I count about, maybe — from Shingle Point to Cape Point — twenty seals before I reach there, then there’s more better chance of them catching a seal.

PIN 13, AKLAVIK

A starving bear in poor condition may eat garbage at camps and even try to kill foxes.

When they’re hungry, they could go after anything, like paper and cans.... When you’re tracking them some-times, they’re getting after foxes or things like that. When they’re healthy, they go for only seal meat, the bears.

PIN 2, INUVIK

Several participants in the PBTK study described polar bears that were special either because of their size or their shape. One such type is an extremely large bear that they referred to as a “shovel bear” or “monster bear.”¹³⁵ Their feet are as large as wide shovels, and they are now extremely rare, if present at all. A Paulatuk hunter talked about how he and his father-in-law had once seen the tracks of a giant bear near Browns Harbour.

You run into the rarity of the big 11-, 12-footers. They’re very rare, but this is the site where they mostly run into the big bears.... 11, 12, 13. Their tracks are like this here [2.5–3 feet wide].... One night we had a camp in between Browns and Bear Island. We had a camp there, and we didn’t see the bear the night before, but we took off back to the cabin. We took our tent, and we went back the next day. And there was a seal hole right beside our camp, and the bear. You could see where the bear was laying waiting for the seal. His front paws were like this [gestures], and the hole was there, tiny little hole about this big.... And his front paws, like Jeez, holy cow! And my father-in-law, he just sits there, shaking his head at the size of them. “What did we miss?” The size of it! It [the bear] had to be at least twelve feet (see Map 32).

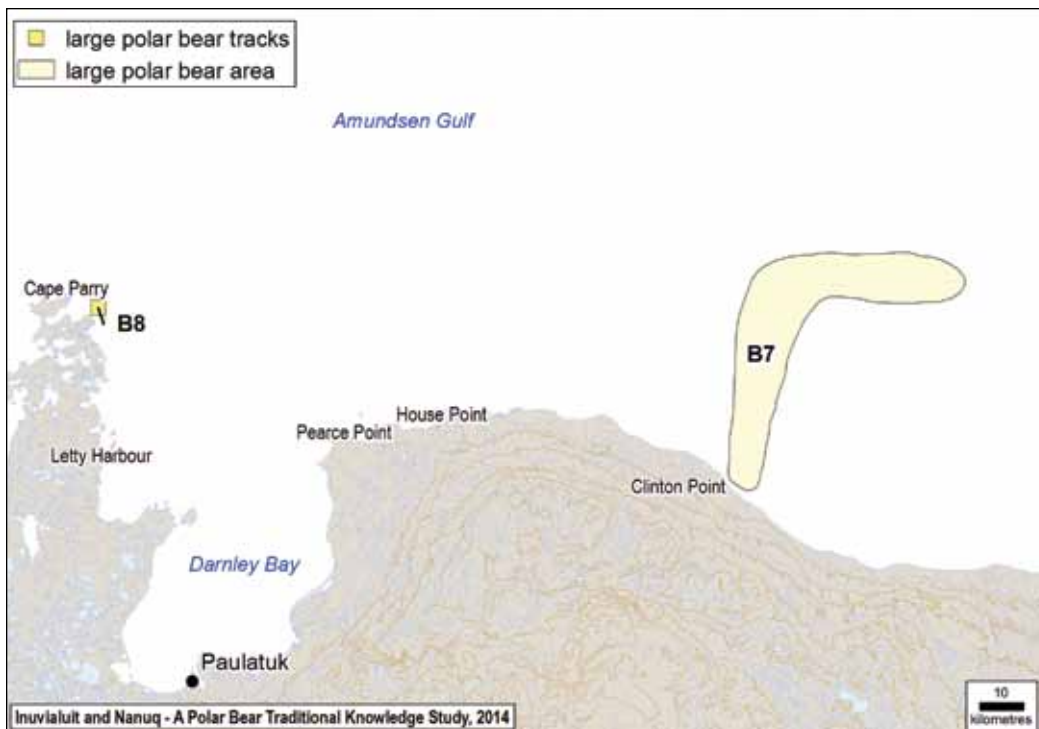
PIN 160, PAULATUK

Hunters from the same community killed a “monster bear” that got stuck in thin ice off Baillie Island in the mid-1980s.

Has anyone ever told you about the bear that was taken at Baillie Island, the monster bear? I'm not sure what the dates were, but it was at least 17 feet.... It might have been [PIN 28] or [PIN 23]. Some of the guys that live in town actually saw that bear. They saw it stretched out. And that was a giant, those ones. They ran into one way back in the mid-'80s in this area. They didn't know what the size was, but you know how big it was, because it had a sway back. Usually when you run into, say an 11-footer, it would be straight to kind of a little arch.... But this one that they ran into, it couldn't get away so what it did was it jumped on the ice. It laid flat, it crushed the ice, went partially into the water and stayed there. That was for its protection. 'Cause I guess the bear knew those guys wouldn't go near it because there was water in the area. They use water for protection. They go underwater or into the water and swim away. But this one actually broke through, went into water partially, and stayed there. And the size of it, they couldn't tell the size of it. They figure at least 15 feet. Because it had a swayback all the way up to its rump. Like, from its rump goes all the way down and come up to the shoulders. And that's a monster.

PIN 160, PAULATUK

Map 32. Paulatuk hunters encountered large bears at B7; tracks of a “giant” bear encountered at B8



Source: PIN 160, Paulatuk

The brother of this TKH saw a shovel bear on the ice near Cape Parry, while accompanying a Japanese film crew. These large bears are extremely smart and normally head for the safety of open water when humans or dogs approach.

There's a bear that frequents the area, and this is kind of hard for people to believe that have not seen it. But many seasons I've seen bear tracks that are that big. That's what you'd call a shovel.... Probably be about two foot long by about one and a half foot wide. Massive, massive bear. Cape Parry area.... I've never see it, but I've see his tracks. My brother saw it one time, but he wasn't hunting it.... Big bear... And this is a smart bear, too. He knows. He knows the season. And when it's time to get out of there...you'd never see his tracks again.... He'd be going

north.... Because all bears know north is water, north is safety, water is safety for bear.... Any time they see a man or a snowmachine or a dog team, first thing they're going to do is hightail it north. Because north is where the water is.... He [his brother] was out there with a Japanese film crew. There was actually three of them out there that day, and they were filming it. If it wasn't that big shovel bear there, eh?

PIN 163, PAULATUK

A Tuktoyaktuk hunter used the Siglitun word angutiryuaq for a big male polar bear with feet the size of shovels. He killed one of these bears back in 1963 when he was a young man.

In 1963, I was just a young one. Thirty years old. February third, 1963, at the time, and ten o'clock in the morning.... Five inches of fat.... big boy, that bear. When I shot it in the ass, it don't even go through that; never even reach the meat. I just got a little gun, too — 200-, 300-grain bullet. That bear worth a lot of money right now. Those days, 175 bucks, I sold it. Average bear were ten-foot, 125 bucks. This one, 175 — boy, that's a lot a money those days! [talking of the size of its tracks] You see those shovels outside? That size. Angutiryuaq [“big male”] It was a big one. I shoot it now, I buy Skidoo with it. Easy.

PIN 38, TUKTOYAKTUK

Accounts of extremely large polar bears are not restricted to the Paulatuk and Tuktoyaktuk areas. A Sachs Harbour hunter encountered very “chubby” bears of an enormous size on two occasions, during the summer around 1975 and 1978.¹³⁶

Boy, you could see some nice big, killer, chubby ones, must be about 11-footers. It can't run, just walk full out. And they are wider this way than they are this way [gestures].... Right in Kellett Bluffs and Mary Sachs.... They're chubbier this way than they are this way.... and they're monsters, too.... We couldn't tell our tracks, 'cause when we went on that ice, it was melted. But could have been 11-footer at the max.... it was summertime and there was a lot of ice here.... Then the second time was just around Mary Sachs.... chubby one.... there was a lot of ice then, too. They were just running away from us. Went on good ice and disappeared.

PIN 137, SACHS HARBOUR

Another hunter from the same community said that his father and the late Frank Carpenter had once seen an exceptionally large polar bear that had no hair on its back or neck. It was bigger than piled up ice, and it spent most if not all of its time in the water.

Those are the kind.... that live in the water. Very, very big. They live out in the water; they don't go on the ice. They have no hair on their shoulders or their full head and all of that. They're just humongous.... My dad seen this one, him and Frank Carpenter [Gore Islands].... They have 30.06, .243, they got scared of it, it was so big. They hightailed it out of there, and... eventually they got to go where they were camping. I don't know what they would have done if that bear would have got to camp. Because nowadays you got to use a .375, .338 if you want to get a huge bear. In those days, when they first started, they were using 25/20, 30.03, .303 and all that. And if they ever got it, what would they do with it; bear with no hair on its shoulders and its neck and its forehead?.... They kind of figure out it the kind that live in the water. I forget the Eskimo [Inuvialuktun] word that they used for it.¹³⁷

PIN 132, SACHS HARBOUR

The other type of polar bear that is special because of its size or shape is referred to as a “weasel bear” in English.¹³⁸ Locations where TKHs from Sachs Harbour and Paulatuk have seen these bears or their tracks are shown on Map 33.

Ulukhaktok hunters talked of large, long, narrow polar bears that resemble weasels and are very quick. Their descriptions are similar, but not identical.

The young bull polar bear, they're just like weasel. They're narrow and long, and those ones are really quick. The really big ones, they get slow.

PIN 115, ULUKHAKTOK

was like this [gestures]. It's a lot different than the bears that we get nowadays; the tracks are like this, oval. The weasel-type bears they're just completely round.... The whole track.... You could put two feet in here, like whole shoes, and there will still be room on the outside.... That was back in the early '80s, when we were running low on petrol. We had to go back; couldn't keep chasing it.

PIN 132, SACHS HARBOUR

Another hunter from the same community said he and his companions had harvested three weasel bears near Nelson Head in the spring, sometime around 1979.

That was a long, skinny bear. They call them weasel bears. That's first time I ever saw one.... It's really long, skinny. It doesn't look like a normal polar bear. It's got a long neck and it's just thin, the width of this table here.... And it was all muscle.... Not much fat, no.... I think I was out with [another hunter] that time. We got three of them there one year.

PIN 133, SACHS HARBOUR

A Paulatuk hunter tracked a large, elongated bear outside of Deas Thompson Point, but had to abandon the pursuit once it crossed an open lead. His grandfather knew of these bears.

My grandfather told me there are two types of bears; there is a weasel bear and there's stocky bear. The weasel bear, when he turns his neck, it takes a long time for his body to move to turn, and these are big 12- to 13-footers. And the shorter ones, they don't turn their head quick.... So, the long ones, they take a long time to turn because of their size, whereas the small ones can turn on a dime.... These weasel bears are just long, big males, anyways. That's the ones that stay close to the open water.... because of their weight, their size. I seen them when they're walking, but as soon as they turn their head, they take a long time for the rest of their body to get into turning. I think that is why they call them weasel bear, because they are more walking like this, and when it takes a long time for their back part to turn.... One time I was tracking one outside of Deas Thompson Point. It was going straight out, and I had a [sport] hunter.... This open lead right here. The bear been crossing on the other side. There was no way to pursue it anymore, so we gave up.... We seen the bear, but it was on the other side.... These are huge bears.

PIN 158, PAULATUK

When asked if he had been seeing weasel bears more or less frequently than when he was younger, the same hunter replied, "I am seeing them more. My grandfather got a lot of bears, and he only got a couple of weasel bears in his lifetime. I am only 45 and I've seen them, but I have never harvested them" (PIN 158, Paulatuk).

3.9 Reproduction

Participants in the PBTK study shared their knowledge about polar bear reproduction, primarily in response to questions related to maternity dens, the number of cubs born, and the movements of cubs and mothers from den sites each spring. To a lesser extent, such knowledge was also volunteered in the context of questions related to mortality and differences in the distribution of male and female bears. The TKHs were not asked about many aspects of polar bear reproduction, and as a result, there is little if anything in their interview transcripts related to copulation, the size of cubs at birth, when they are born, whether they are blind at birth, weaning, and other subjects. This is one of the data gaps mentioned in Appendix 1. Furthermore, many of the people from Aklavik, Inuvik and Tuktoyaktuk who were interviewed for the 2010 PBTK study were also interviewed in 2008 by community researchers working on a project that focused on polar bear denning and post-denning behaviour (Richardson, Branigan and Stirling 2008). Questions related to denning were not asked of interviewees during the PBTK study if they had already been interviewed in 2008. This means that most of the information in this report related to reproduction comes from TKHs who were not interviewed in 2008, in particular those from Paulatuk, Ulukhaktok and Sachs Harbour.

Males looking for females

Inuvialuit hunters know the polar bear mating season is imminent when they start to see mature males moving south down the west coast of Banks Island, southwest down Prince of Wales Strait or close to the mainland along the coast of the Northwest Territories. Late February to April is typically the time when the mating season starts, particularly after females emerge from their dens with their newborn cubs. A Tuktoyaktuk hunter said that mating starts in March, because that is when he has observed males following females out on the ice.

Always try to go out in, March 'cause day light is longer and it is much safer than April and May, and polar bears start breeding in March.... I know that 'cause I've seen it.... From there, they follow the female. You see one bear, and later see maybe three following it, and you know it is a female. They [males] follow it because it is breeding time.

PIN 26, TUKTOYAKTUK

However, a second Tuktoyaktuk hunter associated the start of the mating season with the arrival of very large males with elephant-sized feet at the end of February.

Sometimes it's like a big shovel track, about as big as an elephant foot. I never get to see them because they only hit the shoreline sometimes and then head straight out again.... We don't follow them because it's too dangerous to go out.... sometimes in February. So that's when the big bears start coming to the shoreline looking for their mates, in February.... You seldom see big ones before that. But when they start mating, looking for their wives or whatever.... that's when they start wandering in.... That's when you start seeing them big ones start sitting in the shoreline in late February.

PIN 23, TUKTOYAKTUK

The variability in the timing of mating appears to depend on the ice conditions each year. According to a Sachs Harbour TKH, polar bears “always mate where the open water starts, travelling by the edge of it, travel every day. Even follow female tracks; they catch up later on” (PIN 128, Sachs Harbour). Good ice conditions and plentiful seals will attract females who have just left their maternity dens, which in turn attracts males to the area.

In March they start travelling, eh? When you go out in here, the ice goes out, and then it freezes. And then there's lots of seal holes, and you'll find quite a few male bears roaming around there, because they know the females are coming out, and it's the mating season.

PIN 100, INUVIK

A Paulatuk hunter said that male polar bears travel towards the mainland in April, when the females and cubs are emerging from their dens.

What I been hearing, mostly hearing, is back in the day, the females, they come out of their dens with their young ones. The big males start coming into the mainland looking for these females here.... that'd be the month of April. So back in the day, we'd be going out in the month of April, because that's when the big bears are coming in.

PIN 163, PAULATUK

During the spring each year, male polar bears will pursue the females great distances across the ice in order to mate, according to one Sachs Harbour TKH.

He travel on ice. You see evidence where male is following female. There might be one or two following the same track. Lot of times the female is ahead and males are behind. The bigger one is close to [her], the younger ones are behind the big bear 'cause they don't want to get too close; otherwise. they're going to get their ass kicked around.

PIN 132, SACHS HARBOUR

He and his wife observed a pair mating two years previously at Nelson Head. They spotted the male following the female at about nine o'clock in the morning, and monitored his steady movements

throughout the day until he caught up to the female at around midnight. Female bears will engage in elaborate evasion tactics in attempting to throw males off their tracks. Male polar bears will pursue females so persistently, so determinedly, that their feet become raw and bloodied from wear and tear.

The majority of them, they're either in a floe edge or hunting, but when it comes down to chasing, breeding, they will travel anywhere. A female will travel anywhere to try to lose the guy behind. They are not like us, where we try to attract ourself... they don't do that. The female bear ... will zigzag and try to get the male bear confused. She will keep zigzagging. Sometimes they will use the same trail over, go back, make a U-turn, zip straight this way. They're smart. The male bear... is trying not to lose the tracks of the female. They will follow it to kingdom come [because] there is a prize at the end of here. This female bear will travel anywhere just to try to lose the male bear.... We see tracks in between the rough ice and tracks that stumped the male bear that was chasing the female bear, but lot of times we couldn't track them, 'cause [they were] going over high ridges.... Lot of movement for them to do all of that when it's tough stuff. Bears' paws will even start bleeding when they track so much.... The male bears, their feet are raw, have cuts, they walk so much.

PIN 132, SACHS HARBOUR

The unstoppable persistence of the males was noted by an Ulukhaktok hunter.

In the springtime, when it's mating season, the big male polar bears could track a female for a long time. They sometimes don't stop walking until they find a female. After they mate, the male polar bear can sleep for a long time.

PIN 121, ULUKHAKTOK

Male polar bears can be so single-minded in their pursuit of females that they will walk right through the middle of a tent, if a hunter is so unfortunate as to erect it over the track left by a female.¹³⁹

I heard this one time long ago. If you pitch up a tent, and under there is a female track, you put your tent over it, and the male bear's following the female, he's going to move your tent to get through there, right after her.... [One woman] see polar bear knock his tent down, the kind of thing we been talking about. You know, female tracks. 'Cause even though the female track is covered up, the bear could follow it.... They leave a scent or something... that's where male bear been following.... even when there is a little bit of snow on it.... But that's old-timers say that. Tent over the female track...nothing can get in the way [of the male bears]; something like Mike Tyson.

PIN 132, SACHS HARBOUR

A Paulatuk hunter said that it can be hard to catch up to male polar bears when they are pursuing females. They walk nonstop day and night in hot pursuit.

The males are after the females....Third week of March.... They are travelling all over. As soon as they run into a female, even with two cubs, and she is giving a scent, that is when they travel day and night.... It is really hard to catch up to one of those if you are tracking it down. It is just nonstop. They're travelling day and night. Some guys even say it is like they are sleepwalking. And the big ones, they can cover a lot of distance just by walking fast.... They have something at the end of the trail that they want, and that is their mission in life.

PIN 158, PAULATUK

Two hunters from Tuktoyaktuk also mentioned sleepwalking male polar bears. One said, "springtime is steady walking, sleeping walking.... It's their rutting season... looking for females.... March and April" (PIN 38, Tuktoyaktuk). The other hunter described how he shot a male polar bear that was sleepwalking along a crack while following a female bear.

One time I got a polar bear there in April. To tell you the truth, he never woke up. He was sleepwalking; big male, and that's about a ten-footer. He was walking by a crack about 10, 15 feet wide. It was froze, and when I seen him coming I hid. I had two guns, one with a scope, one without. I looked through the scope. He was sleepwalking following the crack. Only once in a great while he opened his eyes. He got about sixty feet away [when] I shot him

between the eyes. He had his eyes closed.... They don't sleep, those big males, in April. They're sleepwalking.... He was coming straight out from the ice by a crack.... He was following a female track.... Seal Bay.

PIN 33, TUKTOYAKTUK

The condition of male polar bears may deteriorate during the mating season, because they spend so much time pursuing females that they don't hunt.

I think when they start mating they don't eat anymore and when you shot a male it got nothing in its stomach. All they can think of is finding a mate.

PIN 147, PAULATUK

Sometimes in the winter, some of the males get a little skinnier when it's chasing each other rutting.... male bear get little thinned out.... Walk, walk and walk [for] days and days; never eat.

PIN 38, TUKTOYAKTUK

This Tuktoyaktuk TKH likened the behaviour of male polar bears to caribou stags, which do not feed during rut.

These are skinny bears for sure, this one.... This one been fighting too much, maybe that's why he get skinny.... They mating.... They don't eat nothing [when] they sleepwalking, that's why. Just like caribou; they sleepwalking, the bulls, right now,¹⁴⁰ they're some rutting now. Polar bears, when they get so, mate too long, they stagger... they barely walking.... Same as caribou.... Caribou still stagger this time of the year, a lot of them.... so skinny.... just the males.

PIN 33, TUKTOYAKTUK

Male aggression towards other males

Male polar bears fight with one another over access to females. Wounds are inflicted during these altercations; as a result, males accumulate many scars over their lifetimes. According to one Paulatuk hunter: "March and April they're mating and they get all scarred up, so you know the fur is getting thin" (PIN 147, Paulatuk). Two fighting bears can be quite noisy. An Ulukhaktok hunter noted that "some bears got pretty bad scars from fighting.... mating in springtime. They like to fight. You can hear them from a long ways when they're fighting" (PIN 114, Ulukhaktok). Another Paulatuk hunter said male polar bears are more likely to posture and attempt to intimidate one another, compared to the far more aggressive way that grizzlies fight.

I've seen a couple of males fighting over females; 11-footer, good fight and the winner walks away with the female.... Just east of [Distant Early Warning Line site] PIN-1,¹⁴¹ so about this area here. This older bear lost to a younger one. Young stuff, he heavy built, about 10-and-a-half, whereas this male about 11-foot was old. He was still big, but I guess his age must have gave him away. It was a good [fight]; they made a big mess, anyway.... We watched them. No cameras though; we just [watched] them from on top. Boy, they made a big mess though.... They just had scratches on the nose area and on the neck.... Nothing real bad, just gashes, maybe this long [gestures].... Compared to a grizzly, grizzly more of a ripping kind of thing, slasher, slashing. But you would figure they would slash each other, cut a jugular or whatnot, but it's just a scratch. If a person scratch himself, it's enough to get blood. That's what it was.... they are just sort of scratching the surface of the skin... It is different behaviour than a grizzly.... Their behaviour, their attitude, is different. A grizzly is more mean-tempered and easy to get pissed off, and once he gets pissed off, he is like that. A polar bear is not as aggressive. He is more kind of laid back and just accepts things as is. So even when they are fighting like that, they are not tumbling over like a grizzly or wolverine.... This is more passive.... More display the weight, and intimidation or duking it out. There is a claw here, there is a piece of fur there, that kind of [thing].

PIN 158, PAULATUK

At times, however, male polar bear fighting can be so violent that it leads to the death of one of the combatants. Size and weight is no guarantee of victory in battles between two unequally sized males. In this example, a smaller, quicker bear killed a larger one during the mating season.

Probably also too, they kill one another, like, big male bears. One guy in Sachs Harbour, when it was a long time ago, [said] there were two big polar bears. When they were mating they fight.... The smaller polar bear killed a bigger polar bear. He's quicker. They said he hit him with his paw. A paw on the head killed it.... And then that guy, he shot that polar bear afterwards, the one that killed the other polar bear.

PIN 115, ULUKHAKTOK

Although this Sachs Harbour TKH had not witnessed the fight directly, its severity was plainly evident — a lot of snow kicked up and blood everywhere.

One time a big bear been killing one bear. Where they fight, big hard snow was flying all over; really lots while they fighting. So that big bear been killing that small one. Those big bears now are kinda slow all right, so the bear been eating it, arms and head, that's all.... It was frozen meat already when I went there. I think he must have kill it for quite a while; maybe two weeks or one week.... I got to figure out [the location].... I was hunting bear way out. The ice was solid. A guy could travel all day straight out. So I think it was around here the bear get killed.... I don't know; maybe he must have had a piece of seal meat, and when he get more close, he get more mad, trying to chase the bear away. Finally they got into a fight. Boy, blood and all splashing all over.... It was kinda old, all right, those tracks, but you could see the tracks real good. That's a big bear kill it.... it was around March, I think [1947].

PIN 128, SACHS HARBOUR

3

Male polar bears kill cubs; females defend them

It is widely known among Inuvialuit hunters that male polar bears will sometimes kill cubs, especially during the spring, when they want to mate with the cubs' mothers. A Sachs Harbour TKH noted,

once the male bear run into a male, female bear with cubs, it's gonna kill them to breed with the female. That old female really attract them.... I used to hear stories long ago where people used to run into little ones that are dead, killed by ones that start following a female. You see some animals, they get in the mood, they kill the young ones.

PIN 132, SACHS HARBOUR

Similarly, a Paulatuk hunter remembered seeing evidence of cub killing in the Cape Parry area.

I think the big male must have killed the smallest, few-month little young cub, a young bear in order to mate with the female again. I only seen it at Cape Parry, I think it was. They tend to do that, to put the female back in the mating.... Can remember I was a little kid, but there was all this ice around; it was just bloody.... Don't quite remember, but it is in the back of my head. When I think about it, I remember seeing it somewhere on the beach. That would be Cape Parry, not sure what year.... that would be wintertime.

PIN 145, PAULATUK

Female polar bears will try to fight off aggressive males to save their cubs, or alternately will chase their cubs away in order to mate.

There will be a lot of young bears that get killed by older bigger bears. You know, of course, if a big male is in heat and looking for a female, and that female just happens to have a small cub with it, even though that female is not ready for that big bear. That big bear is going to kill those young ones in order to get at that female. Normally the females are pretty good about protecting their young, even from big polar bears. They will fight to the end to protect them.... I witnessed in Baillie Island a female weaning her cubs. And there is a big adult male bear there. Females chasing the cubs away, 'cause she is ready to wean them.... And then she will chase the cubs away, and go back towards the male, and then the cubs follow her, and then she did that four, five, seven times.... And that's why I say generally there is a pair of cubs; both cubs are going to stay together for a little while after their mother

has left them.... They will stay in that general area for a while, but then they'll of course end going farther and farther looking for their food.

PIN 44, TUKTOYAKTUK

Mating

There are no observations in the interview transcripts describing coitus, when male polar bears finally make physical contact with their mates. However, two hunters had encountered male-female pairs that had either coupled recently or who were about to. In April 2005 or 2006, a Sachs Harbour hunter accidentally stumbled on a breeding pair, while hunting rabbits near his cabin on the west coast of Banks Island.

Hunting rabbits along here. It was kind of blowing. I had my rifle hunting rabbits, looked, "Oh, polar bear." I thought it was a female and cub, and drove up to it. It was a big male and female resting. Right out here on top the island. Thought "pretty cool," backed up.

PIN 134, SACHS HARBOUR

One March, sometime between 2000 and 2002, a Paulatuk hunter, his brother and their sport-hunting client snuck up on a pair of polar bears who were so preoccupied with one another they did not notice the human predators. The three men were hunting along a big pressure ridge near House Point.

One time I got maybe about the length and the half of this [gestures] to two bears that were mating, and they didn't know we were there [until we got] maybe only thirty feet from them.... That time, anyway, it was mostly ears. We were on a big pressure ridge; they were just below and on the other side.... With the male and the female they were so busy with each other they didn't have no care in the world. Me and this American went, and my brother. We snuck up to it, maybe about thirty feet. We were just listening. All we could see was the head, ears, until it was time to shoot.

PIN 158, PAULATUK

Two TKHs mentioned in passing the frequency of polar bear mating and/or how long cubs stay with their mothers. In general, female polar bears mate every two years, which means they keep their cubs with them for approximately that length of time after they are born. A Sachs Harbour hunter said females breed "every two years. Cubs usually only stay with them two years" (PIN 134, Sachs Harbour), while a hunter from Paulatuk said that when the cubs "leave their den in April, they are done for until the next couple of years, when the mother is again in the same situation" (PIN 158, Paulatuk).

Only one person interviewed mentioned the actual time when female polar bears give birth — generally in February, while in their dens.¹⁴²

[In] February, they have their young ones, 'cause it take them quite a while to have young ones, I think. I know they have their young ones in February.... I know they have young ones in February in the den.

PIN 142, PAULATUK

Maternity den timing

Having mated in the spring, pregnant female polar bears will start to den late in the fall, normally in November and December, and will stay in their dens until the following spring, emerging with their cubs late in March, April or even May. Just prior to entering their maternity dens, female polar bears may eat small quantities of grass.¹⁴³ Thereafter, they have nothing more to eat until they emerge late the following winter, with the exception perhaps of some of the body wastes of their newborn cubs, as noted by a hunter from Aklavik.

And they don't eat no more — finished eating. I don't know if it's true. They say that all they find in their stomach is a little piece of grass — nothing else, just to keep from shrinking more, I guess — their stomach — an empty stomach the whole winter. They go in December, and they come out in March or April, and they're still fat. They

don't eat nothing all during that time. All they do is clean their young one, that's all. The young one is taking milk from its mother, even if she's sleeping. The young ones pee — they don't waste that, too. Their mother take it.... Same with dogs, same thing.

PIN 17, AKLAVIK

Nine hunters from five Inuvialuit communities had this to say about the timing of maternity denning.

Towards around the end of March, first week of April. See a lot of them [females and cubs] when I'm hunting.... I heard they go in, probably November.... They come out in April.... Sometimes they come out earlier in March.... Depends if they are hungry or not.

PIN 134, SACHS HARBOUR

January, they start denning. No, it must be December, around there.... They come out, some of them, the end of March, April, the beginning of April. I start seeing some little ones start running around March and April, around there.... It's pretty well the same time [every year]. I always see them, because it's pretty well the same time I always hunt every year. I go out every month to try and see if there is any change or anything. Sometimes I'm curious to see what happens. I just take a drive, and sometimes I'm really lucky enough to see every year, that same time of the year, I see the same size or whatever comes out.

PIN 117, ULUKHAKTOK

I used to see some Christmas — just before Christmas and January, I see some polar bear tracks on the land. They had to wait for snow to dig a den, a big snowbanks. They go out from the dens around April. From the den with their mothers they start walking around and hunt seals. End of April and May they start walking around on the [ice] to go outside and hunt. The mothers start hunting with their cubs.

PIN 121, ULUKHAKTOK

They go in January, and come out sometimes in April, May. And when he wants.

PIN 164, PAULATUK

Females they let themselves get buried in November, December, January, February. That is when they have their young ones, and they come out sometime first week in April with their young ones. So they are denning probably about five–six months.

PIN 158, PAULATUK

I would say, like probably, by about this time of year is when they will start looking, November, December.... Usually [emerge] in the spring, early part of April. End of March or early April.

PIN 44, TUKTOYAKTUK

Every year there's females with cubs walking out, and every time I'm going out in the springtime you see them.... For instance, we watched them come out on the ice with binoculars. We watched a female walk out with her cubs, go back in, and pretty soon it's going right over Baillie Island, going out on the other side and going out in the ocean. We watched them going over the land, right from the ice where we're hunting.... Usually in April is the time that they come out [of their dens]. They might come out [earlier, but it's] very hard in late March, I think, because of the weather, temperature around here. It varies [depending on] where you are, 'cause I heard about it Alaska side. It's totally different, their denning habits.... But around here, usually we see a lot on the ice, it's what I saw anyways, was in April.

PIN 43, TUKTOYAKTUK

They used to have the [polar bear hunting] season open on November 1, but now we can see that there's no more ice November 1. And because of that, they change the date to December 1, because in mid-November, the females are looking for denning places to have their young ones. The local HTC moved the season to December 1, giving the females a chance to den before polar bear season opens. It gives them a chance to go into the dens.

PIN 161, TUKTOYAKTUK

I've seen them come out early, and I've seen them come out late, so it's hard to say. "Late" meaning May... mid-May is late.... "Early" would be the end of March.

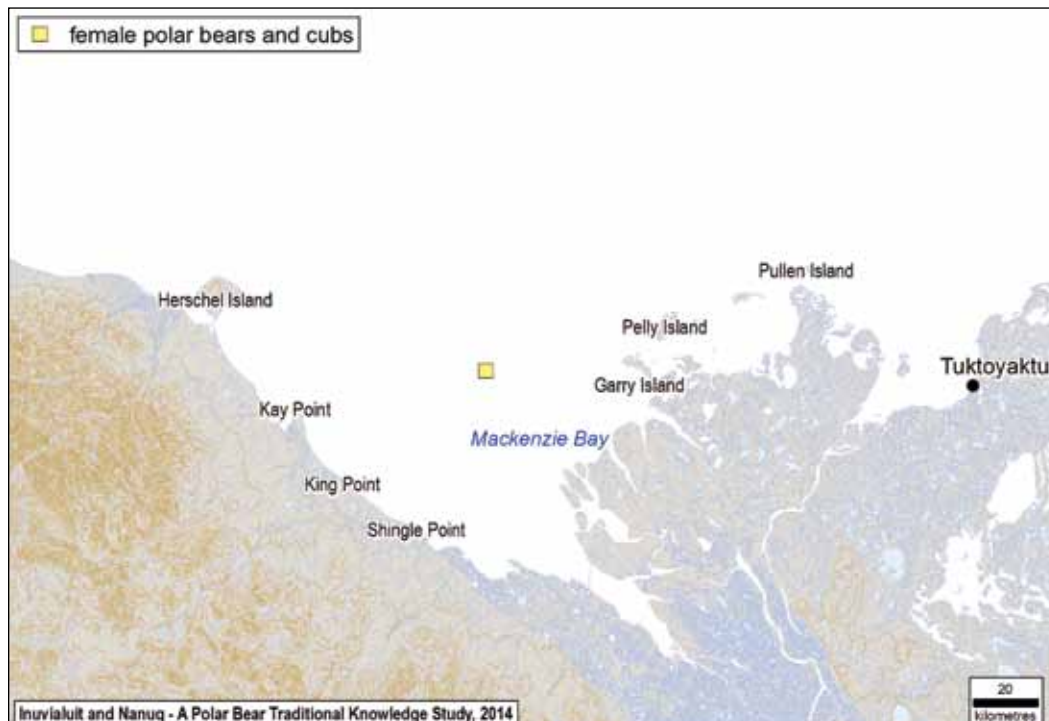
PIN 3, INUVIK

Number of cubs

Several participants in the PBTk study spoke about the number of cubs that female polar bears give birth to. In general, they see from one to three cubs, but pairs seem to be more usual. The annual or local variation in the number of cubs is related to the relative prevalence of seals the previous spring, when the females were mating. When triplets are born it is thought to be because their mothers fed well on seals when they were conceived.

An Inuvik hunter said that he once saw combinations of single and paired cubs when he was hunting to the west of Pelly Island in Mackenzie Bay one day in the late 1990s or early 2000s. "On one day, I ran into four different sets of a sow and cubs.... With twins, one with twins, and the rest were just ones" (PIN 3, Inuvik; see Map 34).

Map 34. Place west of Pelly Island where four sets of females and cubs were encountered in a single day



Source: PIN 3, Inuvik

A Tuktoyaktuk hunter said he usually saw cub pairs or triplets in the spring, never single cubs.

I've seen the bears walk out of the den and you could see how many cubs they had, two or three. I've never seen a mother bear with a single cub walking out. I've seen two or three bears cubs with her.

PIN 43, TUKTOYAKTUK

A Sachs Harbour TKH also said he had never seen single cubs; normally he sees pairs, which tells him that the population numbers in the area are "healthy."

Lately, when you see mother and cubs, you see two cubs all the time.... This has been a healthy population, I think. Normally I see two cubs instead of one.... I don't recall ever seeing just one. It's always two. Even in the summertime, when you're driving out on the ice there, when the ice came in, just hunting seals, you run into polar bears with cubs.

PIN 133, SACHS HARBOUR

Another hunter from the same community spotted triplets in April 2001, near Norway Island on the west coast of Banks Island. He speculated that “the foods might've been better, prior to mating” that year (PIN 138, Sachs Harbour). A Paulatuk TKH also linked having triplets to the health of the local polar bear sub-population.

The most I saw was three.... And that was outside of the Fiji Island.... So they must be doing pretty good when they have three, and they look pretty healthy.... That would be about the middle of April.

PIN 144, PAULATUK

Den site characteristics

Inuvialuit used to find maternity dens with greater frequency prior to the 1970s, when dog teams were their primary mode of ice transportation, and when they used to harvest bears in their dens. Now they are more likely to find dens inadvertently while hunting or travelling along the coast. Curiosity rather than necessity motivates many hunters to search out dens, as suggested by this Sachs Harbour TKH.

Sometimes in later springs, you'd see the tracks heading out or sometimes you'd see the little disturbance in the snow, a little opening. And you go and check it out and you'd think it's a rabbit hole or something. One time [I saw] a nose went sticking out of that. And I ran down to my sled. I didn't get closer than one hundred or fifty feet, maybe.

PIN 131, SACHS HARBOUR

Certain areas are well known for having dens, and Inuvialuit frequently see females and cubs and/or their tracks in association with such places. Virtually all polar bear hunters are familiar with the locations of some maternity dens, as well as their basic characteristics (at least those of the terrestrial dens) and the kinds of terrain features that are best suited for them.

Female polar bears search out locations on the sides of shoreline banks, up creek and river valleys, and other locations where snow accumulates sufficiently to provide good shelter for the duration of the coldest winter months. They are known to den in the snow that accumulates around big icebergs as well. Female bears know what they are looking for when they are denning, suggested this Tuktoyaktuk hunter.

Anywhere there is a lot of snow, they will be back. They probably know when it's going to snow, when it's going to blow in, big bank, turn to a big bank, or something. They got a nature, I guess, know where they are going to den. Right now I know they are looking for den, 'cause no snow. Probably December. I know in December they go in.

PIN 26, TUKTOYAKTUK

A Paulatuk hunter said the same thing. Females “would look for high slopes, and they go in between and make it where they wouldn't get buried. So they know the conditions” (PIN 142, Paulatuk). When they find a possible denning site, they check it for its suitability, and if the snow is not deep enough, will search elsewhere.

Any place where it's deep, good snow, that's what they always [den].... They check, they dig, looking for deep snow. And then, if there's not enough, they'll keep going until they find a really good deep snow.

PIN 2, INUVIK

Four Ulukhaktok TKHs said that female polar bears will abandon a spot quickly if they strike ground while excavating their dens.

But when a polar bear is digging out for a den, if a bear reaches the ground, it will stop digging and give it up.

PIN 126, ULUKHAKTOK

I have seen some [dens] on a slope area, where there is a lot of snow. When there is too little snow on the area where they're digging at, if they reach the ground right away, they leave it and go look for another area to make a den.

PIN 119, ULUKHAKTOK, Translation

Not too long ago, around the '80s, I guess, behind the bluff here, a polar bear was making a den, but the snow is not deep enough. They give up and go someplace else.... Not much snow; he hit the rocks right away and went someplace else.

PIN 114, ULUKHAKTOK

[They] have dens in the area where there's lots of snow. When they're digging to make dens, when they reach the land right away, they would leave the den they're making and go find another place to make a den.

PIN 124, ULUKHAKTOK, Translation

Female bears either excavate dens in existing snowbanks, let themselves get covered by drifting snow, or both, according to PBTk study participants. Big December snowstorms can quickly bury a female, according to one Aklavik hunter.

They don't den like black bear or brown bear or grizzly bear. They den in the snowdrift. They just lay down and dig a little hole, and then the big storm in December — it's mostly the ones that are going to have young ones. They just lay there and the wind come up and cover them right over, and that's their den.

PIN 17, AKLAVIK

A Tuktoyaktuk TKH said he had never observed females making dens, because they usually do this during the first big snowstorms at the end of November, presumably when he and other Inuvialuit hunters had taken refuge in their cabins or some other safe haven. However, it is his understanding that females build their dens, at least in his area, partially by digging and then by letting snowstorms do the rest of the job for them.

They den starting anywhere from close to end of November, [during] the first storm that you see, close to end of November. That's when they come in, especially if they want to come into the land in the shoreline. They come in when a storm comes in, and they're buried right over after they dig in there.... After they dig in, the snow covers them the same evening.... They dig in and then they just let the snow cover [them] right over.

PIN 43, TUKTOYAKTUK

Female polar bears require deep snow in order to den, as noted by this Ulukhaktok hunter, because it insulates them and their cubs from the extreme cold of the Beaufort Sea region.

They have to have a good snow in order to den. If it's a thin snow, a shallow snow, they can't den in it. So, there was a lot of snow. Like my dad always told me, "polar bears can't den if the snow is too thin." If there's not too much snow, it's going to be cold for them. In order to have a warm place, they've got to have a lot of snow where they're in.

PIN 117, ULUKHAKTOK

Another hunter from the same community said the bears "need lots of snow, maybe eight feet, ten feet, sometimes more" (PIN 121, Ulukhaktok). A Sachs Harbour TKH spoke of the importance of wind direction for determining how and where snow will accumulate, and of how female polar bears den on the west coast of Banks Island:

mostly around where there's a hill. And on the fair wind side of the hill. It's going to blow and make a snowbank; that's where they have a den. They never put it on the east side of it. They always put it on the west side of it, like a bank or hill or whatever.... snowbank, on the west side of it.... Here, there's a lot of east wind.... In the fall time when the snow is really soft, when it's really snowing, they'll lay down on the fair wind side of the hill. They'll lay there and eventually when it's starting to blow, they get covered up. Then every time it blows, they cover them more and more. Sometimes it's three metres thick, 'cause when it's late spring, when we see a female bear coming out of a den with a couple of little ones, I go look inside to see what it looks like.

PIN 132, SACHS HARBOUR

Coastal bluffs and cliffs are good places for snow to accumulate.

Where there's a bluff, there's usually really lots of snow. They look for a cliffy place or also a bluff, big snow. And also, sometimes they go farther upland to hibernate.

PIN 117, ULUKHAKTOK

Some of the coastal bluffs in the Horton River area near Tuktoyaktuk are 400 feet (120 m) high, and bears den along the edges of them.

They have their dens in that area. Right up on the banks, well, it's really high banks here. You're looking at 400 feet. In this area here.... They probably go more south, but I've never really travelled that far. But in this area, close to Horton River, you see dens up on the banks there.

PIN 42, TUKTOYAKTUK

In the Garry Island area on the east side of Mackenzie Bay, females search out similar terrain: steep banks along the edge of bluffs or banks. However, where they den depends in part on prevailing winds and snowdrift patterns. If the wind is from the west, they will den in the deep drifted snow on the east side of a bluff or bank. An Inuvik hunter thought this denning preference may be related to a predator avoidance strategy of some kind.

It's like they're trying to keep something away or whatever. The one at Garry Island, it's in the snow, and it's on a bluff, like a sharp one. When he comes out, he has to slide down that.... So, I don't know if it's for predators or whatever, but it's just something I noticed. I don't know if it means anything.... [The snow is hard], that's why it's on a wind bank or something.... Predominantly, it's the west wind that's the strongest wind. So, the drifts are always on the other side of it. They're making their den that way [east side of the drift].... I've seen them [the dens] high all the time. Is that snow harder up there? I don't know.... but they're always higher for some reason. Maybe it's because they don't want another bear to get it.

PIN 3, INUVIK

Polar bears will also den along inland creek and river valleys where the snow accumulates sufficiently. Fish Lakes, near the southwest coast of Banks Island, is one such place.

Seen tracks in the fall time where they're going to look for denning areas.... Going inland.... A lot of them around here [Fish Lakes]. They're just coming off the coast, looking for some creeks that are filling up with snow.... They get a lot of dens along the coast too. If the creeks fill up right away, but if not, they go inland a ways [to] find the right place.... October, like right now, [they'll] be looking around for places to make a den. They go look for a creek where that's filled with snow, or bank is already. A lot of times you get them when we go out fishing in April, May. Then you see the tracks going out with young ones, and you run into them.... I've seen a few bears, mother and cubs, come out of there.

PIN 133, SACHS HARBOUR

According to an Ulukhaktok hunter, female bears “have to look for good snowbanks, big snowbanks, sometimes in the river valleys” (PIN 121, Ulukhaktok). On the Yukon North Slope and in neighbouring Alaska, dens are found:

in the deep valleys, where there's lots of snow, where they get a lot of snow and that. Because we always see a big snowbank there. We were driving past it always... and using the snowbank to go down. Here, all that time, there was a den right beside us, and we didn't know she had a den there. And sometimes, we'll get people coming from Alaska side [and they] see polar bear tracks coming from that way sometimes.

PIN 13, AKLAVIK¹⁴⁴

Snowdrifts deeper than thirty feet in some creeks along the Yukon North Slope provide excellent denning conditions.

The ones we've seen were always on the ground, and the snowdrifts piled up deep on the blowing side. It blows over, and that's where they den — at least, the ones I've seen — the one here, and the one that was here, as well, was in a thirty-, forty-foot-deep snowbank. There's a creek with willows in it, and it piles right up, thirty feet deep. It's a valley — kind of a draw going into the land, and it just fills up with snow, and that's where they den.

PIN 15, AKLAVIK

Several PBTk study participants said that polar bears also den on the ice if conditions are right.¹⁴⁵ Pressure ridges and icebergs (large piled-up agglomerations of thick ice) against which drifting snow accumulates are two kinds of ice formations that females will den in. An Ulukhaktok TKH said that one late winter/spring in the 1970s he had spotted a female with cubs in a pressure ridge at the bottom of Wynniatt Bay. He thought they may have dened in the piled-up ice there, but he was not sure.

Down here one time... it was somewhere around here. Young little bears, they're staying in the ice pile-up together, and it's got a room inside, springtime around April, I guess. Two young ones, they're staying in there with the mother bear. The guys just about shot the mother, but the young little one come out. We think they come out of the ice in there. Ice is thick like that, it's got a room inside, it's got a porch. I don't know if they stayed there all winter long, but I'm not too sure anyway.... In the pressure ridges, they're staying in that.

PIN 114, ULUKHAKTOK

The ice in Wynniatt Bay can pile up as high as a Coast Guard ship, according to this Ulukhaktok TKH. He discovered a den in one such pile-up in Wynniatt Bay in the mid-1970s (see Map 35).¹⁴⁶

I saw one [den at] Wynniatt Bay in the old ice around there. Yeah, in the old ice; one really big old ice.... around the middle of the '70s.... Me and my cousin were sport hunting. We're looking around and looking around. Oh, there's a polar bear over there. Okay, let's go to it. We get close to it. That bear, he go inside the hole. We did not get it.... It was old ice.... Old ice means really old ice. It's never melted before.... Even some of it is really high, even higher than Coast Guard [ship].... From the east wind, because there's big snowdrifts.... I really tried to see that bear, but it go inside the hole. It got a little cub anyway. When we see it, it had a little cub.

PIN 126, ULUKHAKTOK

Another hunter from the same community said that in March 1987 he too had encountered a female polar bear denning on the ice in Wynniatt Bay. She had triplet cubs.

It's an old glacier. He had three pups in there.... We were hunting bears, and it was on top of the rubble ice. I already had my bear. A friend of mine was going to shoot it, and we really started waving at him, because I could see little bears coming out of the den. So, he never shot it. We were really lucky.

PIN 117, ULUKHAKTOK¹⁴⁷

An Aklavik hunter once saw a den in the snow on the side of an offshore iceberg near Barter Island, Alaska, when he was a child.

I seen a bear den against the iceberg, with snowbank just about as high as the iceberg was.... About ten miles [offshore].... I've seen that happen.... around Barter Island. That's way back when I was just seven, eight years old.... Kaktovik.

PIN 15, AKLAVIK

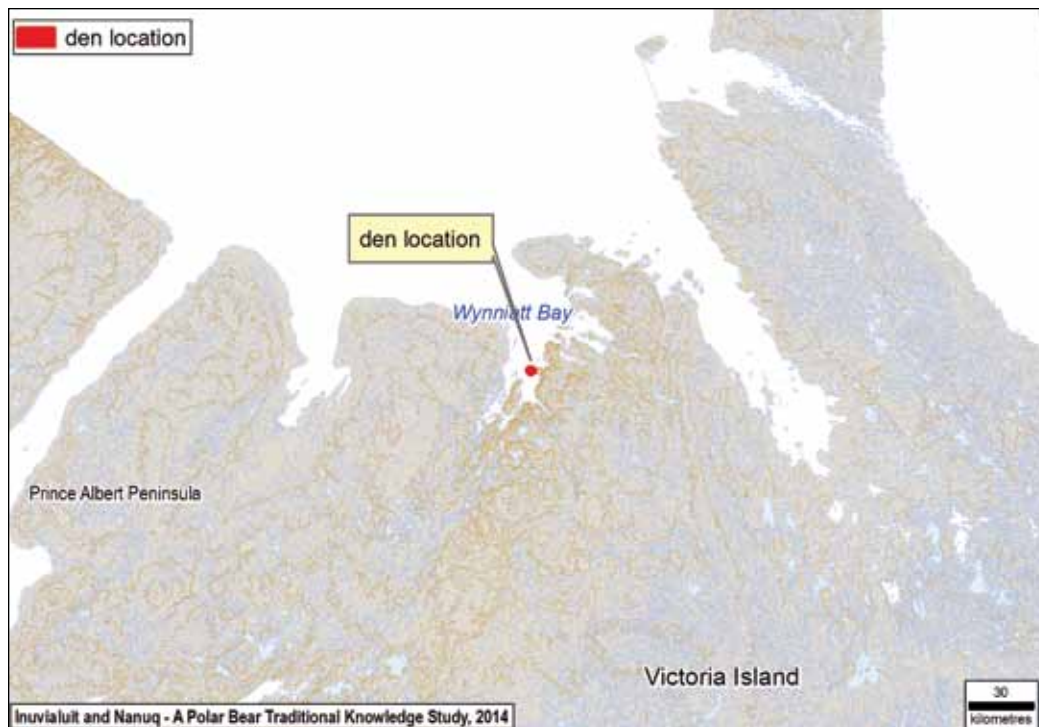
This Sachs Harbour TKH had heard of iceberg denning, although she had never witnessed it herself.

I never saw the bears denning on the ice, but sometimes they do when they're gonna have little ones on the icebergs, 'cause lots of snow on the icebergs, bad weather.... Any kind of snow, even thin little fresh snow, when they're gonna have cubs, they just make den anywhere, even fresh snow, old snow.

PIN 129, SACHS HARBOUR, Translation

Another TKH from the same community said that there are no longer any icebergs around for females to den beside: "What I used to hear, some, they have dens when they find a big iceberg, on the edge, but no icebergs around now, nothing" (PIN 128, Sachs Harbour).

Map 35. Place at the bottom of Wynniatt Bay where a female and cubs may have denned in a pressure ridge



Source: PIN 126, Ulukhaktok

Occasionally, female polar bears will den in less than ideal conditions; for example, in a shallow ditch or hole. This Sachs Harbour TKH saw one such den at Terror Island off the west coast of Banks Island early one May, sometime around the year 2000.

One time, too, in the flat [place,] I seen a bear. I take along my dog and walked to it in a flat [place]. When I start to get close, only just when he start running away, after a little while, kinda flat place, maybe this much snow, I see two young ones there. That's why that bear couldn't run away for awhile.... I just take a look [in the den] and pass it; didn't wanna disturb them too much, because the mother start running away.... [The den was] in a little flat [place] on the land, in a little ditch, I think. That's when they make shallow hole.... I think it was around here. We was travelling around here.... Terror Island.... it was too shallow, [because the] snow wouldn't build up too good. Mother always make dens anyway.... I see two cubs.

PIN 128, SACHS HARBOUR

In an extreme case of poor denning conditions, a bear birthed on top of the snow at a spot on the coast of Thesiger Bay on Banks Island. A Sachs Harbour TKH said he had “seen one bear didn’t even make a den. Just had its young on top of the snow.... There was hardly any snow that year, I think” (PIN 131, Sachs Harbour).

A Tuktoyaktok hunter said that one April in the 1980s, he and another hunter had encountered a female with cubs who was excavating a new den. Its existing den had collapsed, possibly because warm conditions had made the snow unstable.

When me and [a fellow hunter] were bear hunting from Tuk, we used to camp at Atkinson Point I seen that bear den been collapsing.... maybe [snow] got sugary when it collapse, maybe warmer weather. So she been making another hole right down below it with the fresh snow, snowbank.

PIN 29, TUKTOYAKTUK

Orientation of maternity dens in relation to the sun

Another important variable in female polar bear decision-making with respect to denning is the orientation of the snowbanks or drifts in relation to the sun.¹⁴⁸ Frequently, they build dens in places where there is both exposure to the warming sun rays in the late winter/early spring and a good accumulation of snow. Such locations vary from one part of the region to another. For example, north of Sachs Harbour, dens on coastal islands such as Norway and Terror Island are on south-facing bluffs and banks, while those on the coast of Banks Island are on west-facing slopes.¹⁴⁹ In the Tuktoyaktuk area, females den as follows:

pretty much a south-facing bank. And the reason for that is those are the spots that warm up quickest in the springtime.... They just basically look for a bank... and Mother Nature is going to fill it in with snow. When they find this area, that is when they’ll go in denning.

PIN 44, TUKTOYAKTUK

Polar bears also denned on an east-facing slope of a pingo near Tuktoyaktuk, according on one hunter from the community: “[t]hey like to have dens where there’s a lot of snow, like banks and that. Like this pingo over here. On the east side of it, they have a den. There’s a lot of snow. It could have a warm place” (PIN 28, Tuktoyaktuk).

The structure and internal characteristics of maternity dens

Very few of the PBTK study participants had ever explored the inside of a maternity den, and for that reason little information about their internal appearance or structure is contained in the interview transcripts. Moreover, the den interior is poorly illuminated, which makes it hard for Inuvialuit to study their internal characteristics. “Hard to see” in there, said this Sachs Harbour TKH: “We stuck our heads in, that was it.... It was kind of hard to see. It’s quite a ways in, because the mound of snow had built up” (PIN 133, Sachs Harbour).

In general, TKHs have no reason to enter dens. They do not want to disturb the female bear and her cubs, and/or den exploration may have unacceptable safety risks.¹⁵⁰ A Paulatuk hunter, for example, said he does not like to disturb denning polar bears.

We’re always walking around looking around the banks there. When you’re a hunter you look anywhere and everywhere, that’s how you find it. You look down, “Oh, something’s down there. Polar bears been dig the hole”.... I never really followed them. I leave them little buggers alone. You let them grow. But I know he’s down there.... I don’t bother those females.... I never really bothered looking out in there. My elders did, but I don’t know. I never bother them. I don’t want to, because you leave them alone.... they’re down there for a reason. That’s how I see it.

PIN 164, PAULATUK

Disturbing a denning female could be extremely dangerous, as suggested by a Tuktoyaktuk TKH. He said that when he once peered into an occupied den, “I heard him growl. That’s a hair-raising experience that one.... I never go in one before” (PIN 43, Tuktoyaktuk). Likewise, an Ulukhaktok hunter once encountered a den while travelling to Sachs Harbour by dog team with an Anglican minister. He knew that the roofs of the dens are thin and fragile, and that people must be very cautious when walking near them. Falling into an occupied den could be fatal.

[We] walked up to it and checked to see if the bears were still in there. I had a gun, too. They were in there, all right. I run away real quick. [It looked] like a place where somebody made it with a shovel.... Really neat inside. But I guess where the bears were, there was a little bit of seal meat, leftover seal bones inside the thing there. But it was really neat. But I was scared to go any farther in, because I know they were in there, and they had a small one. I was lucky I didn’t fall. We were just walking up... and I said to myself, “Oh, I better not go there. It might be really thin snow.” Because you fall in, you’re finished. You might have a rifle, but you would have to take it off your back and shoot it. So, I didn’t go there. I was lucky. [The den was located] on the land.... I could see the little hole [where they] poke it with their nose. I seen that little glassy ice. I was going to walk there, but I said, “Oh, no. I better not go there.” Never know, it might be only that thin and I fall through — I’m dead. I’m glad I never go. I’m still kicking today.

PIN 125, ULUKHAKTOK

Long ago, a hunter from the Read Island area south of Ulukhaktok fell into an occupied den and lived to tell about it. This Ulukhaktok hunter said he knew the old-timer well.

I know one guy. I know him really good. That old man, he used to go up here somewhere. He didn’t know he was walking on the top. He went down. He see nanuq inside. These bears, he never touch him.

PIN 122, ULUKHAKTOK, Translation

The tops of maternity dens are thin and have small holes in them so the females and their cubs can breathe.¹⁵¹ As noted previously, foxes will urinate around these breathing holes, which makes it easier for Inuvialuit hunters to find the dens. The holes are the diameter of a pencil, said this Sachs Harbour TKH. *Some of them they have their little breathing hole, some of them the size of pencil.... They make a hole with their nose, and you always know it, ’cause the foxes always urinate on it.... It’s very thin. If you walk over it, you gonna fall in. But other than that, it gets thin to thicker.*

PIN 132, SACHS HARBOUR

A Paulatuk hunter said that in the early 1980s he inadvertently discovered a den along a bank they frequently used as a lookout. He explored the interior of the den the next day, after the female and her cubs left.

I was just walking around and looking around, and I parked my Skidoo and climbed up the bank. That’s where we always binocular.... Where we can climb up, the bears have been having a den there, a female. I was parked there for [a while], and I went back to the camp. Next day I went back to the same place. I was going up and I seen a hole there. Was wondering what something dug a hole, so I went around it and a bear had just came out of its den. I was standing right on top of his hole, and the Skidoo track was there. He had his den there and I didn’t even know that... I didn’t even see the small hole, his breathing place there.... If I actually fell into the hole there, I would have been bear meat.... I took a look inside the den.... It looked like a snow house, almost. It’s round, with a nice little bedding area in there.

PIN 145, PAULATUK

An Ulukhaktok hunter had also explored the interior of an unoccupied maternity den that his dog found. The denning chamber was large and clean.

I lose one dog. He inside, and I find out there’s no nanuq inside. So I went inside.... It wasn’t here, it was in Read Island.... I went inside. I went down. You could walk in sideways and check around inside. There could be three

bears inside; all gone already.... The coastline, close to the shore.... But nothing to see; inside all clean.... There was fresh snow inside.... And I didn't see nothing inside, too. But I walked in — it's high.... I could walk in there, but I didn't touch the top. Some places I had to go down a little bit, but it was high.... I was about 18 years old then.

PIN 122, ULUKHAKTOK, Translation

An Inuvik-based hunter linked clean maternity dens to the observation that bears do not “use the bathroom” while there. Moreover, females and their cubs may move their denning chambers upwards as the snow accumulates on top of the den.

When you see a polar bear den, after they leave it, you look in there, it's clean. It's like the time they go until they go out. You never see where they melt the snow.... They say the polar bears, every now and then, they move up from where they first go in [because] the snowbank gets heavier and thicker. So, they move up closer to the top. This is exactly what the elders tell me about it.... I've never seen the entranceway. It's just where they go out.... They don't use the bathroom [in their dens].

PIN 100, INUVIK

Bear cubs left claw marks on the surface of their House Point den, according to this Paulatuk TKH.

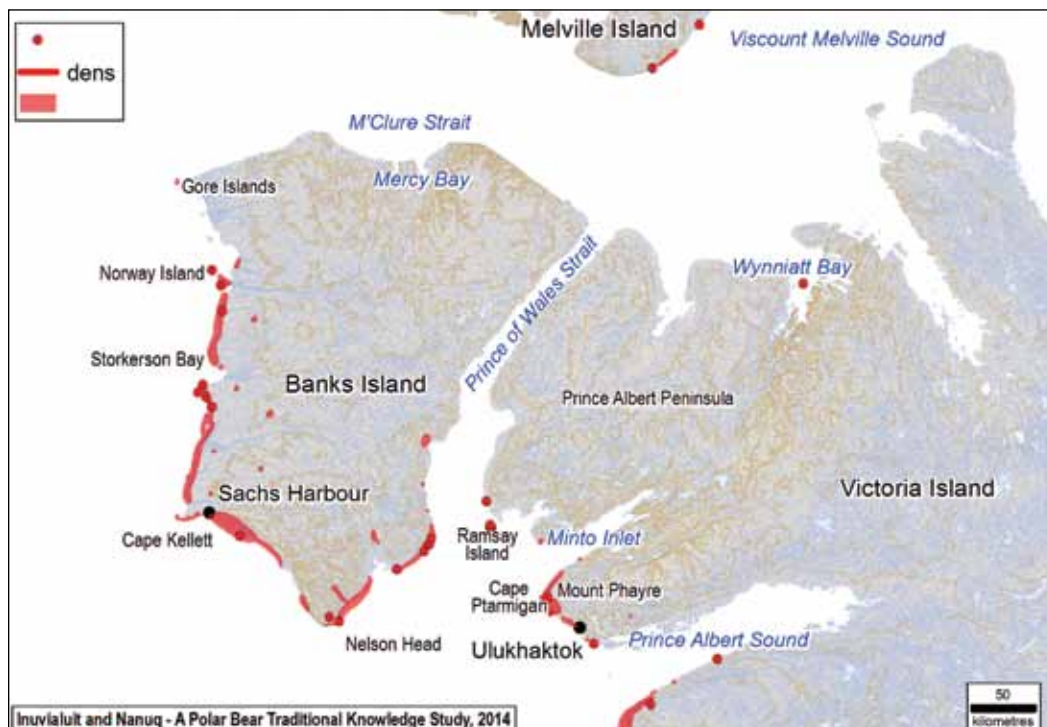
I just briefly looked inside of it and seen a whole bunch of claw marks and that. Seen how big they are, those little bears were, from small chubby to about a white fox track.... this was after the polar bear left. In April.... just the tracks, when they are leaving.

PIN 158, PAULATUK

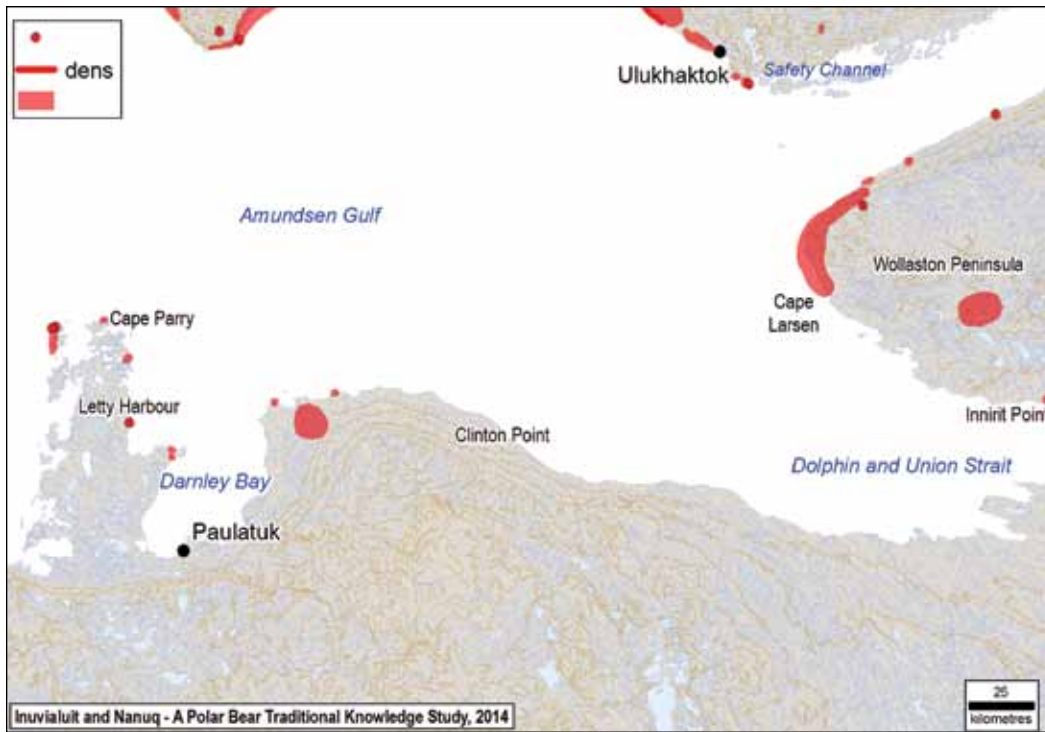
Den locations

A large number of maternity den locations were documented on maps of varying scales in the context of both the PBTk study and the 2008 study by Richardson, Branigan and Stirling as noted in the methods section of this report. These den locations are shown in Map 36, Map 37 and Map 38.

Map 36. Polar bear maternity den locations, Banks Island and portions of Melville and Victoria islands

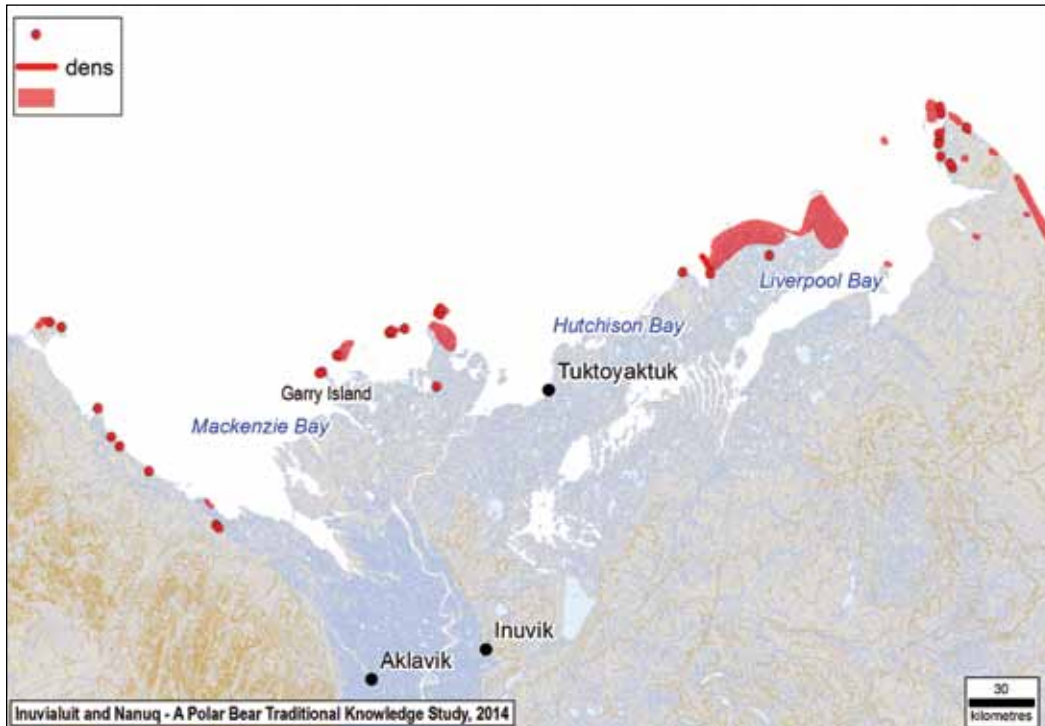


Map 37. Polar bear maternity den locations on a portion of Victoria Island and in the Paulatuk area



3

Map 38. Maternity den locations: Tuktoyaktuk area and along the Yukon North Slope to Herschel Island



TKHs noted maternity dens in several locations on or around Banks Island, including Gore and Norway Islands on the north coast, the coastline between Adam and Storkerson Rivers, the coastline between Terror Island and Cape Kellett, the coastal zone near Fish Lake southeast of Sachs Harbour, Nelson Head, the coastline between De Salis Bay and Coal Mine Bluffs, and Jesse Bay, in addition to several inland areas such as Raddi Lake and the headwaters of the Egg, Storkerson and Adam rivers (see Map 36). In addition to terrestrial locations, a female bear was also reported to have denned on the ice near Gore Islands at the northwest corner of Banks Island.

One Sachs Harbour TKH described the den he had seen up a creek near Cape Kellett in November 2009.

[The bear] was right on the side of one of the creeks there, and it was still in the den. But you could see that it was already dug out, and the bear was already around there, and my friend wanted to go and have a closer look... which wasn't a very good idea. So we never went that close to it, but you could see it was a bear. The bear was in there.

PIN 139, SACHS HARBOUR

Another hunter from the same community talked about the dens he had seen on the west coast of Banks Island.

Every other year we run into bears that are just coming out in springtime. Sometimes in the fall, looking for places to den.... I'd say from here, Blue Fox [Harbour] area, right up to Terror Island there.... Wasn't on the island, but we were passing through here one time, just the other side of Sea Otter [Island], going to Terror. We were just driving along and see this head poke out. Small. Stopped and looked at it. It was polar bears coming out of their den in springtime.

PIN 133, SACHS HARBOUR

On or around Victoria Island, study participants knew of dens along the shores of Wynniatt Bay, on Princess Island in the Prince of Wales Strait, Ramsay Island, the shoreline area at the mouth of Minto Inlet near Mount Phayre, the coastline around Cape Ptarmigan, just north of Ulukhaktok, Safety Channel, and Cape Larson, a coastal spot near Innirit Point, and an inland spot on the Wollaston Peninsula north of Williams Point (see Map 36 and Map 37). In addition to terrestrial locations, female bears were also reported to have denned on the ice at Wynniatt Bay, as mentioned previously.

In the Victoria Island area, one Ulukhaktok hunter said he had seen dens in the mid-1990s adjacent to a major travel route between the community and Safety Channel.

I never seen little cubs going in and out in dens, but I seen some around this area, though. They're staying in a den. There's two I seen not too far away from here quite a few years back.... Middle of '96, somewhere around there.... I was going by there for how many thousand times in wintertime and I didn't know [they were there at first].... Springtime, they start to come out. They had a little breathing hole in the snow. That's how we find out. Been travelling by them about probably fifty feet away. The trail is fifty feet away from the den. Big trail that's a road for people going over this side in wintertime, overland here under the cliffs.... And when they come out, I seen the track.... I didn't want to follow it. Every second day, I travel by there, because I was trapping this way... trapping foxes.... On the side of the cliff.... The lower side.... There's a big snowbank...about eight feet high, I guess. They've got to breathe in there. They've got a porch to the outside... going in and out, springtime.

PIN 114, ULUHAKTOK

Another Ulukhaktok TKH saw a maternity den on Ramsay Island in 2009.

Last year, too, I saw a den.... [on Ramsay Island], but I didn't get close to it because there were polar bear tracks close by — around it. It was in the den, but it had come out. We got to it just as it had exited its den, and it got into rough ice. I saw it, all right. When we camped there overnight, it had just recently come out of its den.

PIN 119, ULUKHAKTOK, Translation

Her father told her of seeing dens in the coastal zone around Cape Ptarmigan. The time period of his sightings is probably the 1930s.

Her father used to tell stories of going down towards the coastal point where those high hills are, and there used to be lots of snow there.... Her father would go look for dens by walking along with dogs, way back then... It's not exactly in that place called Pinggulahait [Cape Ptarmigan], but there are hills where there can be lots of snow. They'd use a sniffing dog to find them. So, it's around this area.

PIN 119, ULUKHAKTOK, Translation

In the Paulatuk region, TKHs reported maternity dens at House and Pearce points and Cape Lyon on the east side of Darnley Bay, Bennett Point on the west side of the bay, Johnny Green Island, Cape Parry, and Fiji and Booth islands. One Paulatuk hunter identified dens on the latter two islands where there is a "lot of snow and a lot of cliffs on the islands out here. Covers over with snow and the polar bears go in there to den.... Snow is snow, when they reach some big snow, that's when they go into den" (PIN 147, Paulatuk). Another hunter from Paulatuk also commented:

[They den] anywhere you got deep snow, Franklin Bay, mainland area, maybe, Pearce Point. Big snow.... In our area here, somewhere, I see the tracks one spring in April. Two young ones and one mother, there.... Hornaday [River], right around that area somewhere, I see tracks.

PIN 162, PAULATUK

A third Paulatuk hunter pointed to dens at Bennett Point, Cape Lyon and Fiji Island.

I've actually seen a female and two small cubs come out, explore a little bit, and I guess, go back into their den. And then I've come across dens sites where the bear and young cubs...their tracks are wandering away from the den. There's a den in that area there [Bennett Point].... And then right in Cape Lyon here. In the east side there was a den there.... And then right on Fiji Island here, the North side of Fiji.

PIN 163, PAULATUK

In the Tuktoyaktuk region, participants in both the 2010 PBTk and the 2008 Richardson, Branigan and Stirling studies identified maternity den locations all along the western shore of Franklin Bay near Smoking Hills, the mouth of Horton River and the Whale Bluffs area, Baillie Island, the west side of Cape Bathurst to Cy Peck Inlet, an isolated spot up the Mason River, the northern tip of the Nicholson Island, Cape Dalhousie, Seal Bay, Phillips Island to McKinley Bay, and Pullen and Hooper islands. Females with cubs had also been seen in numerous locations during the spring, such as the coastal zone from Atkinson Point to Hutchison Bay, strongly suggesting that they had denned along the coastal bluffs and creeks there. In addition to terrestrial locations, a female bear was reported to have denned on the leeward side of piled-up ice offshore of Ballie Island, at the mouth of Liverpool Bay.

One Tuktoyaktuk TKHs said he knew of dens in the Whale Bluffs area on the west side of Franklin Bay. *Whale Bluffs, right here, it's a high bank.... It is always a bear den right there. I caught them sliding down one time... the roughest part, anyway. I seen the mother and the cubs slide down and get out in March.... In March they come out and slide down. I caught them one time just by luck.*

PIN 26, TUKTOYAKTUK

A second hunter from the same community said that polar bears den all over Baillie Island.

When we used to be in Baillie Island, we don't travel too far, 'cause young ice is always close there. We just go to the island sometime here, 'cause [it] used to be the best for bears.... you see bears all over this area on this island. By the way, there's so much bears, Apitjak call them denning bears in this island here.... They always dig in this island. Once in a while you see holes in there. They den all over, even on this island. I see a bear one time in this creek here. As long as there is good snowbank there's a lot of denning places in this place.

PIN 23, TUKTOYAKTUK

A third Tuktoyaktuk hunter said that in recent years, female polar bears have started to den at the northern tip of Nicholson Island.

In the past nine years or so, they start coming in this area here, around the Nicholson Peninsula, up around the reindeer cabin area. They're getting more bears, and they're starting to den. Before they never come in, but now they're denning right on the side of Nicholson Island. You never see bears in that area before.... Even my father see in the summertime there, at the sandspit and everything. So they're coming more in.... I've seen the bear, seen the bear in the den there.... It was building a den, must have been.... I don't even remember what time it was, but I know I've seen bears there and dens there. I went there so many times; I'm trying to recall when I saw bears.... the last few years. And since about nine years ago, they start denning there.... Nicholson Peninsula. I think it was in first part of December, bear went in there, end of November before that and then December. Bear being around there.... They're just sitting outside, on the top of the bank by their den.

PIN 42, TUKTOYAKTUT

In the Mackenzie Bay-to-Herschel Island region, TKHs reported maternity dens on Pelly and Garry islands, inland at Coney Lake, along the Yukon North Slope near the mouth of the Blow River, from Shingle to Kay points, and along the northern coastline of Herschel Island. Cubs with or without their mothers have been encountered along the coast between Phillips Bay and Herschel Island, strongly suggesting that they den in that area. One Aklavik hunter said there are probably maternity dens on Pelly and Garry islands, given the number of female and cub tracks they see there.

There are a few bears right inside around here that you see, some mothers and cubs around, close to here. Actually, they must den around here someplace, one of these islands.... I think Pelly and Garry.... When we travel through there, you see lots of tracks with mothers and smaller bears in here.... They're going out, maybe looking for food, and then coming back. Because maybe training their young ones or something to go out, and then come back.... You don't even want to bother them. Once you see them with tracks, you just turn away, and you go different ways, because you're wasting time.... You don't want to interrupt them, to chase them around or anything.

PIN 103, AKLAVIK

A second Aklavik TKH said female polar bears den on the north side of Herschel Island, in a couple of large valleys.

I've rarely come across a polar bear den; maybe on [Herschel] island, one or two. They tend to use the north side, where there's a big ravine and a lot of the snow accumulates.... above Qikiqtaaluk there. There's one or two good-sized valleys that are in there that the snow accumulates in.

PIN 19, AKLAVIK

Fidelity to maternity den locations

Although participants in the PBTk study were not questioned directly on the matter, a couple of them spoke about female polar bears returning to the same areas to den from one year to the next.¹⁵² One of the participants was more certain of this than the other, and neither person supported their conclusions with direct observation or any other evidence. A Paulatuk hunter speculated about the matter:

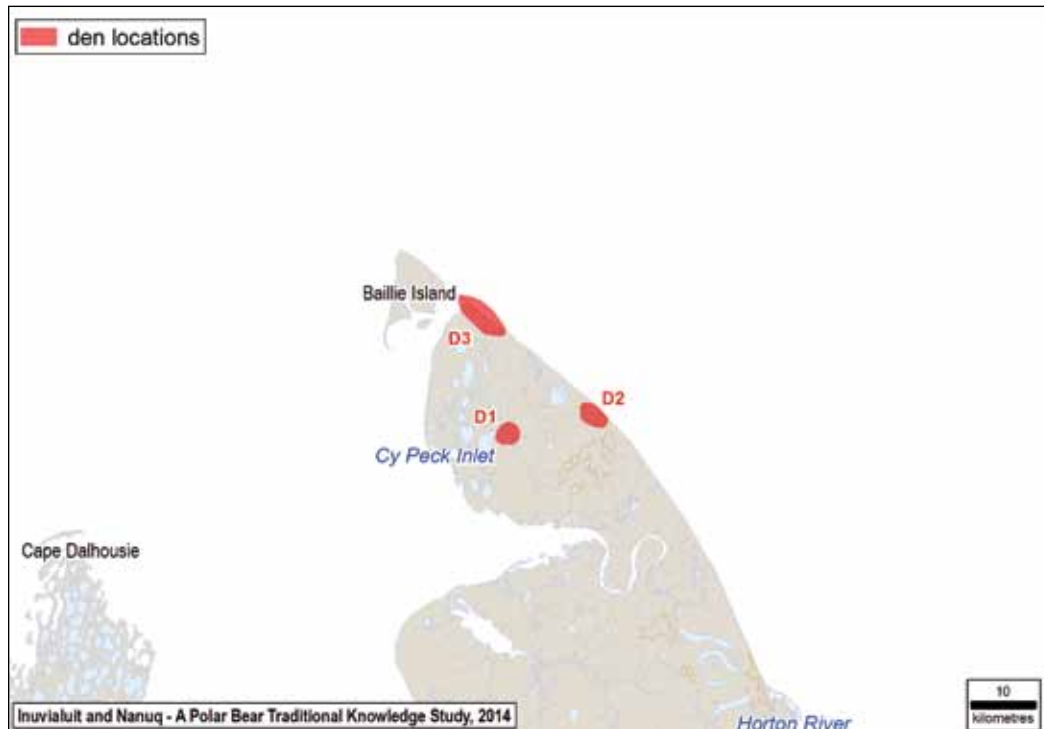
I guess they probably still use their same areas that they have denned in before.... Nobody know if they do that year-round, but I guess they probably do, because they need a certain amount of snow cover, the thickness for the denning, or for having the youngs. So location has to play a role in selecting a den site.

PIN 158, PAULATUK

One Tuktoyaktuk hunter was much more certain about den site fidelity (see Map 39).

Positive, I am really positive [that they return to the same den locations], 'cause I see this one two times [D-1 and D-2; Map 39]. Probably [the same female], 'cause they always go back.... I always seen it the same. I am not sure. Why would another bear borrow that bear's den? Probably the same one.

PIN 26, TUKTOYAKTUK

Map 39. Den locations at Cy Peck Inlet and Whale Bluffs where female polar bears return annually

Note: Bears also den at the tip of Cape Bathurst; Source: PIN 26, Tuktoyaktuk

Females with cubs when they emerge from their dens

Many of the participants in the PBTk study observed female polar bears and their cubs shortly after they left their dens, and the movements of these family groups were an important topic for Richardson, Branigan and Stirling in their 2008 study. The 2010 study asked participants to describe the directions that females and cubs travelled on the ice after denning.¹⁵³ Map 40 shows numerous locations where females and cubs were seen throughout the ISR. Locations where they were seen, and their direction of travel in the area between Hooper Island and Cape Bathurst, are shown on Map 41.

PBTk study participants had diverse observations about what female polar bears and their cubs do once they leave their dens in the late winter/spring each year. Some said the bears head directly for the floe edge, cracks, breathing holes in the landfast ice, and other locations where the mothers can hunt ringed seals. Others said the bears hang around their dens for a short time while the cubs find their feet and presumably get accustomed to their new outdoor environment. No matter what they do immediately post-denning, the priority destinations are locations where the females can secure food. They need to eat after several months of not eating while suckling cubs, and must find places to teach their young how to hunt for themselves. Denning bears are hungry when they emerge from their dens, noted this Sachs Harbour hunter.

They stay out of the den for a couple of days, then after that, the mother makes her way out onto the ice. Start hunting seals, 'cause a lot times, she won't eat anything when she in the den, so she's pretty hungry, looking for something to eat.

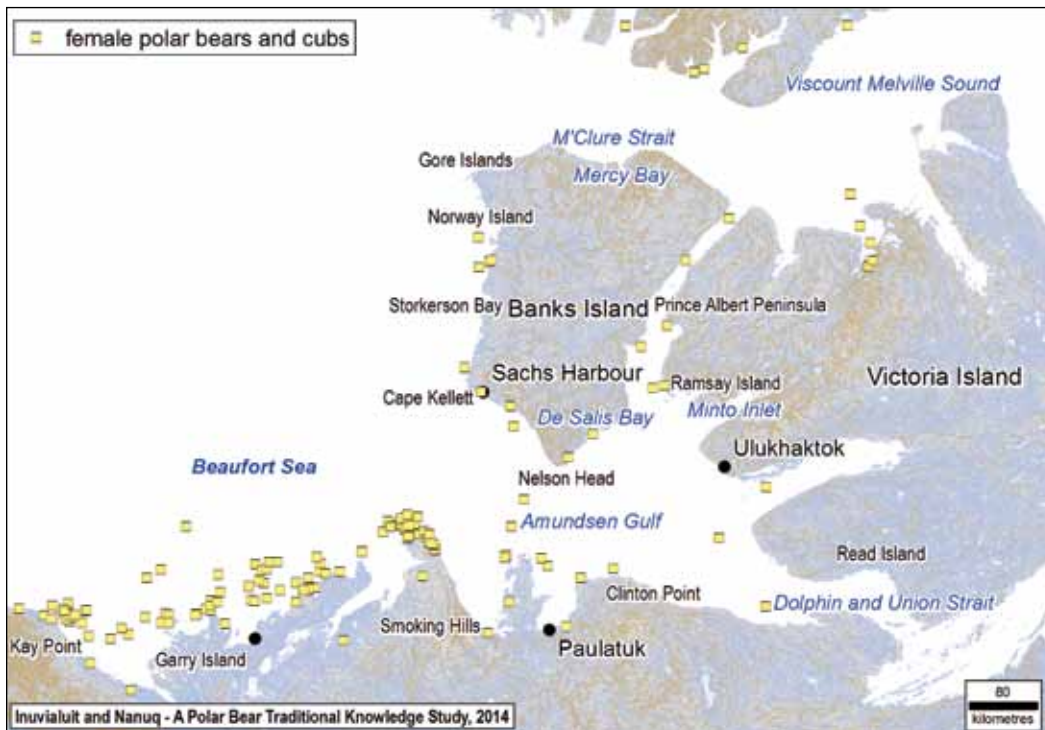
PIN 139, SACHS HARBOUR

On the west coast of Banks Island, some den locations are close to good seal hunting locations, as noted by the same hunter.

Lot of times they like to go usually on an island, like on a high snowdrift bank. So when they come out of the den in April, they could move around outside the den, usually where it's close to sea ice, too. They don't have to go very far to hunt seals when they go out.... The mother, she'll walk around and look for breathing holes under the old [landfast] ice. So, usually in springtime, they hunt in the old ice so she doesn't have to go that far, hopefully, to find seals.

PIN 139, SACHS HARBOUR

Map 40. Some locations throughout the ISR where females and cubs were seen



Another hunter from the same community indicated that the deeper snow that accumulates on the landfast ice (main ice or old ice) provides shelter for the young cubs and their mothers.

Majority of them, when they go out they're heading towards the water. That's where they could hunt, I think... And sometimes when I go down there in April, might run into a polar bear with little ones. They're hunting on the main ice, where there is snow for them to sleep or whatever.

PIN 132, SACHS HARBOUR

A Paulatuk hunter also said that females and their cubs head for seal-hunting locations on the ice.

You see young ones come out. They go towards the ice, where it got seal holes, where it got seals. I used to see quite a few tracks they make. Staying inside the snow 'til they make young ones, about April. I don't know what time in April the young ones come out.

PIN 162, PAULATUK

This Paulatuk hunter said that the Baillie Island area attracts females and cubs because of its seal abundance, and that where there are female bears in the spring there are also males (see Map 42).

This area is pretty good for females too. You see a lot of female tracks with young ones. This must be a pretty active place for seal hunting, and the current must be pretty good too around here because of the amount of seals.

[Where] there is seals, you will find the polar bears hunting... I'm not too sure, but my theory is when you see the big males going this way in April, they are looking for the females, and this area is, I guess, because of the currents... it is steady moving so you got a good supply of food down below.

PIN 158, PAULATUK

Another Paulatuk hunter said he had seen tracks heading straight out from Cape Parry towards open water in the middle of April 1999.

We see tracks coming out of the dens and we follow it for a while and you see bear walking with a little bear... They're travelling, looking for any kind of a seal hole or crack.... Anywhere out you travel, as soon as you see tracks, you see cubs following around.

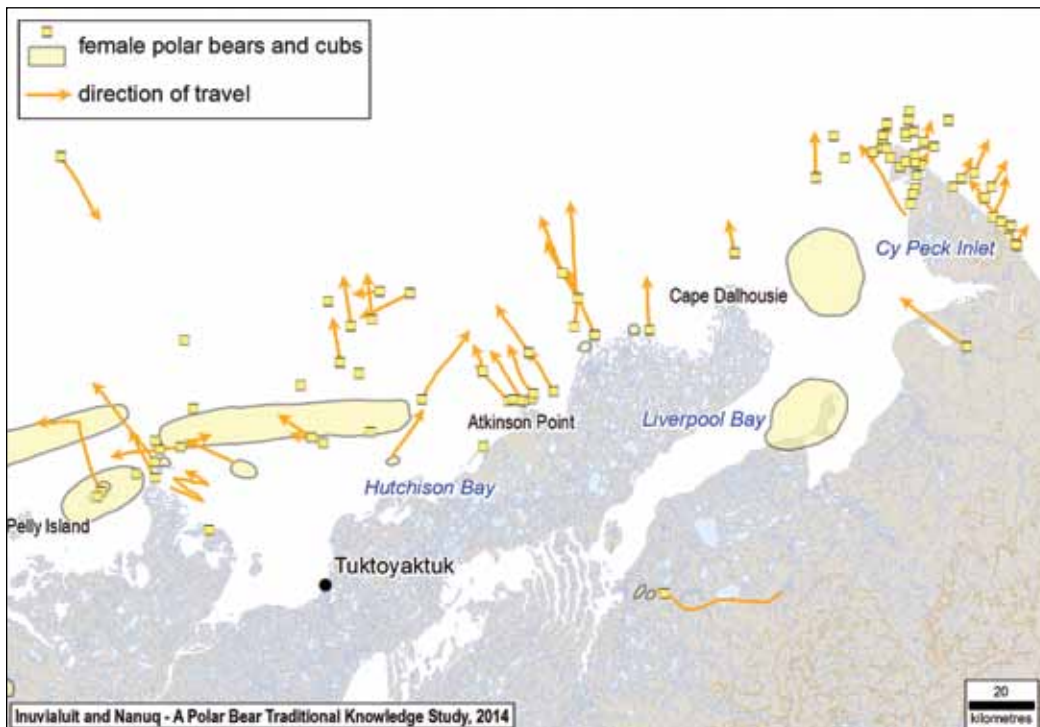
PIN 147, PAULATUK

This Tuktoyaktuk hunter said the females and cubs do not stick around on the landfast ice; they head for the floe edge (open water, moving ice) as soon as the cubs are old enough to walk such distances.

As far as I know from my experience is seeing mother bears with cubs or tracks. They're all heading into open water. They never stick around on shorefast ice. They're heading straight out there, and then they're just gone... once the cubs are old enough to travel comfortably, they keep up to their mother, the pace that mother sets based on the cubs.... I've never seen them stopping to hunt seal. They're heading out straight for moving ice. There's floating ice out there.

PIN 43, TUKTOYAKTUK

Map 41. Locations where TKHs observed female polar bears and their cubs and their direction of travel

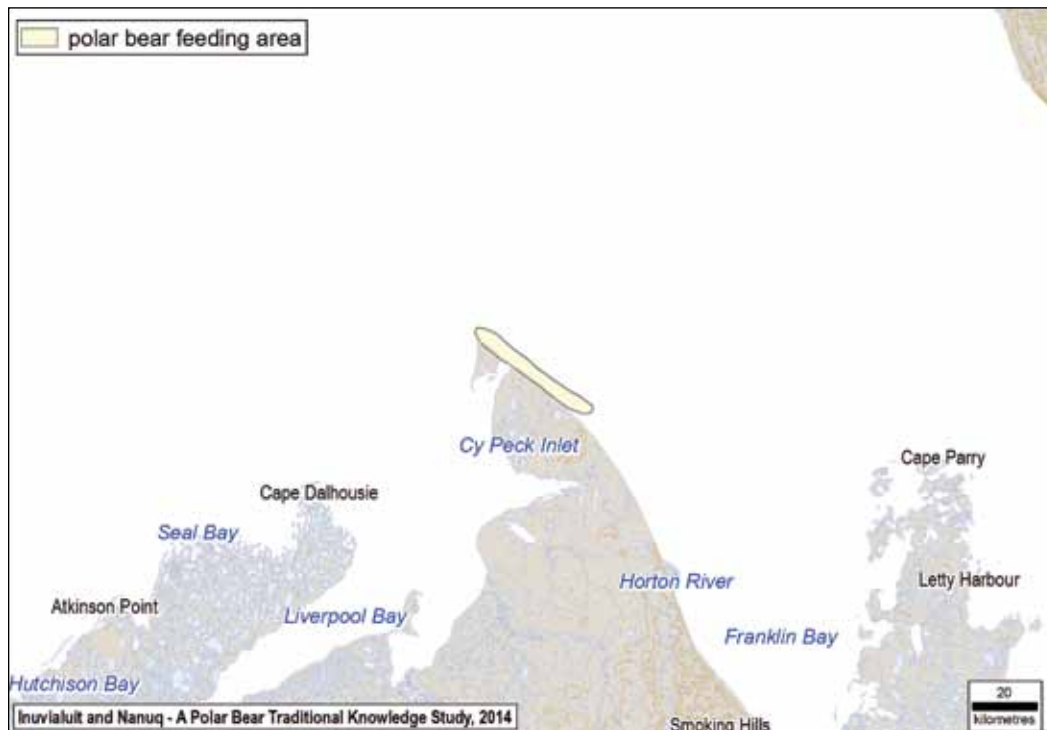


Source: Richardson, Branigan and Stirling 2008; and this study

The floe edge and open leads are where young or new ice forms and where hauled-up seals and breathing holes are found. This explains why they are high-priority destinations for the family groups that den near Tuktoyaktuk, as noted by another hunter from that community. "They go out in young ice where they could get seal and feed their little ones. That's their favourite food, I guess, the seal" (PIN 28, Tuktoyaktuk).

As noted in Section 3.5, a TKH from Ulukhaktok observed females eating grass during the immediate post-denning period in the Nelson Head area at the southern tip of Banks Island. He added that the female had “just come out of its den and it’s hungry. But in a few days when it goes out onto the ice, it will be eating good food, like seals.... The middle of April, end of April.... Along the shoreline” (PIN 126, Ulukhaktok, translation).

Map 42. Baillie Island is a good place for seals, female polar bears, and cubs in the spring



Source: PIN 158, Paulatuk

Several TKHs spoke of the patience shown by female bears as they coax their young out across the ice toward good hunting places. One Sachs Harbour TKH spent an entire day closely observing a female and cubs newly emerged from their den at the northwest corner of Banks Island. This happened a “couple of years ago when we were at the north end. We watched a mother bear all day.... If the little bear don’t go to her, she’ll go back and get him” (PIN 143, Sachs Harbour). Another TKH from the same community described how cubs are patiently chaperoned by their mothers.

Once in a while we go down there and see a mother bear coming out with a couple of cubs, when we’re out on the ice.... To me, when I watch them, they have a lot of patience. They’ll walk so far, say 300 metres ahead of their little ones. Then they’ll wait.... They’ll sit down for a little while, and after a little while, she’ll go again...from point A to point B back to point A.... They just keep doing that until they get out on the ice.

PIN 132, SACHS HARBOUR

An Inuvik-based hunter described a similar coming-and-going pattern.

At first, when their cubs are a little bigger, he train them before he goes out, and then, with his two young ones, he’ll go out, and then, he’ll go back. And they keep doing that until... Sometimes they really go quickly, but some of them, they go out of the den with their young ones and they walk for a ways, and then they go back.

PIN 2, INUVIK

Another Inuvik hunter said the family groups will “stay around the bear den for about ten days [after they emerge].... They take their young out.... Then after they get used to walking, they leave the den” (PIN 100, Inuvik). An Aklavik TKH said the females and cubs make little progress across the ice when they first emerge from their dens.

They stop and they just lay there for a while and feed their young ones.... [One person I know] say they only go about a mile a day or something when they have really small young ones. They don't go very far away. They just go about a mile, maybe...and then stay there for a day or two and feed their young ones. And then they just sit there until their young ones are old and they go again. But the cubs are really small, like a small little dog, maybe about two or three feet off the ground.

PIN 13, AKLAVIK

Cubs after they leave their mothers

Young polar bears are “orphaned” by their mothers once she mates and/or gets pregnant again in the spring. The young cubs are chased away by their mothers when they get to be about six or seven feet in size, at which point they must fend for themselves. A Paulatuk TKH had this to say:

towards the end of March when the mothers get in the heat, that's when you see a lot of these orphan ones out here.... End of March, you would see more orphans, the six-, seven-footers out here.

PIN 158, PAULATUK

The young cubs are like teenage humans who get kicked out of the house once they reach 18 or 19 years of age, said another Paulatuk TKH.

Most [cubs] I ever saw was two.... Never see too much change in that.... Mother chases them away when they get to about six foot, just like humans, when daughter turns 18–19 they are gone.... They just roam all over, I guess [after their mothers chase them away].

PIN 147, PAULATUK

Abandoned youngsters stay close to their denning mothers, hunting at seal holes in the landfast ice throughout the winter. A Tuktoyaktuk hunter said he observed such behaviour near Pullen Island.

I notice in my time, if the mother bear is under the snowbank at this west end, the two cubs are always circling the whole winter not far from that area. They go round and round. They always meet. I could see the tracks 'cause there is one den always at the west end here.... Pullen, and the two young cubs, they're six-, seven-footers. They're always wandering around not far from the island sometimes...until their mother comes out.... all winter, they never get very far; just wandering around [during the] months of the December, February, March.... You could see six-, seven-footers; they prefer digging out seal holes in the main ice.... It's easier for them to get a seal on the main ice, I think.

PIN 33, TUKTOYAKTUK

A Sach Harbour TKH shared the same observation; the abandoned cubs stick close to their denning mothers throughout the winter.

Most of the ones I've seen, ones that just left their mother, they'll stick around the area where their mother left them. They're, say, ten kilometres inside that area. They'll hunt and hunt. They're constantly looking for their mother, 'cause they are not used to being out. Just like your kids sent to school, and [they] keep thinking that their parents are [still around], that sort of thing, but eventually they'll go out in there with the ice.

PIN 132, SACHS HARBOUR

The sibling cubs will continue to hunt together for some time after leaving their mother, but eventually they separate.

[T]hey have been taught by their mother to hunt, and basically what the mother has showed those cubs, those cubs are going to do the same thing in their search for food.... Free to roam. I would say after a female had two

cubs, and those two cubs were weaned from the mother, those two cubs are probably going to stick together again for at least a year, maybe two, and they will hunt in pairs.... And then probably at the age of about five–six [years], that's when they'll start pretty much going out on their own. They start to mature more.

PIN 44, TUKTOYAKTUK

3.10 Causes of death

Polar bears die for a number of reasons, according to the TKHs interviewed for the PBTK study. They die accidentally when hunting seals; males kill other males, females and cubs during the mating season or when they are extremely hungry; occasionally, cubs and mothers die in their dens when roofs collapse; and some are killed by grizzly bears. A few die for unusual reasons, discussed below. Male polar bears killing cubs and/or their mothers, and bears killing other bears and then eating the dead ones is discussed in Section 3.6.

Perhaps the most common causes of death, other than by being shot by a hunter, are sickness and old age, when polar bears are simply too slow and feeble to hunt seals. When asked how polar bears die, apart from being killed by hunters, an Ulukhaktok TKH replied:

Old age, heart attack — I don't know; old age probably.... My dad... said he used to find a dead bear. He figured he died of old age. It was in poor shape. Yeah, not good shape, so probably old age. But the animals that die by themselves, we're not allowed to touch them.... so he didn't bother with it. Like he was telling me, "Any animal you see laying on the ground that's got no blood or anything, don't touch it, any animal." So, I tried to follow it, what his instructions are.... He figured it might not be an animal. Like, long ago, they used to believe in... shaman's there, whatever you call them. So he said, "Don't touch it. Just leave it alone. It might be an animal, but it might not be an animal, so just leave it alone."

PIN 117, ULUKHAKTOK

Another TKH from Ulukhaktok spoke of elders warning not to touch polar bears that had died for no apparent reason. He found two dead polar bears: one on the ice at Wynniatt Bay during the winter in the 1970s that had probably been killed by a grizzly bear; and another just south of De Salis Bay on Banks Island in the 1940s. The latter bear was skinny, but showed no obvious cause of death.¹⁵⁴

I have seen one that died on its own. No: two. Shoreline, they were sick. Foxes were eating on them. Way back then, when I just started hunting polar bear, that is what I seen.... But I didn't touch them, because my grand-father had talked to me about [how] I shouldn't touch them because they are sick; they have sickness in them. The foxes have been eating them, and they spoil them.... I don't know why it's sick. Any kind of animals it's sick, I know that. Any kind of animals just dies. Even caribou is like that. They die, any kind of animal, even seals.... Elders have talked about them, and also this sport hunter in Cambridge Bay has talked about that. He found a dead bear in Hadley Bay area. But our grandfathers and elders have taught us, and told us, not to touch them, ones that died on their own. We are just to watch and look at [them].... Wynniatt Bay, I saw one down there.... around '70.... I don't know why he died. It must be grizzly bears.... But this one around here [De Salis Bay], I know there's no grizzlies around here. He's sick.... It looked skinny.

PIN 126, ULUKHAKTOK, Translation

An Aklavik elder with experience on Victoria Island said they never find polar bears that have died of old age, but reasoned this must be a cause of death, by analogy with humans.

Victoria Island — lots of people hunt there. You never see bear die of old age or anything like that. They never talk about it. They must die of old age, too, just like any animals, or human beings. We die of old age. Can't hunt anymore. But there's all those other animals eat you up right away, too. No more evidence.

PIN 17, AKLAVIK

A Sachs Harbour hunter remembered a smaller bear that died one May in the 1970s, but he was not sure of the cause. Perhaps the bear had “overheated.”

I've heard of some sick ones in the past. Remember that one that came to town and those guys were chasing it, and it just dropped dead? This was when I was still in school.... So something was wrong.... Might have overheated or something.... '70s for sure, 'cause I was still in school when it happened.

PIN 135, SACHS HARBOUR

Starvation was cited by the PBTK study participants as another cause of death. For example, an Inuvik-based hunter once found a smaller (“medium” sized) bear close to Nelson Head in the 1960s that had suffered starvation and had curled up to die. “Only once in a while I seen when a bear gets so weak, not a big one, a small one, they curl up and we find them frozen, because they starve.... I never see that for a while. When there's lots of seals, there's no problem” (PIN 2, Inuvik). The same hunter attributed the starvation of these young bears to lack of hunting ability. In his words, “I've seen smaller bears, they starve when their mother don't look after them. They die, too.... Towards spring I seen that, late spring. Because he's all alone, and he don't know how to hunt. And some of them die” (PIN 2, Inuvik). A Tuktoyaktuk TKH said his brother-in-law found a dead polar bear cub up in the Smoke River area. “A dead cub, yeah. Probably just died from hunger, I guess, but it wasn't that bad of shape. The pelt was really good shape.... It was dog-sized after the first year” (PIN 42, Tuktoyaktuk). Another young polar bear was found dead at Herschel Island in the early 1990s, according to this Aklavik TKH.

I was working on the island [Herschel], and right at this Osborne Point here, one of the rafters that came in there reported a dead polar bear. So we went over there and had a look at it, took pictures, took some hair samples and whatnot, and sent it in. This was a young bear that just starved, from looking at the conditions.... That would have been...early '90s.... He was already dead and washed up along the shore.

PIN 19, AKLAVIK

TKHs reported male polar bears killing other males, but it is not always clear if their behaviour was related to mating competition, starvation or some other reason. For example, a Sachs Harbour hunter found a dead polar bear near Siksik on the west coast of Banks Island in April in the mid-1980s. Its remains were partially eaten by foxes. “We kind of think that was killed by a bigger male.... It wasn't very big; I would think a year and a half old. I kind of think that when we used to trap in them days, that kind of thing might have been in the wrong place at the wrong time, that's why” (PIN 132, Sachs Harbour).

Polar bears sometimes have accidents while hunting seals, but this cause of death appears to be infrequent. One example is a bear that got his head stuck in a bearded seal's breathing hole.

I've heard this story one time from my dad, that one of the elders long ago, he got a polar bear. Not only that, he got a bearded seal too. That bear it was frozed into the ice; his head was frozed into the ice. And my dad, he started chopping around the head, and then next thing, he started seeing a seal. The bear been biting, and somehow jammed inside it. The bear he couldn't pull his head out of that hole, and that's how he died, along with that seal.

PIN 27, TUKTOYAKTUK

Bearded seals are strong and powerful, like polar bears. In this case, a bearded seal managed to escape predation, but subsequently died of its wounds.

A big bear stalked a bearded seal, and the big bear got its jaws into the bearded seal, close to the head or somewhere around there, but the bearded seal was stronger than the big bear, and while they were fighting the bearded seal twisted in a certain way and snapped the bear's neck. So, the bearded seal eventually died from its wounds on the sea ice, right by the hole — seal hole — and that polar bear had a broken neck. That's with the bearded seal.

PIN 120, ULUKHAKTOK, Translation

In very rare cases, cubs and their mothers die when the roof of their den collapses and they suffocate under the snow. A Sachs Harbour hunter said that he had never seen bears die in this manner, but he thought it possible that they could do so. Finding such occurrences would be difficult, however, given the location of many of the dens on Banks Island that are located in deeper snow on the banks of creeks or river valleys. Spring melt would likely wash their bodies out to sea. In his words, “You’d have to be out in June to find them. Only wash away. All the snow melts and if they’re in the creeks they’ll just get washed away. You’ll never find them” (PIN 133, Sachs Harbour). Similarly, an Aklavik hunter had never witnessed collapsed dens, but he knew of one incident that occurred 25 years previously. “Douglas Irish discovered it. It kept collapsing, and then the bear and cub, they suffocated.... That would have been late ’80s” (PIN 15, Aklavik).¹⁵⁵ Accumulating snow on top of the den during prolonged periods of bad weather may lead to the den’s collapse, said this Ulukhaktok hunter. He knew such incidents occurred in the past because his elders spoke of them.

These ones are big ones, like two-year-old bears, with a mother bear, too much snow. They couldn’t breathe anymore. They died in there. You know, there were no biologists. We don’t have that kind of people a long time ago.... but they say they’re good. They’re not starved. They never starve, but they say there’s so much snow over their den, they couldn’t breathe anymore, and they died.... So, that’s what the old people telling stories, and I heard from them. I think a lot of them had that problem, I guess, all over. You know, they’re staying in the den and so much bad weather, so much snow over their den. They’re staying in there, too deep in the snow. They don’t breathe good anymore and they die. I guess a lot died like that — not a lot, but a few, anyway.

PIN 114, ULUKHAKTOK

When Arctic fox trapping was still a major economic activity on Banks Island, Inuvialuit sometimes caught polar bear cubs in their traps. The frequency of this occurrence is unknown.

The cubs, they get caught in our fox traps, and that way, they die, too.... People that trap down towards the Bernard River, they get quite a few of them.... Cubs get caught in their trap. The trap is not very big. It’s... one spring; so they get caught, and they can’t get out. You know, they’re only about that big [gestures] when they come out of their den, eh?

PIN 100, SACHS HARBOUR

An exceptionally rare polar bear death appears to have been the result of an encounter with a wolverine, an animal renowned throughout the north for its fearlessness, viciousness, strength and tenacity, despite its diminutive size. All the evidence pointed to a wolverine, according to the father of one of the Paulatuk TKHs.

My father always told me a story of a wolverine killing a bear.... He said the evidence he found was, when he found the dead bear, all he could think of was a wolverine because it had small marks in its neck in the throat area. That’s all he could figure. A small bear wouldn’t kill a big bear.

PIN 160, PAULATUK

More recently, another Paulatuk hunter witnessed a fight between a polar bear and a wolverine near Pearce Point that the wolverine finally won, having inflicted serious wounds on its adversary.

There was one year outside of Pearce Point we saw a polar bear and a wolverine going at it. We were watching it. That wolverine was just tearing the polar bear’s skin off with its claws, on its back. Every time it’d get on its back, it chewed it up. Somehow it got the polar bear in its jaw, in its mouth, and locked it, just hanging like this [gesture]. The bear was staying in one place, couldn’t move at all. Then it must have gave up and walked out. We just caught the ending of the fight.

PIN 142, PAULATUK¹⁵⁶

Another exceptionally rare death is the case of a polar bear who died of an apparent heart attack, possibly as a result of its interaction with a biologist.

The people that gave it the heart [attack], they say that polar bears are sensitive When Stirling was tagging polar bears, the elders was really against it, because they say you chase it with a helicopter, it gets nervous, and after that, he can't hunt seals anymore. When the seal is coming up from his hole, before he gets to the top, he just blows, and it's just like a whistle. And the polar bear stands at the top edge, waiting for it. When it blows, it [the bear] jumps and scares the seal away. They get jumpy, eh?... And that's what they were against. But it didn't stop Stirling. He had to do his job. But in Sachs, the day before we got there, the polar bear came around.... this was in June. And everybody went up, taking pictures. The last person that went up to take pictures, he was taking movies of it, and it stopped, and it never moved. So, the next day, they went over to it, and it had a heart attack.... [PIN 136] said, "That's a bear caught without a bullet." He just dropped.

PIN 100, SACHS HARBOUR

3.11 Male polar bear denning

Basic to Inuvialuit PBTk is the understanding that female polar bears birth and take winter refuge with their newborn cubs in maternity dens. Denning by male polar bears was less known among the Inuvialuit who were interviewed for the PBTk study, and there was some difference of opinion on the matter. Only pregnant females den, according to five TKHs interviewed for the PBTk study. When asked if male polar bears as well as females den, a Sachs Harbour TKH replied, "Just females that are pregnant" (PIN 131, Sachs Harbour). Another Sachs Harbour TKH said, "Just females. The ones having babies" (PIN 136, Sachs Harbour). An Ulukhaktok TKH said, "Just females when they've got cubs, then they do have dens" (PIN 116, Ulukhaktok). A Tuktoyaktuk hunter elaborated:

[t]he only bears that are going to den are the ones that are going to have young ones. The [male] bears don't hibernate, and the females just go in there to have their young. If you get a female bear that is not going to have cubs that year she is not going to den. She is going to wander around looking for food all year. The only time that bear is denning is when it is a female and it's going to have their young.

PIN 44, TUKTOYAKTUK

An Aklavik hunter also said, without explanation, that males do not den.

Not the males, they don't den; it's the females that look for the den in the latter part of November. The males would be out wandering.... Late November to say March; I'd say mid-March, depending on the conditions and depending on how warm it is.

PIN 19, AKLAVIK

Nonetheless, many TKHs from all six Inuvialuit communities stated that males den at certain times of the year. An Inuvik TKH said that not many males den; an Ulukhaktok TKH said they do not stay in their dens very long.

Some do, but not too many. I don't know why the male would den, but they do den.

PIN 100, INUVIK

[The males] must go in the den sometime in December/January, but they don't stay in the den very long. They come out in a few weeks.

PIN 126, ULUKHAKTOK

A Sachs Harbour hunter knew that males den because he learned of it from one or more polar bear biologists.

I get this from the scientists themselves. Males will den. And when they're denning, the males, a lot of them will, right out on the ice. And there'll be a little chunk of ice, and they'll lay down there and stay there for a while.... At least that's what they're telling us.... I'm sure it would be the older ice, because the newer ice snow doesn't stick to it too well.

PIN 135, SACHS HARBOUR

Another hunter from the same community had direct evidence of denning male polar bears.

Once in a while we run into a male bear tracks that are denning. These are not very big ones. The big ones, they'll stay out here [northeast of Storkerson Bay].... There are some on the south side of Storkerson up there, and north side again might run into a male bear track that got a den already that's in there.... where there is a lot of snow.

PIN 132, SACHS HARBOUR

A third Sachs Harbour TKH said males will “rest up” in dens just before the mating season; a TKH from Ulukhaktok said his father told him they den because they “want to sleep.”

Males den, but most are just out walking around. Sometimes a big bear, just before the mating season, will go into the land and rest up a bit.... along the coast.

PIN 138, SACHS HARBOUR

My dad said male bears den, too.... I think they just want to sleep. I don't know, but he told me even male bears hibernate. But I've never seen a male bear hibernate.

PIN 117, ULUKHAKTOK

Male polar bears may den in the fall while they are waiting for the ice to form, said one Paulatuk hunter.

The females den for the young ones. The males are waiting for the ice in the fall, so they just let themselves get buried, just waiting, waiting until the ice is good enough rather than doing nothing, walking, wasting energy.

PIN 158, PAULATUK

Several hunters, from Sachs Harbour, Tuktoyaktuk and Inuvik, explained that big male polar bears den “when they get too fat.”

I hear of one when the bear get too fat. Big males, they digging too, so they have a diet, go without eating for long time.... When they get too fat, I hear they dig down and hibernate too, big males.... on land.... along the big banks.... Frank Carpenter tell about one. Just about maybe four stories I used to hear about those big bears hibernating. That's when they get too fat. They want to lose some weight, I hear, and they hibernate for a while.

PIN 128, SACHS HARBOUR

From stories I've heard... [from] the old-timers and that, some big males will den if they're over-fat or overfed, I guess. Eating too much, sleep for a month, or probably.... I never ever saw a male bear denning, but from what I heard, they even fall asleep in the bank and get buried in snow. Next thing you know, blowing and drifting.... they're close to a big iceberg or something.... on the main ice.... solid ice. Once it's frozen it stays frozen.

PIN 42, TUKTOYAKTUK

When the males get too fat, they den to lose their fat a little bit, when they get too fat.... females, December, they gonna start going up inland and start denning. Males, middle of winter he go there for couple of months sometimes to lose the fat a little bit.... Even male bears just to lose their fat.

PIN 38, TUKTOYAKTUK

Even the big males den.... when he is fat enough, I guess.... I don't really know; it's stories I hear from my father-in-law, [who] said even the big ones den over the year. Come out, fatten up and stay in the den. Too big, lazy one, maybe.... He said they do get like that, bears; not lots of them, but maybe an odd one now and then.

PIN 26, TUKTOYAKTUK

Well, even sometimes a male, a big male bear, when he's fat lots, he's making a den, and they stay in there for a while, you know. For I don't know how long, but they stay in there — a male — and then, they go out afterwards.

PIN 2, INUVIK

Section 4

Climate change observations

Inuvialuit observations of and concerns about the effects of climate change pre-date the PBTk study by twenty or more years. Starting in late 1980s, Inuvialuit began to notice significant changes in the timing of freeze-up and break-up, shrinking multi-year ice, fewer icebergs, thinner winter sea ice, increasingly frequent and severe fall storms, more hot weather during the summer, unprecedented summer thunderstorms, the arrival of new bird species and salmon, melting permafrost, soil erosion and other environmental factors. Due to the dramatic nature of these changes, the Sachs Harbour HTC collaborated with an interdisciplinary team of researchers to document Inuvialuit knowledge of climate change effects and integrate this with scientific research. The results were presented in a series of field trip reports, a final report and a video production (Ashford and Castleden 2001; IISD 2000; see also Jolly et al. 2002).¹⁵⁷ The voices of the Sachs Harbour elders and other community members joined a chorus of indigenous voices — Yupik, Inupiaq, Inupiat, Inuit, Greenlandic Inuit — sounding their observations and concerns about a warming Arctic (Krupnik, Apangalook and Paul Apangalook 2010: 82; Krupnik et al. 2010; see also Government of Nunavut 2005).

Given that polar bears and sea ice are inseparable, it was impossible for the participants in the PBTk study to talk about polar bear harvesting activities and observations of the bears without also sharing observations about climate change. Furthermore, although the study's primary focus was on polar bears, not climate, several interview questions directed attention to climate change issues, such as "How does the weather affect the ice that bears use?" "If the weather has changed, how have bears been affected?" and "If the ice has changed, how have the bears been affected?" Climate change observations collected during the PBTk study complement those documented 10–11 years previously in the context of the

Sachs Harbour HTC's collaborative research project, and extend the geographic range of the observations to the harvest areas of all six Inuvialuit communities. The following section summarizes these observations, particularly as they pertain to polar bears and their habitat; they are supported by numerous narratives from the TKHs themselves.

4.1 Changing sea ice and weather conditions

Virtually all the TKHs from all the Inuvialuit communities interviewed for this study spoke of profound changes in climate and sea ice conditions starting in the late 1980s. As noted in Section 2, these changes have negatively affected Inuvialuit travel and harvesting activities on sea ice. Floe edges and areas of open leads that were once fairly predictable and occurred in more or less the same places from one year to the next have changed or else cannot be reached on snowmobile due to excessive rubbing of the ice. Observations concerning changing sea ice and weather conditions and other climate change effects were documented in the context of the PBTk study:

- Freeze-up occurs a month later than it did previously;
- Break-up occurs a month earlier;
- Inuvialuit in Sachs Harbour used to experience minus-fifty-degree temperatures in December, which was excellent for ice formation. Such low temperatures are now rare;
- Ice is thinner, and wind and currents can easily break it up and rubble it;
- Ice does not ground on shoal areas the way it used to because it is thinner; (grounded ice stabilizes larger ice formations preventing winds and currents from breaking it up and producing rubble);
- There have been significant reductions in multi-year ice in many parts of the Beaufort Sea region;
- Floe edges are closer to shore;
- Pressure ridges that used to form predictably in the same location from one year to the next are no longer there;
- There is more open water than ever before. It is no longer possible to travel straight out on the ice from Ulukhaktok towards Nelson Head because of open water and/or unsafe ice conditions. Similarly, people can no longer travel any great distance north of Cape Parry towards Nelson Head or from Ulukhaktok south toward Clinton Point on the mainland; and
- Winds shift unpredictably across a number of directions, where prevailing winds used to persist for many days. In addition, wind velocities have increased noticeably, according to hunters from Aklavik, Paulatuk and Ulukhaktok.

A hunter from Ulukhaktok summarized many of the climate changes he had observed over the previous twenty years. He noted that formerly, when it was extremely cold, the steamy breath ("smoke") of dog teams and fellow travelers obscured those following along behind while moving across the ice. This phenomenon no longer occurs, due to warmer winter temperatures.

We start to have open water problems probably about mid-'80s, I guess.... When we started to have problems with the open water or ice conditions not freezing anymore, [it was] not every year for a while. Now it's every year. It doesn't freeze anymore out there.... It's a weather problem. So much wind, not cold enough, so much mild weather, winter like this. Some places used to be [more than] sixty below. [Now] weather are almost going to zero degrees. Yellowknife, it's supposed to be over minus sixty this time of year. Yesterday, it was only minus six. I couldn't believe it. Right here a long time ago, when the weather get real cold, when you're travelling, you can't see the person travelling behind you, about probably 25 yards. Smoke in between us, right there, from the cold weather. From your breathing and dogs breathing, when you're travelling, so much smoke coming out of the dogs on the trail [that] you can't see your partner travelling behind you or in front of you, 25 yards to 50 yards. Now,

we don't get that kind of weather no more; and it used to be good weather, no wind for a long time. Sometimes 32 weeks, no wind. Right now, the windy days, bad weather days, way more than the good weather. It's very different today. That's why we don't have ice anymore out here.

PIN 114, ULUKHAKTOK

An Inuvik participant who spent many years on Banks Island talked about the 1950s, when there was still enough sea ice in the bay in front of Sachs Harbour on July 1 to have dog-team races; multi-year ice would drift into the shallow shore areas, and huge “icebergs” would ground there as well. Some years, sea ice stuck around all summer. Winter temperatures were extremely cold, unlike today.

Wintertime, it's really cold on Banks Island.... One of the guys down here, he's got a thermometer. He went out to look at it — gone, busted. It goes to [minus] sixty, and then, past it, it busts. Really cold!.... it's really warm here [Inuvik]. But now it's getting the same thing; it's pretty warm in Sachs now.

PIN 2, INUVIK

Until the 1980s, Beaufort Sea ice used to freeze at least seven feet (two metres) thick, and stay solid well into the spring.

My uncle [said], long ago, there used to be thick ice. It was seven feet, something like that; and every year, it used to be frozen good. But right now... it don't freeze like that.

PIN 122, ULUKHAKTOK

When I first [started] hunting you'd have solid ice pretty well right 'til the first week of May. Until middle of May would be good. The ice was so thick then, not very long ago. Now the ice doesn't get that thick anymore.

PIN 144, PAULATUK

A hunter from Ulukhaktok noted that strong wind and current were always capable of breaking up and rubbing the ice, even thick ice.

Sometimes, even though the ice gets really thin or really thick, just by the currents alone, and the winds, once it breaks, it still goes piling on top of the ice and gets really, really high.... For instance, if you want to go by calendar, like last year, it was January when it sort of really piled up out here. Even though the ice was thick.... With the currents and the wind, as soon as it started breaking, it just piled really high.... That's the way the ice is, and that's the way it always will be.

PIN 120, ULUKHAKTOK, translation

The problem now is that the ice is thinner and more easily disturbed by wind and currents.¹⁵⁸ It breaks, is frozen together again by the cold, and then re-broken repeatedly, producing a heavily rubbed surface that is difficult for hunters to travel across.

The ice would freeze and break up and freeze as solid with a lot of rough ice after that. And that ice that's freezes over for a couple of days and breaks up again, piles up and refreezes, it just keeps doing that, and that's why I know the ice is not too solid.

PIN 144, PAULATUK

Many TKHs spoke of the effects of thin ice on harvesting. For example, a hunter from Sachs Harbour said that even light winds can cause the ice to break off the landfast ice, taking hunters with it.

Even when it's frozen nowadays, you can't go out far, because you just need a little bit of wind, it will break off. When I got drifted out just outside of Mary Sachs that one year, there was no wind in the morning, and I was actually travelling close to young ice.... I was going from Mary Sachs... heading out, and then a bit of breeze came up, so I headed back. By the time I headed back, it had already opened.... And it didn't open just at the lead; there was a place where I had been glassing from.... It actually broke that piece of ice where you think it would be solid.... It wasn't even strong wind.

PIN 135, SACHS HARBOUR

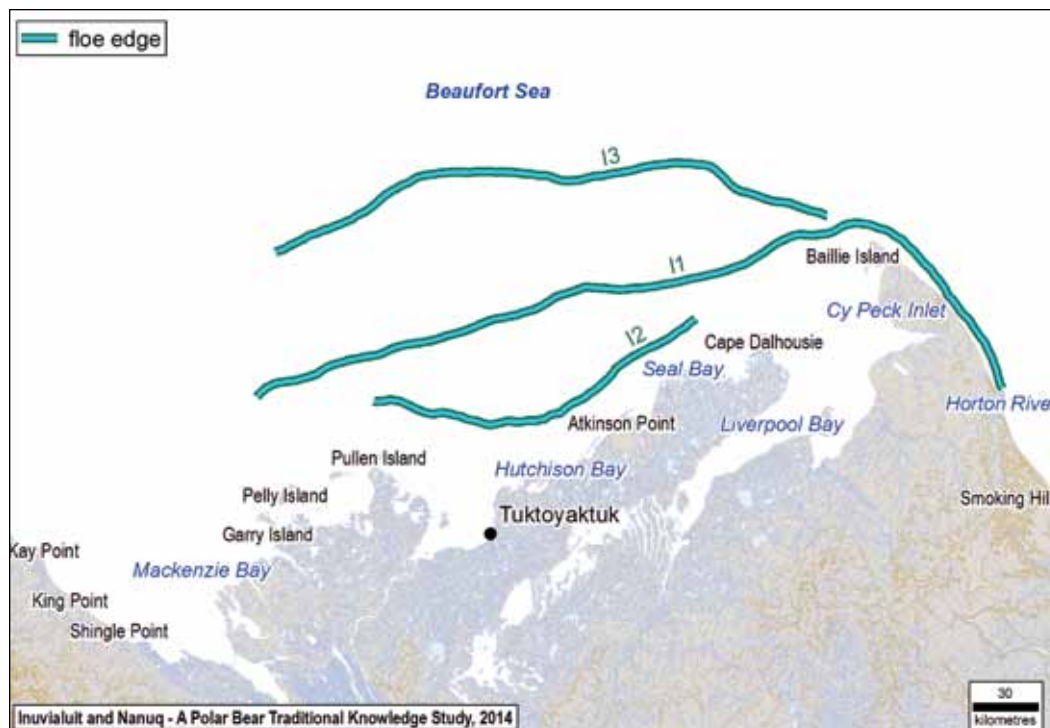
In addition to more rubble ice, hunters noted a shift in the location of the floe edge closer towards the coast. Since the mid-1980s, no one has been able to travel and hunt polar bears as far offshore as they had previously. Ice conditions and the location of the floe edge continue to vary widely each year, but the overall trend in location is closer to the shore, as noted by this Tuktoyaktuk hunter (see Map 43).

Sometimes we went as far as sixty miles out here in certain ice conditions, like when it used to be no climate problem [Map 43: I3]. Sometimes it freezes up really good way out there and there's no movement on the ice. And to get to the floe ice, sometimes we reach forty or sixty miles offshore. Usually it's only about twenty, forty miles, but sometimes it goes to sixty miles.... Nothing really changed climatically until the year '86; that's when [there was] a drastic change in the climate, and it's been escalating ever since. You could hang your hat on traditional knowledge right up until '86, and then from there we started questioning it because it's not following the normal [pattern]... because of the uncertainty of the ice conditions.¹⁵⁹ For instance.... the floe edge this winter was very close [I2], only about 12 miles from the shoreline.... That was the worst I've ever seen the ice conditions. The thickness of it was unbelievable.... Just in there where the floe edge [was] it was only about three and a half [feet]. It should have been about six to eight feet thick, not three and a half. You can see this just by the seal holes.

PIN 43, TUKTOYAKTUK

The hunter had only been that far out on the ice once in his life, and that was in the late 1970s, when unusually stable ice conditions permitted long-distance ice travel. At sixty miles (97 km) out, they were well beyond sight of land and even an oil exploration rig in McKinley Bay. The ice had numerous cracks in it, but they were not opening up.¹⁶⁰

Map 43. Changes in floe edge locations



Source: PIN 43, Tuktoyaktuk; Note: I1 (pre-1986) to I2 (2010); I3 was a one-time hunt in the late 1970s.

According to an Ulukhaktok hunter, open leads take much longer to freeze enough to permit safe passage than they did twenty years previously. It was once possible to cross them after only several hours of waiting. Now, people can wait days for leads to freeze solid.

Last couple of years... it freeze, but it couldn't get hard; it couldn't get thick. It has been really slushy. When it used to freeze long ago, it used to freeze without getting slushy. It used to be like [knocks on table], hard. It gets frozen solid.... It used to freeze and the next day, you could walk on it. But right now, you have to take how many days in order to wait for it to freeze pretty good? One time, I was out bear hunting and it opened up at night. I had a spear; I was looking for seals.... I was using dogs. I travelled on it for seven hours by the edge, following it, because it was opened up, and we couldn't get to the other side. We followed it for seven hours. After seven hours, I tried it again. My spear can't go through. It was so cold, even [though] it was late March. That's when it was still cold.... I tied a long rope to the leader [lead dog], and then walked our sleds across so we don't have so much weight on the sleds.... And it was maybe about 25 yards wide. So, it used to freeze up pretty quick. My dad always said when he used to hunt bear, he used to wait for it to freeze, because it could get frozen right away; and no matter if the ice is moving, they used to travel on it, 'cause it used to be safer than lake [ice].

PIN 117, ULUKHAKTOK

Polar bears have been seen walking the shore at Pearce Point in October–November, seemingly waiting for the ocean to freeze, but the wind delays the freezing process, according to a Paulatuk hunter.

There is so much open water; little bit of wind already opens the ice. I think global warming is here now; it is supposed to be here last year and this year looks little more scary on ice now.... You might see the odd one [polar bear] walking on the beach here, trying to wait for ice to get thickened. They walk around and wait.... Right here on this point [Pearce Point] maybe one or two.... I just leave them alone, 'cause they are waiting for the ice to form.... I was out a week and a half ago, and there was so much open water out there, along the beach here.

PIN 142, PAULATUK

The same hunter wondered if a regularly occurring lead had formed across the mouth of Darnley Bay (Map 44), because warm weather had kept the area ice-free (open) that year far later than previously.

I do not know about this year. There was so much water, this whole area has a lot, even out here, and Tuk[toyaktuk], they have water.... It is just sitting there, and whenever [you] get minus 30, that's when everything will start freezing. But if we have too much warm weather, it will stay open for quite a while.

PIN 142, PAULATUK

Ulukhaktok hunters used to be able to travel and harvest polar bears far out on the ice, for example, towards Nelson Head on Banks Island. However, commencing in the late 1990s, winter ice to the west of the community started to break up, rubble and open.

In the '80s, '90s, we used this for polar bear hunting wintertime, because it used to have really good ice.... We used to go from Holman straight to Nelson Head.... straight across; even in the '90s.... Maybe '99, some place around there, it started opening, breaking up, and we started to have trouble.

PIN 117, ULUKHAKTOK

This TKH has observed the same changes in the ice elsewhere on the Beaufort Sea when flying to Inuvik.

The ice is starting to break up and going back and forth and getting rough and all that.... Before that, it used to freeze, and then get solid. It never really opened wide and break up... But now the ice keep going back and forth, opening up and closing, opening up, and closing.... That's how come even when you're flying, you could see it when you're going to [Inuvik].... it's pretty rough and all broken ice all over.... So, there's a big change there.

PIN 117, ULUKHAKTOK

Changing ice conditions have had a negative effect on his polar bear harvesting, a point made by other hunters in Section 2. A pressure ridge that used to form predictably on an annual basis and that was excellent for polar bear hunting has simply disappeared (Map 45).

If there's really good ice, if there's pressure ridges, that's where they're [polar bears] going to stay.... We used to have a good pressure ridge going across to Clinton Point.... That's straight from Holman [Ulukhaktok] to Clinton Point.... That pressure ridge, no matter how many times we used it when we were polar bear [sport hunting], and also hunting just for ourselves, even though there was lots of dog team trails, the smell of the dog team trails didn't bother the bears, because it was good hunting. The ice was good, and the pressure ridge was good, and there were a lot of seals in there from that one pressure ridge.... We got three bears from there from the polar bear sport hunters. And after the polar bear sport hunters were done, we went back there, and we got our own bears.... That was in '87-'88, someplace around there.... Nobody harvests here anymore [because] it keeps opening.¹⁶¹

PIN 117, ULUKHAKTOK

Map 44. An open lead across the mouth of Darnley Bay

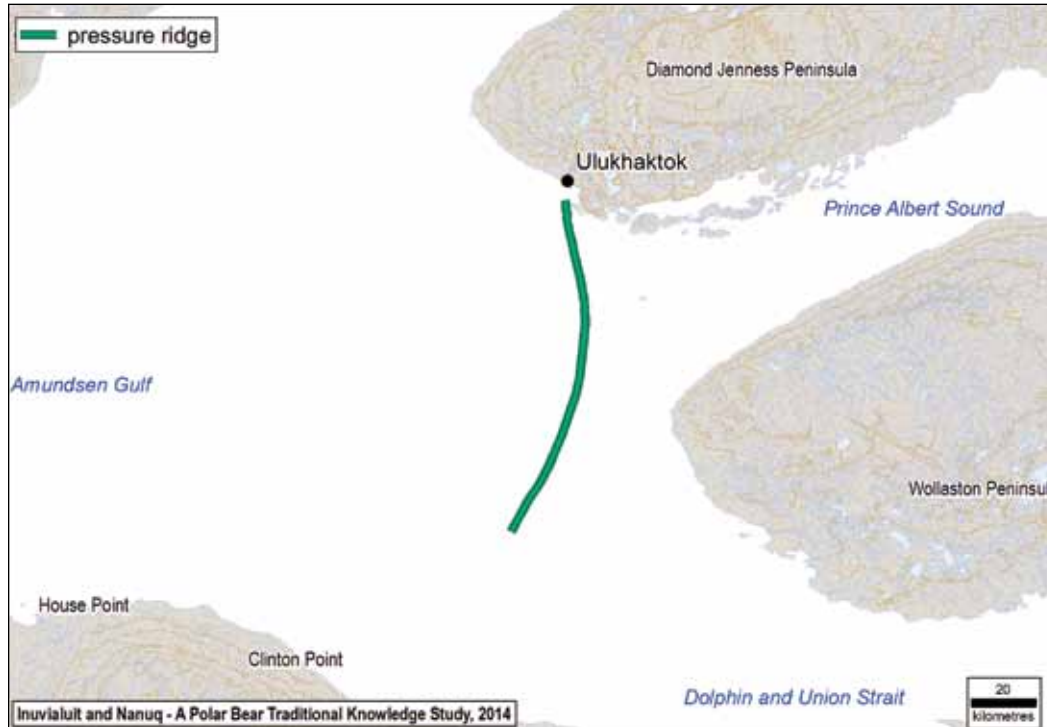


Source: PIN 142, Paulatuk

Several TKHs noted the disappearance of large pile-ups or conglomerations of ice; these are referred to as icebergs throughout most of the ISR.¹⁶² This is significant, because in the past, icebergs played a crucial role in anchoring or stabilizing newly formed young ice, especially when they grounded in shoal areas closer to shore.¹⁶³ When icebergs floated into the bays and lasted the duration of the summer, they facilitated freeze-up there each fall. A hunter from Paulatuk explains:

We used to have this old ice in here a lot [Darnley Bay]; that real old thick ice. Now you don't even see it anymore. So that changed from what we could see from years back to now. We don't even have that thick ice here anymore. We used to have icebergs all along in here. Now there's nothing. Used to have them right through the whole year, locked in.... Used to be quite a bit of them, lots of big icebergs here.... Our ice used to freeze good.... as long as you had the big icebergs around hanging around in August, September.... That's when our ice freeze really good in here. And when we don't have it now, it's really hard to freeze, because that wind moves everything everywhere and blows it out.

PIN 145, PAULATUK.

Map 45. Former location of a pressure ridge that was good for polar bear hunting

Source: PIN 117, Ulukhaktok

An Inuvik elder said that when they used to cross back and forth between Banks Island and the mainland, they would see large icebergs blackened by mud and sand as a result of being stuck close to shore or grounded on shoal areas. They no longer encounter this type of ice.

Big change, less ice and lots of water. In fact, you don't see no black icebergs anymore. When we used to go to Banks Land with a boat, some years, them big, black icebergs, they're flat and black with mud, some of them are huge, long ice. I'd say they'd be about a quarter of a mile long. Some of them are high. You don't see those at all anymore. You just see those flat, year-old ice, that's all.... Old ice; they've been around where there are lots of sandstorms. They've been close to shore and they've got drifted out.... And you could tell when the sand gets on the ice, it would melt away fast.... and now you don't see that, because it's warmer.

PIN 100, INUVIK

When speaking in English, the TKHs interviewed for this study used two terms — “multi-year” and “old” — to refer to sea ice that had survived the summer melt. They distinguished this from “young” or “new” ice that forms in a single winter between freeze-up and break-up each year. With climate change, there is no more multi-year ice anywhere in the southern Beaufort Sea areas along the coast of the Yukon and Northwest Territories, nor in Amundsen Gulf off the coast of Ulukhaktok. The old multi-year ice is far offshore of Banks Island and can no longer be reached by snowmobile. Multi-year ice can still be found, however, in the Prince of Wales Strait, Wyniatt Bay, and the M'Clure Strait area between Banks and Melville islands. Like grounded ice, thick multi-year ice has a stabilizing effect on thinner, first-year ice that prevents it from being rubbled by winds and currents. Multi-year ice also has a calming effect on ocean swells, which reduces breakage and rubbling of the ice. Several hunters discussed the role that multi-year ice once played in “gluing” the new ice together and making it safe to travel far out from Cape Parry on the mainland towards Nelson Head, 80 miles (130 km) away.

A Paulatuk hunter said the sea ice offshore was still very thick until the early 1980s.

[Hunters could] go out from Cape Parry, you could travel around Nelson Head. Because them years, lots of old ice, and the old ice kind of keeps everything together. Without the old ice, it is not glued together. It's without the old ice, just a flat thing, and any current and wind can shift the ice.... even from Pearce Point I'd see Nelson Head... out on the ice out here.

PIN 158, PAULATUK

Multi-year ice not only held the young ice together, it also provided a stable platform for camping, especially when it grounded in shoal areas. It had disappeared from the coastal area north of Tuktoyaktuk by about 2000, according to this hunter from the community.

I think the thing that really changed is the ice conditions. Up until about ten years ago we could camp out there on multi-year ice, and you could recognize multi-year ice when you travelled on the ice quite a bit. You could recognize what's a good place to camp and what's grounded. Usually multi-year ice don't move; it's a good place to camp. But I last saw multi-year ice maybe ten years ago, and I haven't gone every year. After that, I haven't seen any, nothing.

PIN 161, TUKTOYAKTUK

Formerly, when the boating season started after break-up, the presence of offshore ice dampened ocean swells and waves. Now, the absence of this ice, combined with more wind, has created problems for Inuvialuit, who rely on small speedboats to travel to their camps and conduct their harvesting activities. This point was made by an Ulukhaktok hunter: "Lot of times it is too rough to go out in the boat now; lot of wind. There is no more ice to keep the waves down, so we don't travel that much anymore" (PIN 115, Ulukhaktok). The boating safety issue was also raised by participants in the Sachs Harbour-IISD collaborative study on climate change: "[t]he lack of sea ice in the area was identified as having the ... effect [of] — fewer seals in the area, rougher waters, dangerous boating conditions, and increased risk to the hunters. Under these conditions, hunters are limited to the nearshore area, effectively limiting the hunt" (Jolly et al. 2002: 111).

4

4.2 Freeze-up and break-up

There is clearly a direct relationship between the timing of freeze-up and break-up each year, warmer winter temperatures, stronger winds and the drastically changed ice conditions just described. TKHs said that there is still much variability in freeze-up and break-up timing, but in general it has changed greatly compared to when they were younger. Even after freeze-up starts, warm conditions and winds may open up the ice again. When the ice finally does form, it does not thicken fast enough to permit safe travel until later in the winter, as explained by this hunter from Ulukhaktok.

In the '80s, '90s, we used to have freezing in October. Almost the end of September, we used to have freezing. In October, we used to start driving to Mashoyak [Victoria Island], but right now, it really opens/freezes, but it doesn't get hard anymore.... That's how come it keeps opening, and it doesn't get thick anymore. The ice, when it freezes, it doesn't get thick really quick anymore. It's not strong enough.... But right now, ice starts breaking up April, May. Last year, it broke up May–June, and it stayed until August almost. There was still some ice around here.

PIN 117, ULUKHAKTOK

Another hunter from the same community said that break-up occurs far faster than in the 1940s and 1950s, when he could still travel across the ice with his dog team in July. In those days, there would have been, at the most, two months of open water in the vicinity of Ulukhaktok.

Nowadays, it's totally different. This year, it was, what, November–December it started freezing up?... And the break-up is quicker now, sudden.... It's not gradually anymore. It's just quick.... When he was a young guy, using

his dogs to go out hunting, he'd still be travelling out on the ice in July. Now he can't do that anymore.... The ice hold a lot longer in the [Prince Albert] Sound here than out in the open in those days; like a couple of months of open water, maybe, if even that.

PIN 120, ULUKHAKTOK, Translation

Changes in the timing of freeze-up and break-up appeared suddenly, in the 1990s, according to this Ulukhaktok elder. Strong winds and ocean swells (“movements”) started to break up the ice quickly in the spring.

Way back then, it used to freeze up early and snow early. But now, the winds are very strong. The ice breaks up right away. It usually gets frozen before Christmas, but nowadays, it takes a long time to get cold. It seems like it takes a long time to get cold. Maybe 10, 15 years ago, you started noticing the changes coming by quickly. During the springtime, too, the ice takes off right away. Whatever it is – movements from the ocean finishes the ice right away. That is all changed now. Even our sun – it's right on top of us and it's very warm – very hot.

PIN 119, ULUKHAKTOK, Translation

A Paulatuk hunter pointed to wind and stronger currents as forces that delay freeze-up.

Usually, this time of year that whole bay [Darnley Bay] is frozen.... so much water, and the current gets so stronger. Then you kind of wonder if it will make the ice break up and go back out in the water.... the wind is not making the water freeze right now. Usually, this time of year you would see a lot of this whole bay here [Darnley Bay] would be frozen.... This side here, too [Franklin Bay].... Now the whole place, as soon as you look outside of your house, you see that big smoke over the water¹⁶⁴ [Last year] it was kind of scary, though; there was a few people that went through the ice.... They just about lost their lives.

PIN 142, PAULATUK

In general, Paulatuk hunters could hunt on the ice as early as the end of October in the 1960s and '70s. In comparison, Darnley Bay was still not frozen over in January 2010, shortly before the PBTk study interviews were undertaken.

Freezes quicker back in the '60s–'70s.... Ice freezes quicker and they would be out there in November, end of October, they would be hunting, all right.... Today they just say be careful out there; it doesn't freeze like it used to 25 years ago.... this whole bay [Darnley Bay] was still wide open in January out here.... It is freezing up later. Fifteen–twenty years ago, by this time, you could cut across the bay here.... Twenty years ago, by this time of year, minus twenty or thirty already.

PIN 147, PAULATUK

Observations about changing freeze-up and break-up times are much the same throughout Inuvialuit territory. By Thanksgiving of 2010, on October 11, the lakes near Sachs Harbour had not yet frozen over enough to permit ice fishing.

We were eating Thanksgiving dinner the other day,¹⁶⁵ and I said to my family: “When the kids were really small, we used to go camping; go fishing on the long weekend. There was lots of snow, and all the lakes are frozen.” I said, “Look right now, no snow and the lakes aren't even frozen yet.” There's how much it change.... Long ago, freeze-up early, and early fall and late spring long ago. Now it's a late fall and early spring.... Really changed lots.

PIN 136, SACHS HARBOUR

On the other side of Amundsen Gulf, at Tuktoyaktuk, one TKH noted that in general, hunters from his community did not start travelling and hunting on the ice in December due to ice safety concerns; they waited until January when the ice had thickened more. Now the ice is frequently unsafe to travel on even in January.

We never be out on the ice when it's freezing up or when it's melting; that's a dangerous place to be, so we learn not to go out there. Never in the fall.... many years ago, used to go every year around January, when I figure it's

safe enough.... You can't go in December; you can't go out on the ice, otherwise, it's not safe. In January only. Now, even in January, must be dangerous [it's] so mild out.

PIN 33, TUKTOYAKTUK

When he first moved to the community in the early 1950s, freeze-up occurred by about September 20. Now it is around October 20, four weeks late.

A hunter from Inuvik spoke of changes to ice in the Mackenzie Delta area in relation to break-up. The ice in the Delta breaks up around the same time of year as usual — May — but when it goes, it does so much faster than in the past. The hunting season is cut short due to unsafe ice conditions earlier in the spring.

In the Delta, I notice it's [the ice] wearing on the bottom more. I don't know if the water is getting warmer or whatever, but you could tell, like, with candle ice;¹⁶⁶ it's wearing on the bottom more. There's not so much run-off... especially when there's lots of snow and you get lots of [drain] holes.... The ice is getting thinner, a lot thinner than usual, and the only way you could tell is when you're out there, and you actually sink your Skidoo.... When it wears from the bottom, you've really got to watch. Like, the colour of the ice is different, when you start seeing muddy water. If it's muddy water, it's just moving lots underneath.

PIN 3, INUVIK

Another hunter, a man from Inuvik, compared the spring thickness of the ice on the Mackenzie River today with what it had been when his sister was born in 1956.

My sister was born here in October 1956 in Inuvik. As far as we know, she was the first baby born in Inuvik.... My grandmother came from Aklavik with her dog team... all the way through the Delta... right across the big lakes into Inuvik by dog team. They were able to cross the Mackenzie already, the middle of October. We've got to wait 'til November now, just about. And she came into Inuvik and helped my mother with the birth of my sister; and then afterwards, a couple of days in Inuvik, her and Auntie Emma hooked up their dogs, back to Aklavik, thirty miles.

PIN 102, INUVIK

4

4.3 Winds, currents and bad and unpredictable weather

Changing wind patterns and velocity affect the speed of freeze-up and break-up each year. Wind direction is an important variable in creating good polar bear denning conditions, and is a key factor in Inuvialuit wayfinding when travelling and harvesting. Wind patterns and velocity are also linked to deteriorating ice conditions that are often too unsafe to permit travel and polar bear hunting. For example, an Ulukhaktok hunter said the prevailing winds had shifted from east to west, or they come from any direction. "It's different in the wind now.... Long ago, it used to be east wind; [then] west wind mostly. So, right now, you've got wind coming out from any place" (PIN 122, Ulukhaktok). Another hunter from the same community focused on the unpredictability of wind directions compared to the past.¹⁶⁷

Maybe one day of no wind, and then a few days of wind, strong winds.... When he was a young guy, the duration of no wind would be about a week.... There used to be no wind when he was younger, so they'd travel for days with no wind at all. Nowadays, every other day, there's wind.... And there's no way of travelling, no way of hunting nowadays because of the wind. It's always too windy most of the time.... When there's been a little bit of bad weather and when the weather starts turning or nice again, then they would say that it's going to be nice for a long time. Nowadays, it's not that way anymore.... Nowadays, the wind comes quick and from any direction. When he was younger, it wasn't that way.... It's always constantly rotating now, the wind.... The predominant winds used to be east or west winds when he was younger. Now, it's just always rotating, the winds.

PIN 120, ULUKHAKTOK, Translation

The frequency of bad weather has increased as well.

Even though people do want to go out, they can't go out hunting bear anymore in their usual areas.... At this time of the year, January (wintertime). When he was young, there was no fog around at all. Nowadays, there's always fog associated with snow, with winds. Those are the big changes that he's seen. Constant bad weather.

PIN 120, ULUKHAKTOK, Translation

According to one Paulatuk hunter, storm patterns have shifted toward his community and hunting areas. *Tuktoyaktuk in the old days, they'd get a northeasterly killer wind going there, killer. And every year it would just be the same storm. That's as far south as that storm would come. But in the last three to four years we're getting that storm now.... The storm's moving farther south. Because you can see it; you hear of a storm in Tuk, and you're travelling, and you going to hit that weather right around that area there.... just south of Letty Harbour.*

PIN 163, PAULATUK

When questioned about changes in the weather noticed during his lifetime, a hunter from Aklavik said that in addition to spring arriving sooner than previously, the frequency of strong winds and winter and summer storms has increased in his part of Inuvialuit territory.

Nowadays, it seems like it's warming up quite a bit — earlier springs. So, we're not staying as long as we'd like [i.e., away from the community harvesting]. Sometimes it's hard to travel; get too much warm weather, and it's just soft snow, water — things like that.... Even in the summertime, sometimes it's hard to travel, because you're getting lots of south winds steady or east winds. You can't do your hunting.... Used to never be as windy as — some years, you get lots of winds.... Sometimes, if we're out travelling, you'd be staying in the house for two, three days, sometimes even longer — storms. Once that storm passes, then you can travel.

PIN 12, AKLAVIK

In the Paulatuk area, a TKH said that there have been significant changes in the amount of snowfall compared to when he was younger, although it is not clear what time periods he is referring to when he says “those days” and “early days.”

Back in those days, there is a lot of snow this time of year already [2 November 2010].... Back in those days, used to have those matchboxes [houses]. In January they would be walking over top of house.... A lot of snow, those years. As to today, us now get a lot of winds. Them days, houses would be buried.... Not kidding! You'd just see stovepipe; didn't know you were walking on top of house. Did that a few times, right by father's church. Had a “tree house matchbox house,” they call them now. People would make steps in the snow to go out. Lot of snow get on them.... not like right now; it's lucky when you go out there, foot and a half maybe.

PIN 147, PAULATUK

In contrast, there appears to be no trend in the amount or type of snowfall along the Yukon North Slope; it remains variable from one year to the next, according to a hunter from Aklavik.

Some years we have lots, and some years we don't have snow. Every time we go down, like this time of year in April, when we go to our house, we always shovel downwards into our house. We could drive a Skidoo right on top of the house.... And then, after that, our Skidoos are sitting just about on top of the house.... Sometimes we'll have strong north winds, and then we'll have to have a bigger snowbank. But then when it's west, it always be towards the east side, so we don't have to worry about digging so much going into the house.

PIN 13, AKLAVIK

An overland travel route between Aklavik and the coast is better for snowmobile crossings if there are westerly winds. At such times, the snow is smoother on the sides of the hills that people cross and they can avoid having to travel over rough sea ice along the coast.

See Section 5 for information about changing snow conditions in relation to polar bear dens.

In general, study participants agree that not only has their climate become warmer and the Beaufort Sea increasingly ice free over the last twenty or thirty years, but the weather has become increasingly unpredictable. Formerly, Inuvialuit could use TK to forecast the weather, but such techniques are now less reliable, according to a hunter from Ulukhaktok.

We took him out, you know, how to learn — tell him how old this track — two days old or one week old or this morning, and about the ice, about the water, how it's going to flow. You could look at the clouds and say when it starts to blow, maybe tonight or tomorrow. And the ice.... You could do that. But right now, it's really hard [to forecast the weather]. The wind could change pretty fast now.

PIN 122, ULUKHAKTOK

The unpredictability of the weather makes it difficult for hunters in Aklavik to plan long-distance trips from their Mackenzie Delta community to the Yukon North Slope.

You can't plan the trip anymore. Thirty years ago, you could plan during the summer that you're going to make it to Shingle Point or Herschel Island. The wind just blows all the time — all the time. It seems like west wind is blowing, and it will just turn around and start blowing east, especially if you're in this area.... There's a lot more winds.... You get a lot of calm weather [in the old days].... It's different [nowadays]. Everybody will tell you it's different.... The weather governs everything we do.

PIN 15, AKLAVIK

Observations of changing ice and weather conditions set the stage for a review of one of the most pressing matters related to the management of human relations with polar bears: whether climate change is affecting their abundance, distribution and condition. Inuvialuit are unanimous in their observations about various climate change effects, such as late freeze-up and early break-up. However, the relationship between these effects and polar bears is complex.

Section 5

Are there changes in abundance, distribution or condition?

Throughout the 2010 interviews, the TKHs were invited to think about changes, if any, in polar bears and their primary food sources — their numbers, den locations and denning behaviour, spatial distribution, condition (i.e., physical health), and the availability and condition of seals and whale carcasses. A variety of change-related questions were asked of each TKH (see Appendix 3). In general, “change” was conceived as a comparison between two time periods in each participant’s lifetime: an undefined present-day or contemporary period; and a time when he or she was younger. The TKHs were also invited to think about whether polar bears have adapted to changing weather and sea ice conditions.

5.1 Interpretation

It became clear during the NVivo coding process that the TKHs had a range of observations and perspectives on change-related matters. Some thought there were less polar bears compared to when they were younger, while others thought the numbers were much the same in their areas. Some thought that polar bears were skinnier compared to the past. There appeared to be no consistent pattern in these apparently differing views in relation to the age of the hunters or their affiliations with a particular community or polar bear hunting area.

Authors of two other PBTk studies (Born et al. 2011; Dowsley 2005) quantified such differences, presumably to provide the reader with a sense of what a majority and minority of research participants thought, whether there was a consensus, etc., but also to explore a possible regional basis to differences in local ecology, ice conditions, etc. in relation to polar bear numbers and condition. In the Born et al. study, for example, of 16 responses to the question, “Have you observed changes to the occurrence of polar bears?” “13 (ca. 81%) said yes, 1 (6%) said no and two others had no opinion on this subject. Several of the responses were statements that indicated the bears have come closer to the coast, but several implied that there are more bears now. Some of the responses were a combination of these two statements” (2011: 125). Born et al. provide examples of these statements, which help readers understand the rationale and nuance behind the responses.

In the PBTk study responses to change-related questions were not quantified on the grounds that such an approach may (1) oversimplify complex and nuanced observations and thinking about change, and (2) serve no analytical purpose where quantitative differences may not be statistically significant in a small sample size. To say that 29% of the TKHs said the numbers of polar bears has declined, while 33% said there has been no change in the numbers, reveals very little other than that there are differences of observation and perspective among the Inuvialuit. As Born et al. (2011: 203) noted, “[t]hese kind of qualitative data are not easy to summarize. It is particularly problematic to weigh statements when they are contradictory in nature (e.g., some informants thought polar bears are thinner, others that they are unchanged, and a few that thought they are fatter or had changed colour).”

Rather than attempt to interpret Inuvialuit change-related observations and perspectives using quantitative or other means, another approach was adopted: asking a group of experienced Inuvialuit TKHs to interpret the interview data. A Polar Bears and Environmental Change (PBEC) workshop was held in Inuvik in January 2013 with 13 Inuvialuit participants, all of whom had been interviewed as part of the 2010 PBTk study (Table 5). They considered a variety of observations, propositions and theories (OPTs) related to changes in polar bears and what they eat that had been extracted from the interview transcripts. Summaries of OPTs were presented to the workshop participants in the form of bullet points (Table 6), with numerous examples of complete narratives in which the OPTs were embedded.

Table 5. TKHs who participated in the 2013 Inuvik workshop

PIN	Community affiliation	PIN	Community affiliation
15	Aklavik	144	Paulatuk
106	Aklavik	163	Paulatuk
3	Inuvik	135	Sachs Harbour
43	Tuktoyaktuk	136	Sachs Harbour
161	Tuktoyaktuk	138	Sachs Harbour
117	Ulukhaktok	121	Ulukhaktok

A sample of representative change-related narratives was presented, in particular those that are contrasting, seemingly contradictory pairs. This enabled the participants to evaluate the context and argument that support the OPTs. One potential problem with this approach, however, is that it risks amplifying “outlier” OPTs (those advanced by a small number of research participants), thereby giving them the same importance as OPTs held by far larger numbers of participants.¹⁶⁸

Table 6. Bullet summaries of the OPTs, by community, extracted from the interview transcripts

Sachs Harbour	PIN#
Seal habitat not good. Rough ice, small, thin ice pans now. Polar bears farther out, seal whelping farther out.	PIN 131
Much less multi-year ice, less ice in general — no polar bears.	PIN 131
Used to have multi-year ice that cracked and opened. No landfast ice holding the ice anymore. No ice to hunt anymore, two kilometres from the beach now.	PIN 132
Females and cubs coming out of dens earlier.	PIN 132
Significant decline in the number of dens seen on Banks Island.	PIN 132
There will be hardly any polar bears this year due to lack of ice to bring them in. They stay far out on the “big ice,” where “the ice never melts.”	PIN 128
Nowadays, not as much ice in summertime, so don’t see as many polar bears in summer or fall.	PIN 133
Snowdrifts aren’t big enough, lot of seal pups dug out by foxes. Not enough big ice to make snowdrifts, and winds are fierce. Probably affect where seals whelp.	PIN 133
Polar bears seen inland in summertime.	PIN 133
Polar bear population still healthy here.	PIN 133
Last year saw a polar bear on a chunk of multi-year ice that came down Prince of Wales Strait. Polar bear in bad shape.	PIN 133
A lot of polar bears along the shore waiting for it to freeze up. Sometimes they come to the community.	PIN 133
No ice last few summer, so probably hard on polar bears.	PIN 132
With strong north winds, snow still blows into banks, so denning is okay.	PIN 134
No ice, polar bears going inland to look for something to eat. Really bad now.	PIN 136
No more old ice, so we can’t hunt even ten–twenty miles out of Banks. Polar bears still there; see their tracks. But can’t reach them.	PIN 137
People doing surveys saw polar bear swimming around. They get seals even when there is no ice. They don’t need ice. ¹⁶⁹	PIN 137
Used to snow earlier, September–October. Now, it gets blown away. Get snow in January–February. It shouldn’t affect polar bears; they go where there’s lots of snow, e.g., Eastern Creek.	PIN 137
No more old ice pressure ridges to follow. Polar bears don’t have much ice. See them sitting on thin ice hunting seals, waiting by holes.	PIN 138
This time of year [October], polar bears thinner, not eating too much for the summer because all the ice is gone.	PIN 138
Seals don’t really need ice; see them sleeping in the water.	PIN 138
Changing ice is not affecting polar bears much. They can adapt pretty well. No places they can’t go.	PIN 139
Ulukhaktok	
Significant decline in the number of dens seen in Ulukhaktok area.	PIN 115
Not enough snow for denning.	PIN 120
Plenty of snow for polar bears to make dens in Ulukhaktok area.	PIN 114
Polar bears mating a little earlier now, maybe because of the temperature change. Females going into heat a bit earlier.	PIN 138
Polar bears starting to get thin hair on the neck, feet and ears; these are thin polar bears, not in good shape. However, polar bears harvested last year were all good.	PIN 117
Late freeze-up, therefore, polar bears are not moving into the Ulukhaktok area, no bears for five–six years now.	PIN 122
Late freeze-up, early break-up, always mild, ice melts a lot faster — affects polar bears. Fewer polar bears nowadays in area. They move somewhere else. No polar bears denning in areas where they used to den.	PIN 123
Ice not good, all broken up. Not good for polar bears. Polar bears don’t like to stay here — they move to good ice.	PIN 119
Too much rough ice. Never see too many seal holes in this kind of ice. Polar bears has to go to smooth ice to look for seal hole.	PIN 126

Polar bears started to come into town. Maybe nothing to eat out there.	PIN 125
Seals having hard time keeping breathing holes open because ice piling up. Climate change. Hard for polar bears to survive in the winter because ice is so thick.	PIN 125
Polar bears affected by the weather. No ice. Polar bears staying far west side or north side of us, on solid ice, to hunt seals.	PIN 114
Paulatuk	
Populations are healthy, lots of tracks which are a good size, no sick bears.	PIN 150
Polar bears are healthy, not declining.	PIN 144
Less snow last two to three years, harder for females because they need to den.	PIN 163
Less ice, taking a long time for polar bears to wait for ice to hunt seals and they are getting skinnier as a result. Less young seals; they don't have the ice to house their young ones. Hardly see any seal kills now.	PIN 145
No more multi-year ice near Paulatuk. Polar bears moving out to multi-year ice, or hanging around the beach waiting for the ice, or swimming out to the ice.	PIN 145
Lack of sea ice affecting polar bears and seals. Seals need snow to den. Not much ice anywhere. Few polar bears to be seen.	PIN 147
Too much water, not enough ice, bears are having a hard time to get to ice to get food.	PIN 142
Seals may be getting crushed in ice. In spring, snow turns to water and freezes; hard for seals. Foxes or polar bears may get them more easily. Much fewer seals now. They may have moved elsewhere. More open water. Ice not solid in Franklin Bay. Fall time, polar bears are getting skinny.	PIN 149
Formerly, ice solid across to Nelson Head and Victoria Island from Pearce Point. Few leads. Had to go a couple of days out to find polar bears. Nowadays, ice not glued anymore due to absence of old ice. Current and wind shift the ice. Rumble ice now — jagged. Polar bears won't go in that ice unless being hunted.	PIN 158
Late freeze-up makes it longer for polar bears to get out on the ice to hunt. Takes more time for them to build up fat reserves for the winter. Really affecting them.	PIN 158
Polar bears don't winter in Browns Harbour. No ice there. If no ice, no polar bears. ¹⁷⁰	PIN 159
I haven't heard anything from anybody that says polar bear population is dwindling or suffering. Depends on ice conditions. No ice, no polar bears.	PIN 159
In former times, polar bear numbers small due to ice conditions, but this is cyclic, like with caribou. They always recovered on their own.	PIN 159
Lots of rubble ice one year, and too many open places for the seals. Therefore, nowhere for the bears to concentrate. Polar bears were all lean that year.	PIN 163
Haven't noticed any change in numbers or size of polar bears.	PIN 163
Global warming impact; no more solid ice; ice crushes up; hardly any seals whereas there used to be hundreds. Polar bears getting thinner; they don't eat as much. Started to see changes to fat since '90s. Barely three inches of fat on back now.	PIN 164
Polar bears no longer den on Fiji and Booth Islands and in the Cape Parry area due to no snow. Used to get prevailing east winds, but more north wind nowadays, which doesn't built up snowbanks for polar bears dens.	PIN 164
Tuktoyaktuk	
The population is healthy.	PIN 44
More people are seeing signs and bears.	PIN 44
Bear numbers are better in the Baillie Island/Cape Bathurst area than they were 10–15 years ago.	PIN 44
Global warming is having an effect on polar bears.	PIN 44
Polar bears are in good shape, all the hair is good, the carcasses are healthy.	PIN 42
Formerly polar bears were coming into town, starving, looking for food because they weren't getting seals; too much ice, not enough open water or leads.	PIN 42
No more ice in June. Pretty hard for polar bears. Before, if ice coming from northwest, polar bears would go back to Nome, Alaska; lots of them on the ice.	PIN 38
If there's less polar bears, it's because much open water all the time. Polar bears take longer to reach shoreline, takes longer for polar bears to travel, because they come from way out there somewhere.	PIN 23

Global warming is affecting polar bears, e.g., a polar bear in [Fort] McPherson.	PIN 22
Polar bears move out where there's more ice. Hardly any more polar bears where we used to hunt. No more icebergs.	PIN 29
Open water normal distance out from Warren Point. But ice conditions bad, very rough. Heard about polar bear cannibalism from researchers that year. Difficult for polar bears. All this in 2000–02.	PIN 43
Lots of polar bears in 1970s, but polar bear signs are poor in last few years. Ice too thin, so hunters don't want to chance camping out there.	PIN 27
Ice changes might be affecting polar bears, because people aren't getting that much polar bears; because they're not there, or hunters don't want to chance the thin ice. Might be a cyclic downturn in the population.	PIN 27
Inuvik	
Ice is freezing later in the fall. Polar bears need seals. If they don't get them, they're going into communities like Sachs Harbour in the fall time. Lots of them go to Sachs.	PIN 102
Weather is becoming unpredictable; it probably affects polar bears. Ice not forming the way it used to. If polar bears stuck on land, where do they get their food? They can't chase caribou.	PIN 102
Heard on TV about polar bears dying, drowning, swimming farther due to climate change, but I've never seen or heard anything like that locally.	PIN 103
Polar bears have to spend more time looking for snow for dens. They'll die, freeze in dens if not enough snow.	PIN 2
We say polar bears are declining because not enough icebergs. Used to be lots of icebergs from Nelson Head to Baillie Island. Harder for polar bears to hunt because they have to chase seals in the water.	PIN 100
Some years we think the polar bears are declining in Banks Island because there's no ice, but then the ice moves in and the polar bears are plentiful again.	PIN 100
Aklavik	
Don't see as much bears as long ago. Used to see quite a few 15 years ago, between Kay Point and King Point. Bowhead whale carcass stuck on ice; when it floated out, it took many polar bears with it, possibly to Siberia.	PIN 13
A polar bear between Aklavik and [Fort] McPherson all summer, feeding on what? Polar bears will have to adapt.	PIN 19
Polar bears in western Arctic in good, stable condition. See them in winter and spring months out on coast and in Herschel area. Numbers still up there. Polar bears in good shape. They're hunting and being fed.	PIN 19

Workshop sessions were organized according to five change-related themes:

- changes, if any, in polar bear condition (physical health);
- changes, if any, in polar bear abundance;
- changes, if any, in the distribution and number of polar bear dens and visits to Inuvialuit communities and camps;
- changes, if any, in the number of polar bear food sources (primarily, ringed seals); and
- whether climate change is affecting polar bears.

The collective comments constitute an Inuvialuit interpretation of the OPTs from the 2010 interviews.

5.2 Polar bear condition

The first theme considered was polar bear condition (i.e., physical health): 26 TKHs addressed the matter during their 2010 interviews, primarily in response to these questions:¹⁷¹

- Do bears look different? Are they bigger or smaller or in better or worse condition?
- Have you seen changes in the condition of bears over your life (if they've been getting skinnier, fatter or the same or bigger or smaller)?
- Do bears look better or worse or the same as when you were younger, in terms of their size and condition?

Narratives, 5.2: polar bear condition

These are some of the narratives considered under this theme during the workshop:

We're not seeing as many big polar bears as we used to because of the ice conditions, I guess. The great big bears, they stay out on multi-year ice. And once in a while they'll venture in close, in the springtime, looking for females. But you don't see them anymore, like great big bears, I mean.... 11-, 12-footers; the ones you don't see on land or close to shore. They stay on the multi-year ice.... That's where they feed, they live, I guess. You get a lot of those great big bears that just stay in the water; they're the big healthy bears. You don't see that anymore.... Multi-year ice has moved, I guess, they stay with that.... Some of them get so big that the hair quit growing on their faces.... most big bears are in good shape.

PIN 133, SACHS HARBOUR

[Re: the ones around Banks, do they look any different since when you were young?] No difference, the only difference is the ones that go to town and bug you, the young ones we see now.

PIN 137, SACHS HARBOUR

When conditions for hunting seals for the bear, their ice conditions aren't all that great, piled up ice and stuff like that, some years the bears are thinner, some years they're fatter. Depending on ice conditions, even what I hear from my father and grandfather, it depends on the ice conditions for that year. If the ice conditions are good enough for the seals to be making dens in that area, the bear/seal hunting area, then the bears are healthy, in good shape. But when the conditions are bad, the bears aren't fat.

PIN 120, ULUKHAKTOK, Translation

Well, you never hear a person say, "Boy, I got a skinny bear"... You never hear that they're [not] always a healthy bear. So far as I know, the bears have been healthy.

PIN 144, PAULATUK

The ice, it's disappearing a lot earlier and freezing later. And it's taking a long time now for the polar bears to wait for the ice to come in to hunt the seals. And that's getting them skinnier and skinnier.

PIN 145, PAULATUK

For some reason, the ice just crush up, and it goes into really funny way. So no more solid ice. That's what's happening. And we could see that because the bears are getting more thinner. Now, they don't eat as much. You know it is getting too warm and not cold anymore. The bears are getting more thinner, from about five inches [of fat] down to about three.... It's been quite a few years.... let's see, [since] about [the] 90's, [when] they started to see changes in polar bear fat. Before that, they just round: five, six inches thick. In the back, now, you barely get three inches. They're long and skinny. Before they just like a ball, round. Round as a ball.

PIN 164, PAULATUK

[Re: do bears look different since when you were younger? Do they look better, worse or the same since when you were younger?] They never change... nothing has changed.

PIN 158, PAULATUK

[Re: the last couple of years, did the bears look better or worse or the same condition since you were young?] Some years is skinnier than some years; here in Tuk got hardly any seals. Some years when they got a lot of seals the bears are in good shape.

PIN 38, TUKTOYAKTUK

But if you go out there and get a polar bear, you don't see a starving polar bear, like back in our days when we had a lot of ice. Polar bears were starving, because they couldn't get the seals. They were always in seal holes, 'cause seals could have eight feet of ice. Could still have a seal hole in eight feet of ice and living under the ice itself. And that's why you see polar bears coming to town, starving and stuff. But nowadays, with all the hunters that's been going in and out and getting these polar bears, there's never [been one who] say one of them [was] starving or something like that. They're all in good shape, all the hair is good, the carcasses are all healthy.

PIN 42, TUKTOYAKTUK

[Re: have you noticed if bears are looking in different condition since you were younger? Do they look better or worse or fatter or skinnier since you were younger?] No, you can't really tell. Just a couple of bears we got in the later years, they were kind of skinnier than usual anyway. A few times we got bears — one or two around Herschel — and they were fat bears, in the earlier years [1990s].... the last couple of bears we got, they were skinnier.

PIN 103, INUVIK

The number of bears that I do see come through are in good shape. They're hunting, they're being fed. They're successful in their hunts.... But if you do start seeing polar bears that are starving, you'd think that they'll start to pop up here, and they'll start to pop up on that shore.... They'll be here and there; and that's not happening.

PIN 19, AKLAVIK

Discussion, 5.2: polar bear condition

The discussion among the Inuvik workshop participants concerning polar bear condition was part of a broader discussion about variable sea ice conditions and how these affect the movements, prey and feeding behaviours of the bears. Speaking from the perspective of Paulatuk, one participant said that the best ice conditions for polar bears are a mixture of smooth and rubble ice with open leads, and that when such conditions are present, hunters are more likely to encounter fatter polar bears. When the ice is less than two feet thick, however, the winds, waves and currents break it up too easily, producing a great deal of rubbing. Too much rubble ice is not good for polar bears, because they have trouble hunting seals in such conditions. Very flat, new ice is not good for bears either, because seals have few breathing holes in such ice, and there is no place for the bears to hunt. Multi-year ice was prevalent annually before climate change effects were observed after the mid-1980s; it dampened ocean swells and waves and reduced the amount of rubbing. Furthermore, hunters felt much safer when travelling and hunting on the ice. Ringed seals would whelp in areas of older, thicker ice, where drifting snow collected along pressure ridges that formed early in the season. Polar bears would patrol the ridges, looking for seal birthing lairs and breathing holes.

Workshop participants said they note the amount of body fat on polar bears when assessing changes in condition over time. They also infer polar bear condition by noting the density of their local distribution. In the Tuktoyaktuk region, for example, polar bears often hunt in high-density groups of eight to ten. After a while, the seals in their hunting area “get jittery” and more difficult for the bears to hunt. The bears will let the seals “settle down” by moving somewhere else to hunt, but will eventually return to hunt the original area. Inuvialuit hunters make use of this observation by camping in one spot to await the return of the bears. As noted by one participant, “You don't have to go to them; you can wait for them to come to you when you are hunting. They always come back to a certain good hunting area” (PIN 43, Tuktoyaktuk, para).

Tuktoyaktuk hunters are heavily dependent on westerly winds because they bring the moving ice in towards the floe edge along the landfast ice, transporting large male polar bears with it.

Big bears are out there. They only come to the main ice when looking for a female [during mating season]. When I go hunting, I wait for the right wind. It brings the bears in from the floating ice and that reflects the health of the bears. There is a big difference in the hunting areas where there are different ice platforms. In Tuk, we wait for the wind to bring in the bears.

PIN 43, TUKTOYAKTUK, para

In the Ulukhaktok region, polar bears behave in the same manner: they will leave an area, but return to it if the ice conditions and seal hunting are good there. With the right conditions, bears will stay in a particular area for a long time, and pressure ridges are a major attraction for them. Westerly winds also

bring polar bears toward the landfast ice nearer to the community, at which point hunters head out in search of them.

With climate change, easterly winds —which separate the bears from Inuvialuit hunters — are much more common. Normally, when ice conditions are good, polar bears are distributed about five to ten miles apart along pressure ridges and open leads, in which case the bears are usually the same size and not very large (PIN 117, Ulukhaktok, para).

Inuvialuit hunters also infer polar bear condition from the number of females with cubs (family groups) they encounter. If the bears are in poor condition, there will be fewer females with cubs. A Tuktoyaktuk workshop participant said, “The health of the bear is not only fatness. As a hunter, if I don’t see a female with cubs, I will be alarmed. In Tuk, I have never been alarmed yet. The health of bears is okay, ’cause I’m seeing cubs” (PIN 43, Tuktoyaktuk, para).

Workshop participants mentioned other variables that may affect polar bear condition. For example, bears that have been collared for biological research are more nervous and “jumpy,” which affects their ability to hunt (PIN 161, Tuktoyaktuk). Some bears are better hunters than others, with poor hunters getting fewer seals and tending to be skinnier. Also, the size and shape of polar bears vary just as they do among humans. Weasel bears, midget bears and bears with small bodies but large feet have been encountered over the years.

There was consensus among Inuvialuit workshop participants that the physical condition of polar bears in their areas has remained stable over time, although there is considerable variation from one year to the next and even within a given hunting season. However, there appear to be fewer really big bears and they are not as fat as they were prior to the mid-1980s, when apparent climate-related changes were beginning to be perceived as significant. Ice and seal hunting conditions are important, but not the only factors that determine where polar bears hunt. In years when these conditions are good, polar bears are fat, but when they are not good, the bears may be skinnier.

5

5.3 Polar bear abundance

The second theme considered was changes, if any, in the abundance (relative numbers) of polar bears; 49 TKHs talked about this during their 2010 interviews, primarily in response to these questions:

- Have you or have you not seen changes in the number of polar bears in these areas since you were young?
- If you have, what types of changes?

Narratives, 5.3: Polar bear abundance

These are some of the narratives considered under this theme during the workshop:

There doesn't seem to be quite as many like it used to be, in numbers.... The last time I saw numerous bears was in Nelson Head in 2002.... me and my son went over there, and I think we saw about 25 bears in one day.... Just wandering.... just walking.... around here somewhere.... I really haven't been out that much to notice that much difference since then, other than the ice and the weather conditions.

PIN 138, SACHS HARBOUR

I think it's [numbers of polar bears] pretty much the same for this area [Cape Kellett]. 'Cause every time we go, even if we haven't seen bears, you see the sign. You see all the fresh tracks there. There's been years, and it will be an odd year, that we travel, and because the ice is so solid, you won't even see any sign of bear around it. I was out with [one person] for two weeks one time and travelled. Went all the way from outside of Kellett, made

it all the way up this way and we never saw a sign, not even tracks, because it was all old ice. And, solid ice and [we] never even saw a sign of a bear. Then coming home, there happened to be a little lead, right outside of Mary Sachs. We got a bear right there, just on our way home.

PIN 135, SACHS HARBOUR

I think it's getting less every year, myself anyway, I have to say... less tracks every year. This year is worse.... When I was younger, I started following my dad and my brother. As soon as you go out — we used to leave here, Safety Channel, we started seeing bear tracks coming over.... Even in the '80s, you could see lots of tracks there. But it's changing just too fast these days.... The last five years, to me anyway, I could notice. I go out hunting every year, and I could notice it's getting less every year.... I can't help it, though. If that happens, it happens. We can't bring them back.... I don't like to say about the decline, but I notice a little bit, so I have to say it anyway; not like long ago, there's less. I hate to say that, but it might become some day. It's kind of scary, but some people don't like to talk about it.

PIN 121, ULUKHAKTOK

That's how we make a living in the old days. People never used to have a problem with polar bear hunting a long time ago. Today it's a problem, I know that. Ice conditions, wind, bad weather bothering us today. I don't know about the number of polar bears going down. I hear a little bit about the number of bears are going down, but I don't really believe that. Every time I go, I seen so many bears. Like, last year, I went this way, Prince of Wales Strait between Banks Island and Victoria Island.... I seen 13 bears, me and my boys. And we shot five bears, only five. Thirteen.... They were all looking good. Females, males. Cubs, we seen about six, I guess. One of them [females] got three [cubs] — I forgot about that one.... down here somewhere, in this area. That one there, they come to us when we're standing around on the ice. My boys see bears coming in from the side of us. We could see them for a while, because it's blowing snow. About six altogether, I guess; six little bears [cubs] we seen together [in] total, about three mothers, I guess, with cubs, and one triple. Only a few I seen with one cub on my hunting days... but only a few times I seen a mother bear with one [cub].

PIN 114, ULUKHAKTOK

If the seals don't have ice, the polar bears won't be around there. If you start seeing the ice disappear even quicker, the polar bears will have to go farther or go inland and scavenge off the beach. They are used to using ice, hunting seals on the ice, and that's their main way of hunting. But I would see a big change; well, I see it now. The ice, it's disappearing a lot earlier and freezing later. And it's taking a long time now for the polar bears to wait for the ice to come in to hunt the seals. And that's getting them skinner and skinner. When the ice started getting thin, you started seeing less young seals. They don't have the ice to house their young ones.... Quite a few years back, every time we used to see a polar bear track, you'd see where it'd kill seals.... Nowadays, you could barely see these things... I could remember travelling with my dad. I used to see a lot of seal kills.... I never travel out there as much as I used to, but even the people when they go out there the last few years, I've been out on the ice, but I haven't seen seal kills here and there like I used to.

PIN 145, PAULATUK

It was looking good in our area. It's looking good, but some areas, I'm not sure, but what I'm hearing, they're declining. I been operating out of there for a long time. Too many bears in the area; now hardly change since then. In Cape Parry, we're seeing females with one or two young ones, sometimes three. There's a good sign; after two or three years he is going to be adults. So really to me I know there are a lot of bears in the area here.... From what I have observed. We're only getting a few of them to the mainland. And to make it even better now, the two- or three-year-olds, they're there by themselves, not with their moms anymore. You see them there roaming around, so that is a good sign again; when you start seeing a three-year-old by himself, roaming.

PIN 164, PAULATUK

Bears out there, lots, lots more than enough. To me, what I observe in that area here is that it never change. No, it never change. The bears never change.... The only thing is that we can't go out; that's the main difference....

They've had a chance to even increase. And, and to boot, I don't even remember filling up our subsistence polar bear quota for years.... People just don't go for them anymore.

PIN 164, PAULATUK

Ice condition; that's the bears, no more ice, is hardly any bears now. You got the Russian side there, probably that farther up, then the north, probably that another so far out from that corner here.... ice, that's why there's so good shape ice out there, three-quarters the way to Russia.... lot's of ice right there. I don't know how far, but three-quarters I think.... This [is the] Beaufort Sea.... other side of the border there's polar bears.... Russian border.

PIN 38, TUKTOYAKTUK¹⁷²

Could be they're [polar bears] declining, slowly declining.

PIN 24, TUKTOYAKTUK

I used to think that when you reach the floe edge in say, March, there used to be tracks, lots of tracks in the floe edge. But now, if you go to the floe edge in March you're lucky to see a track sometime. For some reason there's been a change. Either they're going farther out or not using the floe edge.... I didn't really start noticing until an elder told me "how come there's no bear tracks anymore in the edge?" and that's when I started trying to think back of what's the change.... The elder that told me that said there's always bear tracks in the floe edge in March. Now when you go there, you see an old track, two old tracks maybe, but he said in the past, it's just like ptarmigan's tracks, so many. I don't know if he was pulling my leg.... lately, with Andy Derocher and Marsha Branigan, ENR, they say the southern Beaufort has been in decline for a number of years. I don't know if it's time to start believing them. I did, because I been out there every year. I notice that [there] just seem to be less bear tracks.

PIN 161, TUKTOYAKTUK

I think the bears go on cycles... some years is good.... My dad used to tell me, some years there's nothing. You could travel miles and miles and miles and there's no bears. He used to go pretty close to Baillie Island and turn back, looking for bears on the ice. Ice conditions were good that time. So now the weather changed today; ice conditions changed today. I figure it's global warming.... Even some seals; they'd say hardly any seals; you gotta go a long ways to get seal, they said.

PIN 28, TUKTOYAKTUK

It's always different every year. Sometimes there's small bears, sometimes you don't go out at the right time. Sometimes they're late; they don't come from the west because those Alaskans always get big bowheads and they leave them on the beach. That's why they gather up over at the west end.... They don't leave that area for long time.

PIN 33, TUKTOYAKTUK

[At] Baillie Island I have hardly seen any changes at all. It's pretty much all the same amount of bears signs in that area. Since five years ago I have seen as many as 12–14 bears in one day. In the slush ice, ice like this. I've seen ice like that.... That was in May.... 10–15; they were hunting for food. And there was a mixture; there were females with cubs, there were sub-adults. There were adults. They were all different, not the same.... the bear numbers, in my view are, probably better than they were 10, 15 years ago.... there are a lot of signs. Well I guess I got to rephrase my answer here. That question you are asking me, generally [I'm] going to be in the area of Baillie Island, Cape Bathurst area. Because that is pretty much where I spend most of my time hunting bears now. And in my view there are lots of bears there. Harder to get sometimes, but they are there.

PIN 44, TUKTOYAKTUK

There are less bears now, I think, and they're smaller tracks.... you don't really see bigger tracks anymore unless you travel for miles and miles.... Like, in this area, probably from here [Pullen to around the middle of Mackenzie Bay], once we went from here to here, and we probably seen only two or three polar bear tracks from that far.

PIN 103, INUVIK

We don't see as much bears as we did long ago. We used to see quite a few bears. Like, there used to be a lot of mothers and cubs all the time. Maybe 15 years ago — 15, 16... and King Point, my uncle used to always go in between there, and sometimes we'll see maybe three or four bears in one area in that place. And they used to be big bears, like eight-footers, nine-footers. And my uncle even told us to go there one time, and sure enough. He told us to go about five miles out, ten miles out, and as soon as we went that far out there, we started seeing polar bears all over — polar bear tracks all over the place there.... We saw a lot of bears that few years, until that bowhead carcass went out. And once that bowhead carcass went out; even that guy said, flying along with the chopper, they couldn't find hardly any bears that spring — two years ago. They couldn't find any bears. But wherever this bowhead carcass went out, towards Siberia or Russia side, I bet you there's more bears on that side. If not, a lot of bears must have drowned going across with that carcass. Because that carcass was stuck on to the ice, and it was about four feet high off the ground there. Because even from standing on top there, from Herschel Island, you could see that big bubble right there. You could see black and white. And you could see where the bears go and eat for a while and then go. And, guaranteed, that's a bowhead carcass right there.... And wherever that carcass went out, there's a lot of bears that went out with that carcass. So, wherever there's lots to eat, they're going to follow that, for sure.

PIN 13, AKLAVIK

From my general observations, the polar bear population in the Western Arctic at least, I think is in good, stable condition. You do see them during the winter months, travelers that are out on the land, out on the coast; and during the spring months when I do the work at Herschel, in and out, two weeks off, two weeks in. The observations that I have made I think the polar bears are still, even though the ice conditions in the springtime are going out a lot earlier, the polar bears seem to still be in stable condition; the numbers are still up there.... I don't think there's a change in the numbers [of polar bears] at all, no.... We've never seen a fluctuation or a de-fluctuation of bears.

PIN 19, AKLAVIK

Discussion, 5.3: polar bear abundance

Workshop participants talked about changes, if any, in the number of polar bears in their areas in the same terms as they did about the physical condition of bears; that is, in relation to variable sea ice conditions. However, the question of whether the number of polar bears has changed was a difficult one and resulted in considerable deliberation.

Sachs Harbour participants (PIN 135 and 138) noted that there is far less landfast ice than prior to the mid-1980s. With more open water close to shore, polar bears are spending more time near the community, and instead of travelling miles offshore as in the past, hunters are making day trips to get their bears. This has resulted in a recent increase in polar bear harvest. In 2010–11 Sachs Harbour hunters came the closest ever to filling their quota for bears.¹⁷³ During the fall 2012, they harvested a dozen polar bears, most of which were in very good shape. However, these accounts of local increases in bear abundance do not tell the whole story. The rate at which the ice is shifting, and other changing environmental conditions, complicate our understanding of polar bear abundance, because local residents are unable to track polar bear movements and behaviour as they once did. One Sachs Harbour participant concluded, “It's difficult to determine what's happening. Nature is changing so fast now, it's unreal” (PIN 138).

An Ulukhaktok participant observed that there seem to be fewer and fewer polar bears in his hunting area and fewer tracks. Formerly, the polar bear quota for this area was filled by the end of December, but this is changing and the quota was missed by one bear in 2011–12. There are no more polar bears in the places where he used to see them. “I hate to say that, but maybe there's less bears” (PIN 121, Ulukhaktok, para).

This does not necessarily mean the number of polar bears has decreased. While there are fewer signs of polar bears near Ulukhaktok early in the season, they begin to increase in January. The bears do not stay in one place, but are constantly moving, looking for good ice and hunting conditions. It is hard to know where they go. They could be staying on ice on the far side of the open water, and snowmobile traffic could be pushing them farther from the community.

Workshop participants from Paulatuk and Tuktoyaktuk also noted that polar bears are now closer to the mainland. About ten years ago, hunters used to travel by snowmobile six to seven hours out from Tuktoyaktuk to the floe edge. They would encounter polar bears in the zone between the floe edge and the moving young ice. Hunters would see few if any signs of polar bears on the way out to the floe edge. In contrast, the floe edge is now only about one-and-a-half to two hours out from Tuktoyaktuk. It is hard to reach, however, because the ice is frequently badly rubbled on the way there. Paulatuk hunters have 18 polar bear hunting tags, which are divided between the Northern and Southern Beaufort sea management areas. They have trouble harvesting their quota of bears from the northern area because bad ice conditions make it hard to travel that far.

An Aklavik participant (PIN 15) noted that hunters in his community are too far from Shingle Point and the Yukon North Slope to make daily observations of polar bears. Therefore, it is difficult to know whether there are trends in their numbers. Aklavik hunters hunt polar bears mostly in March and April, because there is not enough daylight before that time and they have a long way to travel from the delta to suitable ice and harvesting locations along the coast. Last year there was a lot of open water between Herschel Island and Shingle Point, and no polar bear tracks were seen when PIN 15 was there.

After reflecting on these observations concerning variable ice conditions and polar bear abundance, the workshop participants concluded that the number of polar bears in their area has remained generally stable. A summary consensus was stated on behalf of five communities:

- Sachs Harbour — “I don’t see the numbers going down. We’re seeing more around town, but that doesn’t mean there’s a decline in the numbers” (PIN 160, para).
- Ulukhaktok — “Maybe a little change, but overall about the same. Polar bear movements are always different every year. To me it’s the same, but a little bit change since when I was younger” (PIN 121, para).
- Paulatuk — “The big picture is that they’re stable” (PIN 163, para).
- Tuktoyaktuk — “I would say they are the same. Overall throughout the years, they seem pretty stable. The bears are there, just a little bit later. It’s just the ice conditions that are changing” (PIN 161, para).
- Aklavik — “I think I’m just too far away to see. But the talk around Aklavik is they are about the same numbers. I would agree with everyone” (PIN 15, para).

5.4 Polar bear distribution

The third theme considered was changes, if any, in the distribution of polar bears.¹⁷⁴ The interview questionnaire used a number of questions to tap knowledge related to this subject; the spatial elements of this knowledge were recorded using the map biography method:

- Can you show me where you see or have seen bears, how many you see in these places, and what the condition of these bears were?
- Are there places where the people in your community know to go to see bears?

- Have you or have you not seen changes in the number of bears in these areas since you were young? If so, what types of changes?
- What did your elders tell you about the number of bears in these areas?

The attention of the Inuvik workshop participants was focused on two discrete matters that relate to distribution; maternity den locations and numbers; and the frequency of polar bear visits to camps and communities over time.

During the 2010 interviews, some questions explored the relationships between maternity dens and distribution:¹⁷⁵

- Do you see any changes in dens?
- Has the number of dens you see changed over time?
- Have you seen changes in the times that polar bears are going into and coming out of dens?
- Have you seen any changes in where the dens are located, the types of snow bears are using, or when bears are going into and coming out of dens?

Twenty-eight TKHs responded to these questions in some way.

Narratives, 5.4: Polar bear distribution

These are examples of the narratives considered under this theme during the workshop:¹⁷⁶

Long ago there use to be a lot of denning areas here. I know all around the coast, when you travel even up on land you used to run into dens in November, when they first start going, this time of year, late October, first part of November.... But now you hardly ever see that anymore. When we used to trap, we used to run across polar bear tracks heading up. But we never bother them, 'cause we're busy setting traps; that's our thing. But along here, there's lots in the coast. But now we don't really travel that often. There is a few here and there that we see in the late spring that come out.... Not as much as back then [in the] '70s, '80s.

PIN 132, SACHS HARBOUR

The snow never change that much around here. There's just a lot of beach wind. Some of the bears that have dens up inland, they're coming out way earlier, like say two, three weeks earlier than we used to start seeing them in the middle of May. Now you start seeing them in March. It kind of dawn on us that travelling in March, you don't expect to see a mother bear with cubs until the middle of May, or third week, or first part of, but now you start seeing them third week in March, heading out to the pack ice.... I mean it's kind of unusual for us, 'cause we used to see them in second week of April on, that's what it was.

PIN 132, SACHS HARBOUR

Lot of times it would be around the same area.... usually on the side of the bank kinda thing.... [Re: has the number of dens that you've seen changed over time?] Some years you see more than others.... The western part of Banks Island is a high density area for denning bear for the north Beaufort area.

PIN 139, SACHS HARBOUR

There is no differences in the dens, but nowadays, it's hard to tell, because we don't see them or there's not enough snow out on the ocean.... When he lived on Read Island, he knows there used to be dens year after year, but nowadays, there are no more dens there that he has [not] heard of or seen there. I think the same at Ramsey Island, too. It must be the same thing.... We don't use dog teams anymore. We're very different now, so it's hard.... We used to tell with dogs; the dogs used to smell it.... Snowmobiles got no sensor.... Those dogs were the very important travelling equipment.

PIN 122, ULUKHAKTOK, Translation

They [polar bears] have to look for good snowbanks, big snowbanks, sometimes in the rivers, valleys. But now you don't see them anymore; must be not much snow these days, I don't know.... Last few years is not like this

year. This year is going to be lots of snow because it's always snowing. Before Christmas, we didn't have enough snow. Now there's lots of snow.... One of the last ones I saw is somewhere over here.... I didn't bother it, 'cause some people saw it go in the den, but I never saw it. I saw the den door... About 15, 12 years ago, somewhere around there.... It was good snow for it, from the west wind, for the snowbank over here this way.... sometimes long ago, the west wind used to be good for snow, snowbank.... Even the east wind, too.... When I started going here [Nelson Head to De Salis Bay area, '70s and '80s] with dogs, I used to see quite a bit of dens. Quite a bit, but I never see them anymore. They must go more high up to the land.... Elders used to tell me a lot. You could see dens anywhere, but not anymore.... You don't see them anymore [south side of Prince Albert Sound]. Maybe they moved their dens somewhere, maybe higher up.

PIN 121, ULUKHAKTOK

I don't think we have a problem with snow these days. You know, there's enough snow, because of blowing snow all the time and bad weather in wintertime. I don't think polar bears have a problem with the snow if they want to make a den anywhere around this area.

PIN 114, ULUKHAKTOK

[Re: Have you seen any changes in dens?] No... it's just something [you] chance across. Really weren't looking for them. [Re: have you noticed changes in the timing of when bears come out of their dens?] No.... I never really noticed that. It's just what I was saying earlier... that you're going to see the bigger cubs before you see the smaller cubs, is what I'm saying.

PIN 163, PAULATUK

The last little while there was no snow. We noticed it's nothing, zero, and then what I noticed is that some bears used to hibernate right around the island over here. We call Fiji and Booth Islands. There is no more snow, right down to the ice now. Used to get a good 12-foot snow on, below the cliff. But now in the winter you go down there, it's right flat, no more. No more bears. They have their young ones there in those times. But there is not more there, even around Cape Parry. You know that big bluff right there? Nothing [nowadays]. There used to be way lot of snow back then.... Den right there. And around that area right around there.... sometimes there's a lot of snow piled up, right up to about here [gestures]. And there's bears' dens around there, but nowadays, no more, last eight, ten years now.... The other one was over here, but at odd times. You don't see very much but an odd one might den there. But next to nothing now.... Pretty well around Fiji every year in the old days. That's from about the '90s, mid '90s — no more. No more snowbanks. Right down to the ice, right down there; it's finished. So, [they] go elsewhere on the mainland to have the young ones, somewhere at the rivers or the banks, some place where there's a little bit of snow.... Lots of change down in Cape Parry. I was born up there and in them old days when I was growing up, lots of east wind. Nothing but east wind, out there.... What happened to the east wind? We are getting more and more north wind now. That's changed to north, from east to north now. Big north wind now. And that's why it quit building up snowbanks on the west side of Fiji there. East wind, it build up the snowbanks. North wind it's, phhh, nothing now, no snowbanks build up there.

PIN 164, PAULATUK

[Re: Has the time that they're going into or coming out of dens changed since you were young?] I am not too sure. I haven't had any experiences with denning. I am usually out here and along the coast but I wouldn't notice even from 1983 to date if there is a difference, a change. But I know that April is warm now; they're going out earlier for sure.

PIN 158, PAULATUK

[Re: Have you seen changes in the time that they are going into and coming out of dens?] No, no, no, no, no, no. Pretty well the same time.

PIN 164, PAULATUK

[Re: have you seen any changes in where the dens are located, the types of snow bears are using, or when bears are going into and coming out of dens?] Not really, because the polar bears get dug and get covered up. He's

always all ready to look after his young ones even though he's not covered up yet, 'cause the animal is so small, it's big as a weasel when it's born. So when it's having mommuk ["nursing from mother"] or whatever, looks after it, keep him warm.... Even though they're not covered up in snow yet, they wait for months, and when snow start covering over them, they wait 'til they get covered up and they fix their dens later.... it have to blow before it start get covered up in snow.

PIN 23, TUKTOYAKTUK

[Re: have you seen any changes in the dens such as the number or when bears were going into or coming out of dens?] As a hunter we're not looking for dens. We just accidently run into them, or when you're going through a bank where there's usually a den. If [it's a] high denning area, well then you watch for that, because you don't want a bear charging out of the den at you. So it's just by chance a lot of the time, and if you see a track [of a] mother and cubs going out, then you just backtrack them... to see where they came out. That's how you're able to identify these ones here.

PIN 43, TUKTOYAKTUK

[Re: when do polar bears come out of the dens?] Always in March. I know in March, mid-March [Re: has this changed since when you were younger, when bears go into and come out of dens?] I don't think so. I think it is pretty much always, always December to March.

PIN 26, TUKTOYAKTUK

During the 2010 interviews, some questions explored the relationship between community/camp visits and distribution:¹⁷⁷

- Do polar bears come around the community/camps?
- Has this changed since you were young?

Thirty-one TKHs responded to these questions in some way.

These are examples of narratives considered under this theme during the workshop:¹⁷⁸

[We] usually chase them [polar bears] away or shoot them before they do any damage. Since ice hardly around anymore, they come in the summertime now.... They usually come around in the fall time when the ice is just starting to form. [Re: has it changed since when you were younger?] Not really. Hardly saw any. They're usually out in the ice, but there's no more ice to go on now. So they on land. [Re: when you first moved to Sachs, would polar bears come through the community?] Just in the fall time.

PIN 131, SACHS HARBOUR

A lot of them [polar bears] would come to the shore, waiting for it to freeze up more.... Sometimes they come by a community. We used to see more.... in the fall.... More ice close by.... [Re: are people having problems with polar bears in the community?] I don't think so, no. Just Earl. [Laughter] He the lucky one. Every fall or every other fall, he usually shoots a polar bear. [Re: are people having more problems with bears today than when you were young?] Not really. Like I said, it's been getting more quiet, really.... Not as many, no.

PIN 133, SACHS HARBOUR

[Re: do bears come around Sachs Harbour?]. Usually in the fall time.... It is really not that noticeable, maybe a little bit more. But not too much more.... You'll have problems this time of the year [if] you have seals laying around, but nobody has seals laying around anymore.... That's usually what they come in for, because some of them would be kind of hungry. [Re: are there any other places where people have been having problems with polar bears?] I don't think so. Not to my knowledge anyway. If they are, they are not telling anyone.

PIN 138, SACHS HARBOUR

Even healthy ones, I usually see them close to town, in here anyway. People get them — not really fat, but fat and must be curious ones; not that old, not that young.... left their mother. Old enough to be alone, but some of them are curious, young males.... some females — mostly young males like to be curious. A few times I usually see that

[polar bears coming near the community], but not anymore; a few times with people, maybe three times, four times... Right from the town.... Around the '90s, '80s, early 2000.... Nowadays, there is not much signs for polar bears even close by, not like long ago.

PIN 121, ULUKHAKTOK

[Re: do bears come around the community?] Oh, yeah. I got, what, three bears when I lived in the community right in town.... two in the '80s and two in the '90s. Right in Queen's Bay. They were in good shape. In good shape, but why they came is there was lots of seal meat out here, and there were dog teams out here, dogs. Even though they were fat, even though they had fat in them, they weren't scared. They weren't scared of dogs. There were a lot of dog teams out there. They came to the seal fat, started eating from the seal fat, and we shot them.... They came into town; and also, maybe a couple of years... came into town, just out here, so... They were good bears.... average health, medium size.... Mostly males. Young males are so curious.

PIN 117, ULUKHAKTOK

Every year, we get bears coming to town, close by, every year. Not a year goes by without a bear sighting close by. Not once I see a year go by without a polar bear coming close by.

PIN 117, ULUKHAKTOK

[Re: have people been having more problems with bears?] I don't know. I never have a problem with bear.

[Re: polar bears coming into the community or camps] Just a few years ago I see one coming into a camp. For how many years we never see a bear? A couple years ago at my brother's camp I see one. [Re: is this happening more frequently now than when you were younger?] I dunno. When I was younger I don't really know much and I forget those times already. I know in those days, you never see much around those days. There was lots of food at that time. Seals around, maybe that's why. No need to look around so much. They [seals] were all over down on the sea ice, but hardly see the bears around. [Re: more polar bears coming into camps than when he was younger] I think it's 'cause there's too much open water. Not much ice. They're travelling more on land.

PIN 123, ULUKHAKTOK

Sometimes they do [come around the community].... It doesn't happen every year. Maybe once every five years or something like that. [Re: when you were younger, would bears still come into the community?] It's happened a few times. [Re: why are they coming into the community?] Looking for food, maybe.... Maybe hungry. [Re: would polar bears cause a problem at the camps in the old days?] I haven't heard of that. [Re: any stories of bears coming into your camp?] No, they never come around.

PIN 113, ULUKHAKTOK

[Re: are more bears coming into the community now than when you were younger?] Long ago, a lot of bears used to come in close by here. In my younger days, I see a few of them come real close by. This year, we seen one this way, not far, about probably five, seven miles, I guess; and a few days ago, three of them come under the bluff right here. That's all I seen. [Re: are these bears problem bears?] No, I don't think so.

PIN 114, ULUKHAKTOK

[Re: have more or fewer polar bears been coming into the community] No, not these two years; before that, in early '70s, there was a bear... might have been a couple of them, but there was just one behind where our powerhouse is right now... and it was shot there.

PIN 145, PAULATUK

We had to kill a couple back then in the community, polar bears.... Back in the '80s. Since then we've never seen polar bears come into town. Other than the one Bobby got on top, inland.... There was another one, mid-'90s or early 2000s. They ran into bear tracks.... But I've never heard or seen any problem polar bears since [the] '80s.... I heard a couple days ago or last week, that they shot a polar bear, a problem bear, in Sachs Harbour, two or three weeks ago.

PIN 160, PAULATUK

[Re: polar bears coming around Tuktoyaktuk] Not that much. Once in a great while they come to the harbour or the point or whatever.... Last one was about three, four years ago; must be, or five years.... every five, ten years, maybe? [Re: problems with polar bears], no not in Tuk. Grizzlies, that's the one we wanna get rid of. They wanna wreck your camp when you got a camp. There's so much grizzlies in the north now, they're dangerous too. They wanna kill you, too.... That one year, we go pick berries, we gotta carry a gun. Twenty, thirty years ago we don't have to.

PIN 33, TUKTOYAKTUK

Well there have been three or four [polar] bears in my lifetime [that came around Tuktoyaktuk]. Three for sure, that I know of. [Re: are people having problems with bears in Tuk?] No, not polar bears, but definitely nowadays starting to be grizzly bear problems.

PIN 44, TUKTOYAKTUK

No. I never hear about anybody having problems. I guess they come into the settlements every once in a while, but [people] always have dogs, too — loose dogs. I guess it keeps them away from coming to the igloos, wherever you get their meat cached. They never used to tie dogs long time ago — keep them loose. They don't even have dog teams. They might have two dogs, that's about it.

PIN 17, AKLAVIK

[Re: are people having conflicts or problems with polar bears on Herschel Island?] No, not with polar bears. Although we've had them come through the settlement area, we've never had any problems with the bears. Once they see the humans, the smell of humans, or else just the starting of the snow machine, generally the bear just turns and takes off. A lot of our bears in the western Arctic are hunted, been chased, been darted, you know, with choppers and Skidoos and whatnot, and they tend to turn tail when they see humans.

PIN 19, AKLAVIK

[Re: have bears been causing more problems in camps lately?] That varies, too.... Some years they do and some years they don't.... When people leave too much waste and things like that, maybe that attracts them... When everybody leaves in the fall time and they're not staying in their camps, the bears will come in. And if you leave food in your house, they're going to, if they've done it before, they'll do it again.... They're always watching out for them, because there's usually a lot of kids around, too.... Usually, in the fall time, they'll be hanging around. They'll come right in to our camp, too.... right when it starts to get dark. They'll come right into camp.... Just showing us who's the boss, I guess.

PIN 12, AKLAVIK

Discussion, 5.4: polar bear distribution

Workshop participants discussed changes they have observed in recent years concerning the location of maternity dens in relation to snow and wind conditions. Whether the time of the year when females and cubs enter and emerge from their dens has changed was considered to a limited extent.

In the Ulukhaktok area, a number of former den locations have been abandoned because prevailing winter winds shifted to the east and snowbanks suitable for denning have not formed there. Hunters used to find dens in the Ramsay Island area with the help of their dogs in the old days, but this area no longer has much snow and therefore no dens. Recently, less snow in some areas may explain why females and cubs have been seen emerging from their dens a little earlier than normal (i.e., March). Even though there was little snow one year, hunters encountered a female and cubs on multi-year ice in the Wynniatt Bay area and surmised that they may have been denning in the snow accumulated alongside a “glacier” there. A number of valleys on Victoria Island may be good for denning because of accumulated snow, but Ulukhaktok hunters do not travel in the area and as a result, they cannot confirm the existence of dens there. In general, contemporary knowledge of maternity den locations is constrained by the fact that hunters no longer use dog teams to tend traps along the coast. Previously, dogs would sniff out dens along creek banks and in other locations where drifting snow accumulated.

With shifting winds, Paulatuk hunters have not seen dens on Fiji or Booth islands in the Cape Parry area for the past ten years.¹⁷⁹ One of the Paulatuk workshop participants said he recently saw a den on the east-facing slope of Fiji Island that he had never seen before, and he was anxious to return to see if denning was still occurring there. An area by Pearce Point looks as though it would be a good denning location, but the only people who travel that way are going out to check Distant Early Warning (DEW) Line sites, and they have not reported seeing any females, cubs or dens there.

Tuktoyaktuk workshop participants reported that they get a lot of snow in their region, but the timing of it varies annually. Although they do not experience the high winds that Ulukhaktok does, the prevalence of open water late into the fall may have an effect on coastal snow accumulation. Without ice, snow cannot drift ashore to build up along the bluffs. They have incomplete knowledge concerning den locations these days because few people travel the entire coastline after freeze-up, which would put them in a better position to observe dens. Despite this change in land use, however, in recent years they have observed female polar bears heading inland to den if there is not enough snow along the coast to support denning. One of the participants said that “[p]eople have seen tracks even in the tree line. I have seen tracks between Inuvik and Tuk in November, so if there is not enough snow, they go as far inland as they could” (PIN 161, para). The terrain along the shores of many lakes on the Tuktoyaktuk peninsula is steep, which creates good snowbanks and therefore good denning conditions. Females and cubs emerge from their dens at much the same time each year — end of March, April — as they did in the past. In general, over the years, his “observation of polar bear dens along the coast never really changed” (PIN 161, para).¹⁸⁰

The Inuvik participant at the workshop reported that den locations in his hunting area were stable. When they encounter the tracks of females and cubs that have just emerged from their dens in the spring, the tracks are pretty much in the same locations each year.

With respect to changes, if any, in polar bear visits to communities and camps, a number of workshop participants said that bears frequently visited their hunting camps on the ice, particularly when they had dog teams and used seal meat to feed them. Seal meat and other attractants, even small amounts of “stink oil,”¹⁸¹ will attract polar bears from a great distance because they have a very keen sense of smell. Whale carcasses along the shore attract bears in large numbers.

Polar bear visits to Ulukhaktok, Paulatuk and Tuktoyaktuk are rare. Visits to Aklavik and Inuvik are extremely rare given their locations far up the Mackenzie River delta, beyond polar bear habitat.¹⁸² On one occasion back in 1980 or 1981, a bear entered Tuktoyaktuk during school hours and attacked local dogs before it was shot. About four or five years ago, another polar bear was shot by the island in front of the community where sled dogs were tethered. Last year, a polar bear was seen at the north end of the town dump during the fall, but it headed out into the ocean after a brief stay. Inuvialuit have been seeing more bears along the coast near Tuktoyaktuk in the fall in recent years. At Paulatuk, two polar bears recently wandered through the town dump, walking north along the shoreline. One of the Paulatuk workshop participants said that he had seen a polar bear near the community only once since he moved there in 1975. In contrast to all the other Inuvialuit communities, Sachs Harbour stood out as experiencing many more visits from polar bears in recent years; this was attributed to the prolonged open water season in the fall these days.

At the end of the discussion, the workshop participants arrived at a general consensus regarding polar bear denning behaviour and visits to camps and communities over time. In some parts of the ISR, Inuvialuit are not seeing maternity dens in the same places as before due to changing wind and snow conditions. Nevertheless, there is no evidence of a change in the number of dens. Females and cubs may be emerging from dens a little earlier in some areas, but it is still within the normal time period. In

general, there are no increases in the frequency of visits by polar bears to camps and communities, with the exception of Sachs Harbour, which is a special case. Last, there is no evidence that shifts in den locations, an increase in the frequency of polar bear visits to Sachs Harbour, or sightings of bears along the coast near Tuktoyaktuk have any impact on the abundance of polar bears throughout the ISR.

5.5 Seals as a food source

Workshop participants also discussed whether there had been any changes in polar bear food sources. They focused on ringed seals; possible changes in other food sources — such as bearded seals and bowhead whale and beluga and muskox carcasses — were not discussed. Twenty-one TKHs talked about food sources during their 2010 interviews, primarily in response to these questions:

- Has the distribution of seals or whales changed?
- Has their body condition changed?
- Have the numbers changed?

Narratives, 5.5: Seals as a food source

These are examples of the narratives considered in response to these questions during the workshop:

And maybe their food [for seals] is not as much as before. Seals and ugyuk. A couple of years ago, in summer, there was a lot of dead, what do you call those? Almost shrimp-like, but they're small. Isopods [shrimp]. Qinguk.... One time the whole coast here was lined with dead qinguk.... And the first time I saw it, my dad was alarmed.... maybe two, three years ago. Some just recently.... July, August, somewhere around there.

PIN 131, SACHS HARBOUR

A lot of times the snowdrifts aren't big enough, and a lot of the seal pups are dug out by foxes.... It happens, I guess. You just happen to run into something like that, eh? Pulled out of them.... There's so many of them, some of them got to get caught. But now, lately, I don't know about so much snowdrifts. 'Cause you don't have enough big ice to make snowdrifts. Because the winds are so fierce now that snow doesn't stay anyways.... To build up.... The wind blowing too hard for now.... Probably have an effect on seals, where they have their pups and that.

PIN 133, SACHS HARBOUR

A couple of years now, we're having a hard time with seals. Because the ice keep breaking up and opening up and going early. When it used to never break, we used to have seal pups; because seal pups, with their mom, they stayed on the ice and it never break. We have lots of young seals and seal population grow. But now, the place where we used to hunt seals, the ice is starting to break up; and the place where they have their pups, the ice takes off and drifts out. And that's how come the place where we used to have young seals hardly have any more young seals.... Right now [16 February 2010], the ice what we've got right now, it's not breaking. People that are getting their seals, they've got pups inside. So, it should be a good year. But if the ice keep breaking, what is going to happen with the seal again?

PIN 117, ULUKHAKTOK

If this ice was good, like in the 1980s, we would never have a shortage of bears. We could have been getting all our quotas all the time.... It's not the animals that are getting few. It's the ice that's moving, and the seals are on the ice. They're moving someplace else, that's how come. When the seals are not along the shore, it's hard for us to hunt seals, because the ice moves out and the pups move with them, because their dens are on the ice. They open up and move out. And also, they open up, close, smash, because there are no more breathing areas; they'll die, and that's how come. This part, where we used to hunt, it's just the same thing. It takes the seals out, and then the polar bear goes out.

PIN 117, ULUKHAKTOK

We get the impact by global warming. Also, the bears do, they feel it. They don't hunt, they don't get that many seals like the old days. No more forty belows... [In the past], just around the area there, right there, I run into seal kills, of all kinds of bears. But now you can't even see one. Not even one kill.

PIN 164, PAULATUK

There is no certain areas, but they [polar bears] is always passing through.... They don't stay in certain areas. They just keep moving along.... The only time they stay put is when they get an animal, they get a seal. If not, they just keep going. That's why you had kills around this area here all the time. Nowadays, there is not even one kill I run into, last twenty some odd years. Zero: they're running out of seal.... Maybe the ice conditions is number one [reason]. Maybe a little more solid ice, it's a little more north. That makes sense to me, anyways. But you go south, all this no more ice.

PIN 164, PAULATUK

I go out there sometimes, never see a seal anymore. That's why we know the seals will be going. I mean, they are not there anymore. Usually we get a seal in August. The seal migrating, passing through Darnley Bay, never miss. Lots of seals, hundreds. Fifty to a hundred in a bunch, they are travelling.... You see, I got a summer camp right here. That's my summer camp, right in the coast. Usually I go with the boat, there are a lot of seals. Now, nothing, zero.... Always starting to migrate through, when they start a rut. In August. Used to be lots and lots of them; now nothing.... Be about six, seven, eight years ago, really started to change.

PIN 164, PAULATUK

You could find them a little bit scattered here and there. But what I am saying is the seal is not like what it used to be 25, 30 years ago. Usually there is an odd one here or there...That's why the bears are not getting so much seal now. I know I could see a few seals here and there.... It's harder for bears to get seals now.

PIN 164, PAULATUK

Discussion, 5.5: seals as a food source

For the most part, these sample narratives imply or say explicitly that local seal numbers have declined or that there may be some other problem with the seals. It should be noted, however, that this does not properly represent the perspectives of all 21 TKHs who responded to questions related to changes in seals. Perspectives were much more diverse. For example, when asked if there are more or less seals today compared to when he was younger, an older Ulukhaktok hunter said, "It's hard to tell. We seem to be getting less, but seals moving — travel a long way.... Sometimes they come back, sometimes they go a long way" (PIN 122, Ulukhaktok, translation). A younger Paulatuk hunter said there is an abundance of seals, at least towards the end of the summer, which appears to contradict observations made by other hunters from his community.

[T]here's more now. Because fur prices shot down in the '80s. Back then, when I helped my mother and father do the seals, we used to do them in the summer, on average say, about July, August. From August to September would be about ten a day; about 150 per summer. So there's got to be more now, because we quit hunting seal... because the prices went down. And we're seeing an abundance of seals now in this area. Getting way too much seals now in this whole area here, where fish congregate.... From Lasard Creek area from all the way down here.... Feeding on char and cod.

PIN 160, PAULATUK

In any event, the omission of these contrary narratives from the workshop presentation was immaterial. The narratives that were presented had the desired effect of focusing participants' attention on the question of whether there have been changes in seal numbers and conditions over time.

During the workshop, Sachs Harbour participants noted that there have been plenty of ringed seals in the waters offshore of the community in recent years and that they had seen seals in the harbour the previous fall even when there was no ice for them to haul up on.

Ulukhaktok participants reported that there had been very few seals in their waters during the previous two years and that the previous summer was particularly poor. One of the participants was well placed to observe seal numbers in this region because he worked with DFO as a seal monitor. He said that the reason for the low numbers may have something to do with the ice conditions. When the ice breaks up and melts early in the spring, the young seals leave their mothers too early and die. Inuvialuit find dead seals along the shore when this occurs. In particular, they tend to find dead seals along the shore following strong westerly winds with large waves. The other workshop participant from Ulukhaktok had worked with a seal biologist on a project that involved attaching radio transmitters on seals. One seal, caught in July in Safety Channel southeast of Ulukhaktok, had travelled to Wynniatt Bay to the north by August, after which it returned to the Ulukhaktok area in September over a seven-day period. He concluded that the seals follow their food sources over great distances.

Workshop participants from Paulatuk also reported that for the previous two years people from their community had been finding dead young seals on the beaches in their area. They had never seen such numbers of dead seals before.¹⁸³ Normally, they would observe seals hauled up all over the ice in the summer. But in recent years, the Paulatuk area had seen a lot of wind from the northeast in the spring and early summer, which broke up and removed the ice. One of the participants speculated that the seals may have gone farther north where the ice was or that they were “stressed out” because of the lack of local ice. Nonetheless, a longer-term cycle must be considered, because seals, like polar bears, are not sedentary. They go through cycles in the Paulatuk area, characterized by good years when they are abundant and poor years when they are scarce.

One of the Aklavik participants spoke of the many years he had spent hunting and fishing along the Yukon North Slope between Shingle Point and Herschel Island. This stretch of coast has an abundance of seals. Up until two years ago, he fished for char and herring the first week of July between Kay Point and Herschel Island. The last time he fished there, he observed many small seals along a twenty-mile (32-km) stretch of shoreline and assumed that they were following a school of fish. A group of twenty seals was spotted at the entrance to Ptarmigan Bay. The seals left the area a week later.

Workshop participants drew few conclusions from these assorted observations concerning ringed seals, other than they are highly mobile like polar bears, and go through cycles in terms of their local abundance. However, Ulukhaktok and Paulatuk participants reported unusually large numbers of young, dead seals in their areas over the previous two summers. No connections were made between these observations and polar bear abundance or distribution.

5.6 Climate change effects on polar bears

Workshop participants considered whether climate change is having an effect on polar bears. TKHs talked about the matter during their 2010 interviews, primarily in response to these questions:

- If the weather has changed, how have bears been affected?
- Have they adapted successfully or not?
- If the ice has changed, how have the bears been affected?
- Have they adapted successfully or not?

Narratives, 5.6: Climate change effects on polar bears

These are examples of the narratives considered under this theme during the workshop:

They [polar bears] stay out farther now. Where all the young ice is, I guess.... The seals have their pups mostly way out now and before that, it used to be closer. But with all the rough ice.... it's not predictable anymore. In the past, it used to be flat pans of ice. But now it's all small, little.... 'cause of thinner ice, the pans aren't as big anymore.... And not good seal habitat anymore.

PIN 131, SACHS HARBOUR

The ice, if it's really melting too much, what are the bears going to do? They're out there looking for food, seals, and there's no more ice. How are they going to go out there? The summertime, how are they going to get seals?... I don't know; if there's no more ice, they're going to have trouble for sure, because even right now, that ice go out. It's melting quite a bit now. It's not like when I first went to Banks Island. It's a really big difference now.

PIN 2, INUVIK/SACHS HARBOUR

I think if it don't freeze-up early, then the bears must be still sticking around north there. They just don't come much anymore this way. That's why it looks like there's hardly any bears. It's different now.... If it freezes up early, then maybe the bears would be here around Christmas or whatever.... They used to come around Christmas quite a bit, but nothing for a few years; for five years, six years, nothing now. It's so nice out, there's lots of water, but they don't come anymore.... We're usually hunting before Christmas.... I know one time, quota finished before Christmas.... I think two times it used to be finished.

PIN 122, ULUKHAKTOK

Well, the way I see it today. It's really different compared to '60s. It's climate change, I'm pretty sure, making everything change here. And it's hard for polar bears to survive in the winter because the ice is so thick, and the seals, I'm pretty sure we're losing millions and millions of seals because of the thickness of the ice. And I'm pretty sure they're having a hard time keeping those breathing holes open all year round, like right from October until the ice goes.... because of ice piling up. And climate change, I'm pretty sure makes it difficult for seals to keep their breathing holes open all year — six, seven months. That's the one big change in the ice that I see today, even though I haven't had a chance to go out there yet this year. But I would see with my two eyes that things are way different from the day I was born.

PIN 125, ULUKHAKTOK

I think they're moving out farther to where the multi-year ice is. Always used to have this ice back in here years and years ago, all over, like that really thick ice.... And there used to be polar bears there all the time anywhere you travel around. I dunno how this thing is going, but from them years to nowadays, I think it's really affecting the polar bears. They're moving farther out, or they're just hanging around the beach, where when the ice moves. They're probably have to stay around the beach or go swim way out after the ice, or just keep following the ice.... Stay way out on the multi-year, and later on, only later in the winter, they'd probably move back in again when the ice freezes up. That's a big change, though.... If you think about it, it is a big change with the ice conditions.

PIN 145, PAULATUK

I think they move out where there's more ice. There's hardly any more polar bears where we used to hunt long ago.... Not hard to find polar bear here and there long ago. Nowadays, nothing. I think they move over somewhere east maybe, 'cause no more ice, no more icebergs. I think seals move in shoreline nowadays, no ice.

PIN 29, TUKTOYAKTUK

Weather seems to be becoming more unpredictable.... It probably affects them [polar bears], too. They're meat-eaters. They need to survive with the seasons; and with things warming up a little bit, just a couple of degrees in a matter of a number of years, that's got to have a big affect on a wild animal like that.... The ice is not forming like it used to form, so the bears have to have someplace that they can go and get their food from,

especially [since] they live on the coast and they depend on the seals. When the ice is not forming quick enough, they've got to be on land. What are they going to get from the land? They can't chase caribou. They're not going to be able to catch a caribou, I don't think.

PIN 102, INUVIK

Several TKHs discussed climate change effects on polar bears during their interviews in the context of other topics, not directly in response to change questions, and several of their narratives were presented to workshop participants.

[Re: were there any ways that people in your community monitored changes in the polar bear population, ways that they know if the polar bear is doing well or not?] I never hear anybody saying if the bears are doing better than usual. But you hear lots of talk on TV, saying that because of the climate change, bears are dying and drowning and swimming longer. But I've never seen anything like that, never heard of anything like that."

PIN 103, INUVIK.

[Re: do you see bears over-summer on Herschel? Once the ice is gone, are the polar bears gone?] This global warming is happening, and these bears will have to adapt to what's happening. This bear was up between Aklavik and [Fort] McPherson pretty much the whole summer, like July–August, and you wonder what it was feeding on.

PIN 19, AKLAVIK

[Re: you haven't seen a change in the number of cubs at all?] There is a lot of bears out there. But then other hunters [in] different areas can tell a different story. He believes too much of the scientists, this guy.... They believe on the scientists too much... Like now, they go with them [the scientists]. I said he is not trying to say they should have observed myself. What I am doing, I've sampled what I got over here. This guy over there he is saying "that's what the scientists told me," but he's a hunter. Do all your own observations over there. Over somewhere around Baillie too... [There's a] lot of that stuff going on. But I think we have to get together somehow... This is what I like to see, come together with everybody.... really go over the thing. Because nowadays I say global [warming] is here. The seals are really in danger here, okay? Like I said, I used to observe seal kills right around the area. For years now it's been really nothing. That's what I noticed.

PIN 164, PAULATUK

[Re: Inuvialuit hunting polar bear cubs in the old days] Since the global warming, everything changes. And polar bear, first time we seen them up the river. There is one in [Fort] McPherson; it get brought back to the ocean. They can't live without blubber, they live on the ocean. They brought him back to Herschel Island with the helicopters and one month later he go back up again. He got back and he ended up right here again. He can't live off the land. Brought back. It's a global warming; you can see what's going on.

PIN 22, TUKTOYAKTUK

[Re: what kind of things are you looking for when you're watching the ice?] Outside of Warren Point, we went out there. The open water was the normal [distance out], about forty miles. But it was really rough.... This is the first time you hear about polar bear cannibalism, from researchers that same year.... Because the ice conditions were just so bad, for not only a human hunter, but polar [bears]. It was just really difficult. When bears move around a lot, they gotta move; they couldn't stay in one spot, because the hunting was so difficult.... You could trace it to the scientific reports when they started seeing some cannibalism.... You could trace it to that year.... It's more like in 2000, 2002 maybe.... That's not too long ago.

PIN 43, TUKTOYAKTUK

Discussion, 5.6: climate change effects on polar bears

The participants in the Inuvik workshop said that climate change is a tough subject. There is no doubt that climate change is occurring, but they have not yet observed changes in polar bear abundance or condition, and they are reluctant to make predictions about its long-term effects on the bears or on seals and other animals. Nonetheless, several of the participants did — carefully — speculate about the effects of climate change.

It is obvious to everyone that changes in temperature, freeze-up and break-up, ice conditions, wind and storm patterns have been occurring since the mid-1980s. They have been even more noticeable over the previous five years, with later freeze-ups and more open water into the winter. Inuvialuit notice the effects of climate change on a daily basis. In the past, they relied on their TK when they went out on the ice, but changing ice conditions have thrown some uncertainty into the reliability of this knowledge and made harvesting increasingly dangerous and difficult.

Workshop participants spoke of the important ecological relationship between sea ice, polar bears, ringed seals and fish. Seals need the kind of conditions that are good for algae accumulation along the underside of the sea ice because Arctic cod feed on the algae and seals eat the cod. As a result, seals travel with the ice; that is where the food is. One of the Tuktoyaktuk workshop participants said that he had seen Arctic cod on top of the ice; they had been thrown there when the ice popped open explosively in response to pressure from winds and currents. On occasion, seals will have shrimp in their stomachs; hunters know this because they check the stomach contents of the seals they harvest. In the past, Inuvialuit would wash and eat the food found in seal stomachs.

In formulating their opinions about the effects of climate change on polar bears, the workshop participants combined their TK with other sources of knowledge, some of it scientific. Participants from Tuktoyaktuk and Paulatuk spoke of reports from marine mammal observers aboard the icebreakers Amundsen and Louis St-Laurent, and from seismic survey vessels that had travelled far out into the Beaufort Sea. Numerous polar bears and seals were sighted by the observers.¹⁸⁴ Other participants mentioned the aerial survey of polar bears conducted by the Beaufort Regional Environmental Assessment in March 2012.¹⁸⁵ Only four polar bears were seen during seven days of long-range flying.

Tuktoyaktuk hunters have seen or heard of numerous sightings of polar bears on land, which they assumed were waiting for ice to form in the fall. One participant noticed this himself starting about ten years previously. In his view, waiting behaviour like this seems to be a form of adaptation, and he expects polar bears to continue to adapt as the climate changes in the future. An Ulukhaktok participant worried that if there is less ice, polar bears may spend more time on land, where they will start bothering Inuvialuit camps in search of food. Nonetheless, there will never be a winter without ice, said one of the Paulatuk participants. “We will never run out of polar bears because the ice will be there, and the bears will follow and move with the seals” (PIN 144, Paulatuk, para).

For the Inuvialuit, the future cannot be predicted; it could be good or bad as far as polar bears are concerned. However, the consensus among the workshop participants was that polar bears are highly intelligent animals that can adapt to climate change because they have been adapting to many things for thousands of years.

5.7 Summary

Throughout three days of deliberation, participants in the 2013 PBEC workshop concluded that the physical condition of polar bears in their areas has remained stable over time. Fewer Inuvialuit are seeing maternity dens in the same places as before due to changing wind and snow conditions; however, there is no evidence of a change in the number of dens. The emergence of females and cubs from dens is still within the normal time period. In general, there are no increases in the frequency of visits by polar bears to camps and communities, with the exception of Sachs Harbour. Moreover, participants argued that there is no evidence that any shifts in den locations, an increase in the frequency of polar bear visits to Sachs Harbour, or sightings of bears along the coast near Tuktoyaktuk have any impact on the abundance of polar bears throughout the ISR.

A variety of observations concerning ringed seals were shared by workshop participants. They drew few conclusions from these observations, other than the animals are highly mobile and go through cycles in terms of their local abundance. No connections can be made between their observations and polar bear abundance or distribution in the Beaufort Sea region.

Overwhelmingly, the message conveyed by workshop participants was that ice conditions, the effects of climate change and polar bear behaviour are extremely complex. As with all the 2010 PBTK study participants, they recognized that sea ice conditions have changed dramatically within their harvesting areas since the mid-1980s, with later freeze-ups in the fall, earlier break-ups in the spring, thinner ice, receding floe edges, more rubble ice, no more multi-year ice, and pressure ridges that no longer form predictably in the same locations from one year to the next. However, there has always been annual variation in sea ice conditions, and as a result the numbers, distribution and condition of polar bears has varied as well.¹⁸⁶ Everything depends on annual ice conditions, the workshop participants emphasized repeatedly.

Notwithstanding the strength of this statement, it would be wrong to conclude from it or to read into it that the observed importance of sea ice as polar bear habitat and the changes in sea ice conditions and ice coverage are factors that determine the maintenance of polar bear habitat and the corresponding maintenance of polar bear health and abundance. The interviews of the TKHs indicate a diverse set of observations and conjecture about changing ecological conditions and their short-term and long-term effects on polar bears.

The TKHs who participated in the 2013 PBEC workshop were emphatic about the importance of the ice-polar bear relationship. The question of what may happen in the future if ice conditions are consistently or frequently poor was not addressed. The TKHs did not wish to speculate much about the future and long-term polar bear survival trends. For the TKHs, much remains uncertain regarding changing ecological conditions, as well as how polar bears and those who hunt them respond to these conditions.

It should be noted that there are two points of divergence between the 2010 data and the conclusions of the 2013 workshop participants. In 2010 no participant identified a trend in the frequency of polar bear visits to their communities or camps, but the January 2013 workshop participants agreed that bears had been visiting Sachs Harbour with far greater frequency over the last two years than they did previously. This is in line with what one of the Sachs Harbour TKHs said during the confirmation workshop in his community in October 2012: “There tend to be more polar bears around town in the fall the last couple of years” (PIN 132, 17 October 2012). Second, Tuktoyaktuk workshop participants noted that polar bears have been seen more frequently on land in the fall, waiting for the ice to form. None of the Tuktoyaktuk TKHs interviewed for the PBTK study in 2010 mentioned this point.

Section 6

The importance of polar bears to the Inuvialuit

Polar bears and the harvest of them have been an important part of Inuvialuit culture and economy for countless generations. In the days before trade in industrially derived commodities took hold, and when Inuvialuit lived outside of settled communities, polar bear meat was a welcome addition to the family diet, nourishing people and their dog teams alike, especially at certain times of the year when other foods were in short supply. Furthermore, polar bear pelts provided clothing, mattresses and tools for maintaining sled runners.¹⁸⁷ Apart from the bears' economic contribution, they also nourished the Inuvialuit imagination, due in large measure to their strength, agility and above all, their great intelligence.

Polar bears could also be lethal to humans, especially in the days when hunters were armed with no more than bows and arrows, spears and snow knives. Hunting polar bears in those days took great courage as well as skill in order to grapple with them in their ice environment. There is little wonder, therefore, that polar bears feature prominently in Inuvialuit mythology, spirituality, storytelling, art, song and other forms of cultural expression.¹⁸⁸

6.1 Economic importance

The PBTK study did not set out to systematically document the economic importance of polar bears to the Inuvialuit. The questionnaire used to elicit PBTK across a range of topics focused primarily on

biological and ecological matters, and as a result the economic and cultural aspects of the relationship were touched on only superficially. Nonetheless, a number of TKHs spoke of economic matters in terms of traditional uses of polar bear meat and pelts, their economic contribution during the fur-trade period, and more recently in terms of guided sport hunts.¹⁸⁹ TKH perspectives on the economics of polar bear harvesting vary from one community to the next and may reflect historic and regional differences in fur prices, as well as access to the DEW Line and sport hunting markets.

In the postwar period, from the mid-1940s to the 1960s, the prices that hunters received for polar bear pelts were not high, but were relative to the overall cost of living. Income from the sale of polar bear pelts was especially welcome when fox trapping was poor due to the cyclical fluctuation in fox abundance (Usher 1970b: 76). A Paulatuk hunter reminisced about how one Christmas his father was able to buy him a new sled from the Hudson's Bay Company store with the money he earned from the sale of a polar bear pelt.

I remember my father took me to the Hudson's Bay Company there, just after hunting, and he'd sell his skins just before Christmas. I wanted a little sled... those little wooden sleds you lay on.... They're Red something. I remember him taking his bears there and buying me that sled off the rack. 'Cause he could afford it. I don't know how much it cost, maybe 12 dollars for that sled, but that time 12 dollars was like two months of food. But he actually afforded me a sled by getting so many bears. And there was no market for seal in the wintertime. Just for polar bears and foxes.

PIN 160, PAULATUK

Another Paulatuk hunter said that prior to DEW Line construction near the community in the 1950s, polar bear pelts were used mostly for clothing. However, DEW Line employees were a new market for the meat and pelts and were willing to pay good money for them. The economics of polar bear hunting changed overnight.

There was a lot of hunting, because what they do, they trap around the area, around Cape Parry and all over Darnley Bay. That's in them days before they sell the bears, since they were using it for clothing, mitts, leather pants. That was then.... They were taking a few, I believe, them old days. They had to have some bear meat for the winter, because there are no caribous out there. Every chance they get I am sure they get the bear. That was the old days.... Then they really started to change. Everybody was out there. In them days it was about 100, 200 bucks for a bear skin, in [the] '60s. That was good money.... about 30 bears right from Cape Parry, them days. Thirty bears a year, it was pretty near before I really get into hunting. The other elders would get at least 25, 30 bears a year right from Cape Parry.... They were selling it to the locals in the DEW Line. Two hundred bucks was good money, so everybody was staying out. They wanted to see if they could get a bear. One year alone they were getting 30 bears, 25 to 30 bears a year. But it has never been recorded. That was before the quota system kicks in.... Them days, there must have been a lot of bears. Man!

PIN 164, PAULATUK

A Tuktoyaktuk TKH said that DEW Line personnel purchased polar bear meat at a time when the pelts sold for far less than those of white foxes.

Ain't even worth skinning those days, so when the DEW Line came up they start asking for bear skins. That's where they started raising the price a little bit.... 250 dollars, 350 dollars, going farther up. They didn't mind, 'cause they were making lots of money in those days, and it really helped us, 'cause in some years there is hardly no foxes. Selling them to the DEW Line people we could make a good living there.... These guys used to usually use it for meat. 'Cause everybody love polar bear meat in those days. In those days [polar bear pelts were] not even worth selling. While the white fox fur was fifty to sixty bucks, a polar bear might be worth only 25 dollars. So with all the work, it's not worth killing it. But a lot of Eskimos [Inuvialuit] like it for food, so [we'd] use it.

PIN 23, TUKTOYAKTUK

The economics of polar bear hunting in the Sachs Harbour area where there were no DEW Line stations was different during this period. One TKH from the community said that in “[t]hem days, polar bears weren’t worth much. It was mainly food and just for the hide. Used the hide for something else rather than sell it... wind pants, mitts, whatever” (PIN 133, Sachs Harbour). Another Sachs Harbour TKH said that polar bear pelts were hard to sell, and when they did, little money could be obtained for them. These days, however, the pelts are worth much more, and craft items made from them fetch good money.

Well, once in a while, when we need subsistence meat and that sort of thing. Those days the polar bear were hard to sell. Only 75 dollars for a ten-footer them days. No market. So we just hunt mostly for the meat.... They would do a lot of hunting for subsistence meat and that sort of thing. And a lot of them they make handicrafts like clothing for their own use with skin. Now it’s pretty expensive to make handicraft out of the hide. [A pair of polar bear hide mitts sell] for 500 dollars now. You can’t just grab a knife and say, “Make me a pair of mitts”.... In them days, when the market first opened, I think a lot of them were given away to other people for clothing and that sort of thing. But when I first started, 75 dollars them days was a lot of money. You can’t even buy ten gallons of gas.

PIN 132, SACHS HARBOUR

The 1970s brought significant changes in the economics of hunting polar bears. On one hand, the price of pelts increased considerably and Inuvialuit began guided sport hunting (Box 5).¹⁹⁰ On the other hand, the Inuvialuit made the transition from dog teams to snowmobiles, which brought increased needs for cash income in order to purchase the machines and pay for gas and parts.

Box 5. Guided sport hunting

Inuvialuit involvement in sport hunting was authorized by government in 1970 and continued under the IFA (see Appendices 5 and 6). The agreement gives the Inuvialuit the exclusive right to harvest polar bears, and co-management regulations that require sport hunters to retain Inuvialuit guides, who transfer their quota tags to them.

Guiding provides income to Inuvialuit hunters and an economic rationale for the continuation of the polar bear hunting tradition. Moreover, the income from guided hunts pays for the costs of all kinds of harvesting activities (not just polar bear hunting), which increase yearly due to increases in the cost of gas and other operating expenses. As noted by one Paulatuk TKH, guiding sport hunters is a significant source of income for Inuvialuit.

A lot of these people in these communities, [it’s their] main source of income. The hunts go far to providing for your family for the year. Even if you get one hunt, I don’t know what the last hunts are going at, but thirty thousand dollars goes a long way.... I think for that time [in his youth], from what I been told the bear prices were really good in the ’70s and ’80s. I think the bear prices were good even back then. I might be mistaken, but I heard two hundred dollars a foot. Even back then, and that’s what subsistence bears are being sold for now. So you look at the price difference and cost of living, it was really big money back then.

PIN 159, PAULATUK

Subsistence hunting of polar bears continues alongside sport hunting, in part because it is a source of meat for some families, particularly for elders. This point was made by a Tuktoyaktuk hunter when asked how they would cope if there were changes to polar bears or their habitat.

It would affect a lot of people, I guess. Especially ones that get income from sport hunting and that, and for the fur. A lot of people too, elders, eat the polar bear. We don't just leave the carcass, we bring back pretty much everything. Plus for the dogs too, dog food, and that's a lot of grub there. You never waste the meat.

PIN 151, TUKTOYAKTUK

A Paulatuk TKH spoke at length about why he got involved in sport hunting. His motives had as much to do with continuing a tradition passed to him by his father as any monetary benefit. However, the personal satisfaction he gained through guiding waned over the years due to the pressure of trying to satisfy his sport-hunting clients. He stopped guiding once it became clear that an American government ban on importing polar bear products into the United States would seriously erode the client base.¹⁹¹

It all depends on if the guy [sport hunter] wants to experience the whole nine yards. We'd go out at the end of January, or if he just wants to go bask in the sun, we'd go out in April. I used to get a partner and go out when we were doing this back in the day, before the sports hunting. We'd go out and we'd spend five days to a week out there until we both got our bears. We'd go camping in one of those buildings there. And then we'd get out there and spend the night with a tent out there. This is subsistence I'm speaking about. And for sports hunting, it'd be a ten-day trip, just about. I'd been doing it since '85 to 2007.... It's just the way the game is played, I guess. I got guys [clients] who are really by the book, and at the same time I had a proven record, so we were by the book. We're not trying to cut any corners.... We're there to have the guy get the experience and the bear. It wasn't about the money at all. It was something my dad passed down to me. It was fun, no pressure, it was like a picnic. It was so much fun, eh? And then after a while, after we got into sport hunting, I was still young at the time and full of ambition, and go the extra ten yards for the guy every time. But the thing was starting to become no fun because it was always the pressure in the back of your mind to get the animal. The longer you stayed out there the harder the pressure is. But the reason I quit, I was seeing the market was going to drop.

PIN 163, PAULATUK.

Apart from the economics of polar bear hunting, it is clear in the interview transcripts that polar bears remain highly esteemed by a great many Inuvialuit, particularly older people who grew up with them in one way or another. The following narrative from a Tuktoyaktuk hunter clearly speaks of this admiration.

I've seen them climb up [while I was] chasing a bear. And there's a wall [of ice] straight up, maybe twenty feet straight up, just in a little angle, nowhere to grab. I'm chasing that bear and it's heading for that wall, and I thought, well I'm gonna get him when he's trying to decide if he's gonna go to the wall and stop. The bear just kept going, and he went right over that darn thing, and I couldn't even climb up it to see what's going on. There's no grip anywhere. [The bear] climbed right up twenty foot... It's amazing what this animal [can do]. It's their environment, and it's hard to believe, but that's what happened. [There's a person who] is a witness to that. I'm not just talking and telling you a story off the top my head. All the stories I been telling you about got a witness to them.

PIN 43, TUKTOYAKTUK

According to one Paulatuk TKH, polar bear hunting was more highly esteemed among the Inuvialuit as a whole in former years when people still spent a great deal of time on the land, ice and water trapping foxes and participating in other harvesting pursuits. Their increasing involvement in the wage-labour economy appears to have eroded the prestige of the polar bear hunter.

I don't know why it changed back in the '80s; starting in the '70s.... I was basically stationed in town back in the late '70s and '80s, 'cause I was working back then. Back then you could see that the life of the community was based around polar bear hunting. Foxes at that time. Everybody was out on the land. If you got a polar bear, then you were respected, because you could go out there and get polar bear. You knew the ice, you knew the conditions. You know all of that. You got a polar bear, you were a well-respected person. But from the mid-'80s, starting in the '90s, it all went away. There was other purposes in the community. Work, the work force came into the

community, Darnley Bay, the hamlet. We switched over from a settlement in '87 to a hamlet, to where we are now. And all the jobs started coming in, heavy equipment, carpenters and things like that. Then we started losing the hunter and people that actually went out and did the hunts.

PIN 160, PAULATUK

The high cost of living in the western Arctic, including the price of gas, oil and food, has deterred many younger people from travelling great distances in pursuit of polar bears, particularly where Inuvialuit based in Inuvik and Aklavik are concerned. Wage labour in the towns provides more income than what they can earn from harvesting polar bears. This combination of economic factors means that even though Inuvik and Aklavik received three and five polar bear tags respectively per year, they were rarely all used.¹⁹²

The last polar bear was 2008. Before that, polar bear was harvested, another one — jeez, I can't remember what the next one was — 2005, 2004? The price of gas, the price of food, the harvesters are just not going out there and harvesting the polar bear. Or if they are, they're not spending the time. I don't have the resources to spend the time out there for ten days, two weeks at a time. Generally, these people that are going out are just weekenders or else three, four, five days. It's not like what we used to do long ago, where we used to go out and just spend two weeks out on the land, just living out there, harvesting what we harvested. This generation, no, it's more the cost is high.... They'd get more money in town, doing that job, rather than going out there and harvesting that polar bear.... Everything is so high: the cost of food, the cost of gas, oil.

PIN 19, AKLAVIK

6.2 Cultural importance

Despite such socio-economic pressures, contemporary polar bear hunters hope their traditions will be continued by younger people. When asked how the Inuvialuit would cope with changes to polar bears and their habit, a Paulatuk TKH talked about the importance of polar bear hunting (Photo 30) in relation to the global forces of cultural change that engross so many Inuvialuit youth.

We're definitely going to change, for sure, we're good at that. We're good at change, but it's going to be a tough one, no doubt.... My age group is going to have to really step forward and push it into these young guys that don't want to learn about it. We got to push it; we got to actually push it, to make them learn today. They're in the modern world today. I don't blame them for that; everybody wants to live in the modern world. But you know, there's things like polar bear hunting that is a part of our life, has been part of our lives, and will be part of our lives for, I'm hoping forever and ever. Because it's a part of us, eh?

PIN 163, PAULATUK



Photo 30. Polar bear hunting camp — a hunter, his dogs, snowmobile, komatik (sled) and a tent.

Jean and Pat Ekpakhohak

An Ulukhaktok TKH talked about the modern-day influence of television and computer games on Inuvialuit youth and why it is important to share their stories of polar bear hunting and life before permanent settlement with them.

I think these stories that I'm telling you, it's good for young people, because they never once seen a guy hunting polar bear with a dog team. They only see it on TV with Skidoos or something. You know, some of those kids — our grandkids — especially my grandkids, never seen a guy like myself making a snow hut to live in. And none of those kids are born in igloos. I know quite a few Inuit people were born in igloos, too. I'm one of them. I'm real proud of that because it reminds me of how the elders or people before me were born. That's how they lived — suffered. But it's not suffering. This is how we're brought up, kind of in the middle of hard times and good times. And those stories that people before us tell us is really important for me because the way I see it, we need to pass it on to our younger people.... They're not going to see those stories no more because nobody's telling them anymore. Sometimes, I feel, too, that it would be nice to bring it up to the school and tell stories of how we were brought up to this world. We were never brought up to watch TV or games on TV. There was no TV when I was born. And we had to get some ice every day or cut some wood or cut some ukhuk [seal/whale fat/blubber] for the stove. We didn't have no electricity. We had to use gas lamp and oil stove, ukhuk, for seal oil. That's what I was brought up with. But none of these kids saw this in their own life. All they see is TV.

PIN 125, ULUKHAKTOK

A Tuktoyaktuk hunter was optimistic that his hunting traditions would continue: “[t]hat lifestyle, go hunting, is always going to be there to ensure at least the next generation gets to experience it. It has to carry on” (PIN 24, Tuktoyaktuk). An Inuvik TKH was also optimistic about the future place of polar bears in Inuvialuit lives. He felt that the experience of just seeing them, with or without hunting, was meaningful in its own right.

I think the Inuvialuit are always concerned about the health of the polar bear and the population, because the polar bear has been a part of our lives all along and will continue to be. I think that if we notice a big difference in the number of polar bears or a loss of polar bears, it would have a great effect on the Inuvialuit. Just to see them is great! You don't necessarily have to be hunting them all the time.

PIN 102, INUVIK

A Sachs Harbour TKH made a similar point. A person does not need to harvest polar bears in order to enjoy them and the environment they live in.

Lot of times I come back skunked.... [But] it's fun if we go.... That's the highlight of the trip. Even if you don't get anything.... Even if you just see them, you went 200 miles, brighten up your trip. You win some; you lose some. We're not here to try to kill off as many as we can, that sort of thing.

PIN 132, SACHS HARBOUR

Hunting, trapping and fishing is a big part of who the older generation of Inuvialuit — who were raised on the land, ice and water — are as individuals and as a people. The Beaufort Sea and its terrestrial margins and the various activities they carried out there are the foundation of their sense of place. Moreover, the memories of this place are shared with other Inuvialuit whenever the occasion arises. Such memories and the oral tradition that transmits them are the heart and soul of Inuvialuit history.

A healthy oral tradition is an old one, including stories that occurred long before the current generation of elders was born. For example, an Ulukhaktok elder who was interviewed for the PBTk study related experiences with polar bears that he had not witnessed himself; they are stories passed to him by his own elders.

The stories of when a hungry bear goes into a camp, the middle of the night, really dark. The dogs are howling and barking, making noise, a lot of commotion. And the bear finds a stash of meat that's in a porch of a snow

house. He would go into the porch and start eating, and the occupant of the snow house would grab his snow knife. Even though it's pitch black, pitch dark, they'd go out into the porch, and they could hear the dog growling, and they could also hear the bear eating away or doing something. Just by the feel of the fur of the bear — because there's a difference between dog hair and bear hair. Bear hair is thicker, coarser or feels different than dog hair. Just by that feel alone, they would feel which one is the bear. And even though it's really dark, stick their knife and kill a bear in their porch, the starving bear. Those are stories he's heard. And stories also of bears that haven't been hurt or harmed in any way by another person — by human beings — that a human being would just go up to the bear and touch the bear and pet it or communicate with it. [These are] stories he's heard, but personally he has never experienced anything like that. Even though the bear is a fierce animal, it's very kind and gentle to some people. Those are stories that he's heard.

PIN 120, ULUKHAKTOK, Translation

As noted in Section 2, the Inuvialuit required great courage, skill, endurance and resilience in order to hunt polar bears and live on the sea ice, and it is the sea ice that sets the stage for much of the story-telling that helps define who the Inuvialuit are today. One such story is that of another elderly Ulukhaktok TKH; as a girl she had to overcome her fear in order to assist her father, who had been badly wounded by a polar bear.

They camped over at Kayalihuk and Ihuuhik¹⁹³ checking traps, and all of a sudden their dogs took off. As the dogs were taking off running she had her dad inside the toboggan with a blanket over him.... She was in the back of the toboggan on the handle. As they were travelling, he called out to his daughter and told her to slowly put the anchor down without making it get stuck all of a sudden because the dogs are going for the polar bear tracks. When the anchor got caught on the hard snow, her dad got off the toboggan. He had a rope. She put a rope around his hand in case he fell off the sled and that's what he used to hold on to. And when he got off the toboggan and started to walk towards the leader [lead dog] he saw polar bear tracks. He took his mitten off and checked the tracks to see if it's tummit, a fresh track. When they noticed it was a fresh track, her dad told her, "Take the dog chain, the grub box, the stove, blanket and the caribou skin." She left those inside the toboggan, took out everything else and left them out. He went back inside the toboggan and she used his string to keep him tight so he won't fall off and to keep his blanket.

As they continued chasing the polar bear, following the tracks, the dogs were on a full run and in the distance she could see smoke...the fog from the breath of the polar bear. She could see it, so she asked her dad, "What are we going to do?" She put down her anchor and stopped, and her dad told her to take two dogs off the harness. The two dogs took off after the polar bear. The two dogs that went to the polar bear, they were keeping it in one spot so it won't take off any further, by barking around it and keeping it in one area. During that time, it seems like they were ready to shoot the polar bear. They continued going after the bear until it was far enough for a shot.

Her dad took his gun out of the case and got ready to shoot. She took one more dog off the harness to help the two other dogs. When he got out the sled he grabbed his walking cane and took his gun with him and began walking towards the polar bear. As her dad was getting ready to shoot, she took the last dog off the harness. The one that was barking at the polar bear took off straight for her dad. And the polar bear did the same thing, running after the dog, as her dad was getting ready to shoot.

Herself, she grabbed her snow knife and started running to her dad. As she was getting closer, the polar bear gave up chasing that dog and turned to her dad. When the polar bear started going after her dad, he put his head down with the gun, like this [gestures], and he shot the polar bear, but he didn't kill it. He shot it by the shoulder area. When the polar bear reached her dad, it went over on top of him and took two bites.... After the polar bear bit her dad, the polar bear went onto his side, onto his tummy and died.

When her dad got up from the snow, he ran around for a little bit and then called out to her, "Come here, it must've cut me." She got scared. She got very, very scared. And without knowing, she began yelling out into the

air. She doesn't remember what she said. He had four punctured holes on his back. Herself, she didn't know what to do because she got too scared.

He told her not to worry, but to take the liver out of the bear, right away. After she took out the liver from the polar bear, she gave her dad some water from the thermos. Then he asked for a piece of fat, so she gave it to him. He told her not to worry, to work on the polar bear. Afterwards, she made a square shelter. She piled two blocks of snow on top of each other until it was big enough for her dad to sit up. And she put the stove and the lamp inside and covered the top of the shelter with a canvas tarp. She lit her stone lamp and her other lamp to make it warm enough, and she made a bed for him to sit upon using a caribou skin overcoat. Fixed it up so he could sit without him lying down.

And then she skinned the polar bear. She was in a hurry skinning the polar bear. Then she finished skinning. As she was cutting up the meat of the polar bear, every now and then she would go into the shelter to check up on him, and he would tell her not to worry, he's doing fine. During the night, he slept himself, but she didn't sleep much as she was watching over him. After the next day, they took the meat and the skin and they went back to their other supplies they left on the land. They left some of their meat on the land to pick up later. Then they picked up the rest of their supplies and continued on to their main camp. Later on, she didn't want to go with the polar bear hunters anymore, but her uncles and her dad didn't want to leave her behind anymore. He healed well, so he lived a long life.

PIN 101, ULUKHAKTOK, Translation

Telling stories about polar bears is a memory lane to the past and a highly personal link to parents, grandparents and other Inuvialuit ancestors.

My grandfather used to tell me stories about his life hunting. They go with dogs, walking with a bow and arrow and a spear; and they stay out there with no food. Wintertime, they could stay out there without eating three days sometimes, three nights, but they've got a water bottle made out of skin. They keep it inside their coat. And they told me they stay out there three nights, sometimes two nights. When they get a bear they eat a little bit of raw meat, polar bear meat. That's what they used to tell me, anyway. And they take two dogs along, three dogs along with no sled — walk. They used to tell me when they go out there, maybe seven miles. I said, today it's that cliff [that's] almost a blue colour. When you go a little bit far, the colour of the land is — how do you say? Purple-y, blue-y or something like that. When you go out there, they start seeing a lot of bears, long ago. When they're doing that, they talk to themselves, "We're getting into polar bear ground."

PIN 114, ULUKHAKTOK

An Aklavik man's father told him a story about using a set-gun to hunt a polar bear when they lived at Barter Island, Alaska. The bear died of injuries, but not those caused by the gun.

My dad probably killed at least five bears that were coming into our house on Barter Island. They come into the porch and he shot them — probably about five — before we came to Canada. My dad got a polar bear once — he just shot the skin here, just touched the skin.... I was only about seven years old when that happened.... What happened was my dad had probably two, three rifles. So, he went out in the ocean on an iceberg — high iceberg, a hundred feet.... And he set his gun out there against the bank where the iceberg was — put it right against. And he set the gun and put a bait on it and put a stick on it. It was a kill set. He'd leave the gun out there. And when they're trying to grab that piece of meat or blubber, the gun is aiming. And he touched it, and I guess when the bullet went off, he missed it — only touched him here. But I guess the bear, in excitement, fell over the cliff — a hundred feet. He went about two, three hundred yards, and he died from injuries from falling over the cliff. Pretty good shot, eh?

PIN 15, AKLAVIK

An older TKH from Ulukhaktok shared a lengthy narrative about a female polar bear that became a human while her cub became a dog. It illustrates a key aspect of the Inuvialuit worldview: there is little

differentiation between humans and animals and they can transform back and forth. The narrative is an origin myth that explains why polar bears resemble humans in certain ways. At the end of the narrative, the translator said that “ancestors have told us to pass these stories on for many, many generations, that originated tens of thousands of years ago or just 500 years ago. That’s been passed down for years and years and years, those stories.”¹⁹⁴

The stories our ancestors have used.... This guy go out hunting to the hunting grounds, the caribou hunting grounds that his father and his grandfather had gone to before. On his return trip, he could see a plume of smoke coming out of his tent. He never worried about it. He seen it a few times happening. When he’s going back home, he sees a plume of smoke. After a while, he wanted to find out what was actually happening. He went to find out what or who was making meals for him. When he gets home, there was food prepared already — tea, everything all ready, all set to eat when he gets back to his tent. But there’s nobody around, no one around to see.

One day, he decided he would pretend to go out hunting to his usual hunting grounds, but stay a little bit distant and watch his tent. He went in the direction of where he usually goes hunting, and then he made a turn and went to an area where he could hide, but keep an eye on his tent. He really wanted to find out exactly what was happening, why food is prepared for him, and stuff like that when he got home.

While he was hiding, watching his tent, a couple of bears went over to his tent. The bears went and got up to his tent and removed their skin. And by that, they put their snout out onto the ground, and their skins peeled off of them. The female took her skin off and became a human being and got all dressed in caribou skin clothing, and all that, and then started preparing food for the occupant of the tent (I guess).

He got out of his hiding spot and went over to his tent and confronted the bears, but out of the female bear, he cut up the skin of that female bear, the bear that had become a person. He had cut up the skin of that female bear, so there was no way for that female to turn back into a bear....¹⁹⁵ The other bear that went to the tent with the female became a dog, his pet of some sort, like some animals seem to do.

When he had cut up the skin of that female, that bear couldn’t turn back into a bear; let’s put it that way. So, he wanted her to become his wife. That cub became his dog and the female became his wife, because that male could provide very well, could provide food. I guess that female wanted to stay with him.... The female was much stronger than the male. So, she would carry more when they’re moving from camp to camp; carry more of the provisions, the stuff they need for the camp.¹⁹⁶

When they got inside of his parents’ camp, his parents had seen that he’s coming home with a female. So, they figure that he’s got a wife now. The mother was running over to them, really happy and everything. “I’ve got a granddaughter!” When they got to camp, they greeted everybody, and when they were leaving again, that female bear could pack a lot more than the male. Anyways, they would use the fat of caribou or something for straps and for covering their provisions, their camping gear or any stuff like that, their sewing stuff, and pack them. Anyways, the one who was a bear who had turned into a human put that on.

The mother wanted to help them when they were leaving, help them to another camp. The one who was a polar bear, that female, gave her pack for the mother-in-law to carry. She just handed it to her like it was nothing. That woman was going to put it on her back, and the mother-in-law just collapsed. She fell right to the ground because it was too heavy for her. She couldn’t pack that packsack, so the male packed it for her instead. When they moved to the camp, that’s where they lived as a couple for the rest of their lives. That female bear never changed back into a bear. She just stayed as a human being.¹⁹⁷

Because of that story, he figures that.... the bear meat or bear fat has got the same texture as human flesh. That’s where that story probably comes from maybe. That’s his last words there.

Inuvialuit who know the land, ice and water enjoy telling and listening to one another's stories. Some of them are of harrowing experiences: difficult, sometimes terrifying accounts of dangerous ice and close calls with polar bears. Others are humorous, such as this one about a close encounter between a hunter who fell asleep on his sled, a dog named "Lazy" and a polar bear.

I'll tell you about the polar bear I got. It must be about nine foot, over nine feet anyway. I got one not far from Sachs Harbour. I went early in the morning. It must be about 6 o'clock in the morning. I was kind of tired. I was only about 19 or 20 years old back then. I was going along thinking nothing; nice, clear weather like this, sunshine. This was around the tenth of May, and I was going along and [I was] tired, so I go to sleep on top of my toboggan.

While I was sleeping I started to wake up, hitting really hard my toboggan on that ice and snow. In the spring-time, really bright. I look and I can't see good. I finally could focus and I looked in the front. I said, "Gee, that's funny." The rest of my dogs are galloping really fast. Later I go really slow like this [gestures], and then I realize it was a polar bear. So, right there, I got excited, I guess.

I was going to grab my rifle when my toboggan hit a snowdrift and I fell off. I fell off before I could grab my rifle, a .243. A couple of minutes later, the dogs catch up to the polar bear and go all around it and stop it. Boy! I get really scared. I don't know what to do. I got no rifle. I got no knife, nothing! Everything, it's in my toboggan.

So, right there I don't know what to do. Stand around a long ways about half an hour, about maybe 100 yards from the dogs and the polar bear. I was right there, and I started thinking, "Maybe if I run to my toboggan I could grab my rifle."

Sure enough, I got brave enough and I grabbed my rifle, because it was on top. It was under the lash. I grab it first and I run back, and then, the polar bear was going like this [gestures] to the dogs, because he's too ticklish of the dogs. He can't bite anything, because every time he turn away another dog bite him on this side.... When I grabbed my rifle, I was running back and thinking, "That bear must be chasing me." I look back. That bear was still doing the same thing to the dogs, still hitting at [them].

So, right there I feel tough. I know I got five shots in my rifle. So, put shell in it, and get about thirty feet away from it. One of my dogs is so lazy I call him "Lazy." Pull [the toboggan] only when I'm walking, then they finally could pull. I got really close to it and make sure that it's over the dogs. I don't want to shoot my dogs. Sure enough, I shoot him in the head here; somewhere closer to here, I guess. The bear just drop like that. When it drop, I could hear one of my dogs there is really hollering. I figured, "Gee, I must've shot one of my dogs, too." But what happened was that when it dropped, it been landing part of him on top of Lazy, that lazy dog. So, I just kept him there for a few minutes. He never did get hurt.

PIN 115, ULUKHAKTOK

Several Inuvialuit women hunt polar bears, and some have harvested a considerable number of them. During the community confirmation visit to Ulukhaktok in October 2012, one female Inuvialuit harvester said, perhaps out of modesty or in jest, that she could not remember how many polar bears she had killed. A Paulatuk TKH noted that she had challenged the traditional views of some elderly women in order to hunt polar bears herself, and so that she could play her part in transmitting Inuvialuit traditions to a younger generation (Photo 31).

I used to get in trouble from the elderly women. They would tell me women are not supposed to be going out hunting. Women are not supposed to be wearing men's travelling clothes; the old traditional belief that women are not supposed to be out there. I just pushed it aside.... I am not sure how much the elderly women would have hunted back then, but nowadays you don't see women going out to hunt.... You don't see very many of the young people or women going. A lot of the time it's because our community is so remote, everything is so expensive, the

gas, the groceries, everything is so expensive. So it is kinda hard if you don't have the right equipment to be going out, to be able to do that.... [The traditional role for women was] fleshing the hide and drying them, tanning them, sewing with them, the pants and maybe mitts.... Because of who I am as an Inuvialuk I believe that it doesn't matter if you are a male or female. It is all a part of who we are as a culture. To carry that tradition on and continue passing it on to our children. 'Cause my oldest daughter, she was like, "Mom, can I go hunt a polar bear when I get older?" She knew that I got one myself. I said, "Yeah, you can do anything you want; just finish school."

PIN 150, PAULATUK

Hunting polar bears and sharing the meat and other products of the hunt integrates a hunter socially into his or her community, and it pleases the animals who monitor the extent to which humans are generous in their relations with one another. Sharing meat is a way to show respect to the animals, as noted in Appendix 5.

When you help others, the animals know. So if I'm helping elders in the community, even the fish, caribou, helping them with meat, single mothers, if I am helpful to community members, the animals, the elders say, that the animals come to you. If I go out camping somewhere, because of my good deeds, the animals will come to me when I am hunting. But if I am not helping others, just for myself, then I would have a harder time, because I am thinking of me, and the animals are more apart, they are not close to you anymore because of your actions. You see what I am getting at? You're helpful in the community when you go out hunting. The animals come to you, instead of me going to them.

PIN 158, PAULATUK

Inuvialuit never forget their first polar bear hunt. The event lodges permanently and vividly in their memories and serves as a rite of passage in their lifetime development as human beings.

I couldn't forget that first hunt. Me and my two buddies were trapping along the coast towards [Cape] Dalhousie and they were hardly getting any foxes, 'cause that year was really poor for trapping. One of my buddies mentioned polar bear hunting, so we thought about it, had a little meeting, and we went straight out to the ice from our trapline. That's how I got started. It was fun! I couldn't forget that trip....

When we had a meeting, we said that the first person to get a bear will be the oldest one. We'll give it to the oldest hunter, and so that trip we only got one, and we give it to the oldest hunter between us....

6



Photo 31. Jean Ekpakhohak is dedicated to passing her traditions to younger Inuvialuit.

Jean and Pat Ekpakhohak

When we got to the bottom of it [Russell Inlet], we decided to go out for polar bears. We went straight out, and it took us a long time 'cause we started from the bottom of the bay. Mid-winter: it's cold and rough. Somewhere out here is the floe edge. We reached the floe edge, and when we got to it, we make camp. When we were inside the tent me and my other buddy, the older guy, he stayed on top looking around from on top the high ice. It was nearing that time when me and my other buddy were having tea inside the tent, joking around and laughing, just glad to be settled in the tent.

The older guy came down and he was all excited. He said, "You guy's better keep quiet. There's a polar bear coming." So we all got ready, put on our parkas, boots and whatever. We ran on top the ice to go check, and sure enough, there was a polar bear coming towards us from the east side. We watched it for a good 45 minutes, almost an hour, just watching it coming towards us. He didn't know we were there. Nice big bear. It was coming straight. It couldn't go anywhere else. Ice was too young, too thin for it to walk on.... Me and the younger guy we couldn't keep still; we were so excited to see a bear. So the older guy had to keep telling us to keep quiet, keep still. It came almost within rifle range and we didn't wanna take a chance in shooting it, 'cause we might just wound it and then lose it. So we waited, and for some reason, it started to walk out, then it change its mind. It came back upwards towards us and started following the edge again, at which point we knew it was heading for smoother ice, the way it was heading. So we ran back down to our tent, and start up our Skidoos, and followed the older guy. He was looking for a way to go out, so we can stop the bear from running out into the thin ice, which is what we did. We waited for it to go on smooth ice, solid ice, then we cornered it. He end up shooting it, the older guy. It was fun.

PIN 27, TUKTOYAKTUK

For some Inuvialuit, hunting polar bears is part of a bigger bundle of agreeable experiences, including the use of dog teams and bear dogs.

It is very enjoyable. I really enjoy hunting polar bear by dog team, especially when the dogs are smart. When you come across polar bear tracks and you untie your dog from the harness; when the dog is very smart, the dog will follow the polar bear tracks. As the dog is tracking the polar bear, when it reaches the polar bear, it will keep it in one place by biting on the hind legs, barking at it, keeping it in one place. That is why the polar bear stays in one place. When you hunt polar bear that way, it is very good.

PIN 124, ULUKHAKTOK

Polar bears, hunting them and travelling and living on the sea ice are worthy topics for contemplation and conversation. They provide the ingredients used by older Inuvialuit to constitute their personal and collective identities, and also nourish various forms of cultural expression, in addition to storytelling. Several contemporary Inuvialuit print-makers and carvers, for example, use polar bear characters and themes in their art work, Mabel Nigiyok and Louie Nigiyok among them. Both of these Ulukhaktok artists were TKHs interviewed for the PBTk study.

Polar bear hunting has also inspired Inuvialuit song. An Ulukhaktok TKH spoke of one that a friend had composed about the old days, when he shot an exceptionally fat male polar bear that had denned.

One of my friends wrote a song about a den that he had spotted. So, he went up to it and shot the bear, which was a big huge male. He couldn't skin it in that area, so he rolled it all the way down to the ocean. There's a song written about that. Both males and females do have dens. Usually the bears would go to their traditional spot or to the area they've been to make a den; the female would go to the same spot to make a den again in that same area.

PIN 120, ULUKHAKTOK, Translation

Outsiders with little if any direct experience of life on the land, ice and water may have trouble understanding the intensity of feelings that older Inuvialuit have with respect to polar bears and their environment. However, they can achieve a modest appreciation of this vicariously and cross-culturally through Inuvialuit stories, art and songs. There is an aesthetic undercurrent and an Inuvialuit sense of

the sublime to all of this, as can be seen in this account by a Tuktoyaktuk TKH of fog, polar bears and a sport-hunting client.

Not every year you see this, but they're [polar bears] watching us, certain times of the year. For instance, this spring, that's the first time I see a bear walk out of the fog. It just got foggy. You can't see two hundred yards. The [sport] hunter gave up, went to the tent there, just down below, sitting there. I told him, "Look, that's the third one. Fog won't stop them from moving around." Five minutes after he went down, I see this almost green appearance, and it comes right out of the fog, standing right there. I knew it was coming. So all these experiences, you don't experience them every year. But there's the odd time it's just a beautiful picture when you wanna see, because you're hunting them... Every time you see something different, it's something that you wait all your life to experience. They [polar bears] reveal themselves to you. It's just the best feeling. It's not only the hunting experience, that you go out there to get a bear, but you just enjoy it... Out there, wherever you lay your head, that's home out in the ice.... One [sport] hunter, I was explaining to him, "There's where we're camping. Welcome to my home!" After we set up tent, taking pictures, I told him that's our home, and back here in the land, Baillie Island, about five miles out, that's my back yard, and this ocean, that's my front yard. You gotta be comfortable where you are, and that's home.

PIN 43, TUKTOYAKTUK

Such perspectives are devalued by contemporary industrial societies, where too many people choose to strip the world bare of its richly textured meanings, emotions and sense of place. The lives and world-views of urban citizens in particular are in stark contrast to those of the Inuvialuit, who have spent their lives on the land, water and ice; who see great beauty in the geography of their place and the footprints of their ancestors everywhere; and who actively contemplate their relations with one another and with the other animal beings who share that place with them.

Section 7

Closing discussion

Many other TK studies have documented knowledge, but not the methods by which TKHs know what they know about animals and other living beings and the world they inhabit. This report describes in considerable detail how Inuvialuit come by their knowledge of polar bears: primarily through inter-generational transmission, direct experience, daily social interaction and use of modern mass media and technologies.¹⁹⁸

7.1 Inuvialuit knowledge of polar bears

Central to PBTK is the point expressed by one TKH that “all that knowledge never really clicks until you’re actually experiencing it” (PIN 43, Tuktoyaktuk). This points to the fact that TK is largely related to survival — safe travel and harvest for food and clothing — and the requirements are many, including technical knowledge, fortitude, tenacity, courage, quick thinking, emotional self-awareness and discipline and self-confidence based on experience, in addition to knowledge of polar bears. Moreover, an essential hunter attribute is respect for the animal. This includes an appreciation of the strength, agility, intelligence, willpower and potential lethality of polar bears. How Inuvialuit harvest polar bears, then, informs and is informed by their TK.

As a general rule, Inuvialuit harvesting is planned according to weather and ice conditions and knowledge of where polar bears are most likely to be found. Sea ice serves as the main platform for hunting, with preferred hunting spots reached by snowmobile and/or dog teams. Inuvialuit polar bear hunters concentrate their efforts along floe edges, cracks, pressure ridges and other ice features where

ringed and bearded seals haul up or have breathing holes and birthing dens. Until recently, and despite annual variation, many of these features were found with some certainty in the same locations year after year. This included headlands and across the mouths of straits and deep bays, where the currents of the Beaufort Sea bring moving ice into contact with landfast ice or ice grounded in shallow, shoal areas near shore. Inuvialuit hunters are strategic in the decisions they make about where to look for polar bears.

Ice matters

The underlying theme for almost all topics addressed in this study is that ice matters. Everything from polar bear condition to mating, reproduction and polar bear harvest of seals to Inuvialuit harvest of polar bears depends on ice conditions. The range in local and regional ice conditions accounts for much of the variability in the views of Inuvialuit TKHs.

There has always been significant annual variation in sea ice conditions and hence in the local abundance, distribution and condition of polar bears and their primary prey. As a result, caution is required in thinking about climate change-related effects on polar bears. Nonetheless, Inuvialuit recognize that there have been substantial changes in Beaufort Sea ice conditions since the mid-1980s that have affected their harvesting activities and opportunities to know and learn from polar bears. Changing ice conditions and a warming Arctic in general are a great concern to the Inuvialuit TKHs who participated in this study.

Polar bears and climate change

In general, TK holders said that the physical condition of polar bears in their areas has remained stable over time, although there is considerable variation from one season to the next, and even within a given hunting season. There appear to be fewer really big bears and they are not as fat as they were prior to the mid-1980s.

Ice and seal hunting conditions are important, but are not the only factors determining where polar bears hunt. The complex matter of actual and potential changes in polar bear abundance, distribution and condition is an important part of the PBTK study and this report. Observations, propositions and theories (OPTs) concerning sub-population-level changes were brought before a group of TKHs during a Polar Bear Environmental Change workshop in January 2013 so that Inuvialuit could interpret their own data. The consensus of the workshop participants is that it is premature to conclude that the abundance of polar bears in the Beaufort Sea has declined and that their overall condition has permanently deteriorated, given the complex nature of polar bear interactions with sea ice and seals.

The number of polar bears in the Inuvialuit polar bear hunting area (generally the Canadian Beaufort Sea region) have remained relatively stable during the living memory of study participants. While TKHs stated repeatedly that ice conditions are changing, they also stated with equal vigor that ice conditions have always been highly variable.

7.2 Potential management applications of Inuvialuit PBTK

Protection and preservation of Arctic wildlife, environment and biological productivity is one of three founding principles in the IFA. Conservation is tied to that principle and underlies the management of polar bears in the ISR. The starting point for the application of PBTK and biological science in practical support of polar bear management begins with the requirements of conservation as defined in the IFA where conservation “means the management of the wildlife populations and habitat to ensure the maintenance of the quality, including the long-term optimum productivity, of these resources and to

ensure the efficient utilization of the available harvest.”¹⁹⁹ On that basis, management of human activities with respect to polar bears and other wildlife is carried out and supported by the best available scientific knowledge and Inuvialuit knowledge and experience.²⁰⁰ These are some of the management functions that apply to polar bears:

- determination of polar bear harvest quotas;
- the polar bear harvest season (closed season/time of year when they can be killed);
- where polar bears can be harvested (i.e., in one of three zones — Southern Beaufort Sea, Northern Beaufort Sea and Viscount-Melville Sound) and the locations of boundaries between sub-population/management zones;
- a ban on killing female/cub family units, including in the maternity den;
- restrictions related to the sex of the polar bear harvested so as to maintain an appropriate male-female demographic;²⁰¹
- restrictions related to the method of harvesting polar bears (e.g., requirements to hunt on foot or with dog teams, limits to firepower, a ban on set-guns, etc.);²⁰²
- regulations related to sport hunting (i.e., by non-IFA beneficiaries) and to Inuvialuit guiding of sport hunters;
- tagging methods, provision of measurements, tissue or hide samples, ovaries or baculum from harvested animals;²⁰³
- regulations related to killing and reporting “problem” (nuisance) bears; and²⁰⁴
- CITES permits for the export of polar bear pelts and other parts.²⁰⁵

Inuvialuit participate in and apply their knowledge as co-management partners to decision-making related to polar bear research, conservation and sub-population assessments and management plans. Recent examples include the 2008 maternity den survey (Richardson, Branigan and Stirling 2008), the October 2009 polar bear workshop in Tuktoyaktuk (Slavik 2010), and the current PBTK study; they also report polar bear kill locations, bear conditions and sizes, and provide a male bear’s baculum and other information related to the harvest. Much of this information is gathered by the GNWT Department of Environment and Natural Resources, the IGC and WMACs, and is used to monitor compliance with harvest quotas from each polar bear sub-population and other regulations in addition to changes if any in polar bear abundance, distribution and condition. The information is provided to territorial and federal processes that conduct species status assessments (e.g., processes under the NWT and federal species at risk legislation), and to the Federal-Provincial Administrative and Technical Committees that collate polar bear data from across the Canadian Arctic and make recommendations on applied research and management.²⁰⁶ The information is also used to respond to Canada’s international obligations under CITES and to provide information to the Polar Bear Specialist Group of the International Union for the Conservation of Nature and Natural Resources.

Inuvialuit traditional knowledge is also directly linked to management functions associated with resource development planning and environmental assessment, monitoring and mitigation. Oil and gas exploration in the Beaufort Sea has been a major preoccupation for the Inuvialuit, polar bear biologists, and government agencies responsible for wildlife and environmental protection since the 1970s. The potential negative effects of oil spills on polar bears, increased interactions between polar bears and humans involved in exploration work (e.g., on artificial islands/drilling rigs), and disturbance to denning and post-denning females and their cubs were subjects of various research efforts. The following refers to some that made use of PBTK: *[i]n response to potential oil and gas development in the Mackenzie Delta, CWS [Canadian Wildlife Service] conducted a four-year program to identify and map important polar bear maternity denning habitat of the SB [Southern Beaufort] subpopulation. Researchers conducted aerial*

surveys in March from 2006–09 to locate active maternity den sites. In addition to aerial surveys, CWS in association with the Northwest Territories Department of Environment and Natural Resources and the various Hunters and Trappers Committees conducted interviews in the spring of 2008 to document Traditional Knowledge of denning areas and areas used by females with cubs (Lunn et al. 2010: 120; see also Richardson, Branigan and Stirling 2008).

PBTK has been used in community conservation plans prepared by individual Inuvialuit communities, the WMAC (NWT) and Joint Secretariat (2008).²⁰⁷ It has also been used in the Beaufort Sea Integrated Management Planning Initiative, which was established in 1999 in the context of the federal 1996 Oceans Act, the 2002 Oceans Strategy and obligations under the IFA (see Hart, Amos and ICRC 2004: 3, 65–83).

The practical application of PBTK is potentially extensive given these management requirements and needs, and what is known of Inuvialuit PBTK as a result of the PBTK study and other research. There are several more specific areas where PBTK could be useful:

- Inuvialuit OPTs regarding current and past population numbers (abundance) in various community land-use areas (regional abundance/distribution);
- Inuvialuit OPTs with respect to the future of polar bears in the ISR in response to climate change, focused on abundance, distribution and condition;
- data concerning the cultural and economic importance of polar bears to Inuvialuit and what this means in terms of quotas, the timing of closed seasons, harvest locations related to polar bear management zone boundaries, and context for Inuvialuit participation in co-management processes;
- the consequences of possible future declines in polar bear abundance, distribution and condition for the Inuvialuit, given their cultural and economic importance;
- narratives/data that point to important differences in worldview between Inuvialuit and their scientific co-management partners (and relevant CITES audiences), and which may help to explain the causes of disagreements over mark-recapture and other scientific research methods (which many Inuvialuit view as disrespectful towards polar bears), or which shed a light on foundational views concerning polar bear abundance and distribution (e.g., the theory that animals move away if they are disrespected);
- knowledge of key polar bear habitat locations over time;
- knowledge of key polar bear prey habitat locations over time;
- Inuvialuit observations concerning changes (if any) in polar bear-prey relations (e.g., dietary shifts as a result of changes in sea ice, etc.);
- additional observations having ecological characteristics (e.g., polar bear interactions with fox, wolverine and wolves and/or possible competition with these animals for ringed seals in some areas; polar bear-grizzly bear interactions, etc.);
- knowledge concerning changes in sea ice, freeze-up and break-up patterns and weather and their effects on polar bear abundance, distribution and health;
- knowledge of locations of key ice features (e.g., pressure ridges) and changes in their locations and characteristics over time;
- trends (if any) in human-polar bear interactions in communities (e.g., reasons for polar bears visiting communities and cabins, etc.);
- knowledge of maternity den locations over time, their characteristics and changes in them — since surveys cannot be conducted annually, a den monitoring program may be feasible in some areas; such a program could include tracking local snow and other weather conditions in relation to their effects on den formation and on stability throughout the winter;

- PBTK data concerning historic and contemporary Inuvialuit management of their relations with polar bears (e.g., decision-making regarding where, when and how to kill polar bears); and
- baseline data for future community-based monitoring.

PBTK can provide direction to the Inuvialuit in helping them develop their research and co-management priorities. It can also “provide observations that generate scientific research questions in a similar manner that natural history observations have long been employed” (Peacock et al. 2011: 379). Science-based research can then be formulated that can be used to collect and analyze data related to these priorities and questions. This may be useful in addressing key co-management challenges related to climate change and mitigating and monitoring industrial development in the Arctic. Furthermore, by using various social science methods for the systematic documentation of PBTK, such knowledge can be a valuable equal partner to scientific monitoring methods, especially given the fact that scientific methods are usually expensive and restricted to limited time periods each year. Inuvialuit TKHs are in a good position to collaborate in long-term polar bear monitoring research because they interact with bears during the early winter and other times of the year when scientific research is not feasible (ibid., 380).

7.3 Future documentation of PBTK

PBTK studies are time-consuming and expensive and require an enormous commitment from the Inuvialuit and their partners. As a result, they can be conducted only periodically. Future efforts to document Inuvialuit TK should therefore build on the baseline established by this PBTK study, with supplementary data and analysis where needed, keeping in mind the need to tailor research to the practical requirements of co-management related to polar bears.

The PBTK study was limited in part by its inability to penetrate deeply into traditional Inuvialuit perspectives because of the Inuvialuktun-English language barrier. An in-depth exploration of the way in which Inuvialuktun-speaking people think and talk about polar bears in their maternal language was not possible. Consideration should therefore be given to exploring more deeply the Inuvialuktun linguistic foundation of PBTK in order to document traditional ideas concerning polar bear movements, “populations,” “habitat,” cycles in local abundance, the position of polar bears in an Inuvialuit taxonomy, polar bear anatomy, etc.²⁰⁸ At the same time, the creation of an Inuvialuktun sea ice dictionary, including careful descriptions of sea ice and vocabulary, would help refine understandings of polar bears and their ice “habitat.”²⁰⁹ With respect to Inuvialuit thinking about the “mind” of the polar bear, one productive avenue of inquiry in the future may be to examine narratives in each of the three Inuvialuktun dialects for descriptive terms related to the mental functions and powers of polar bears.

There is a need to explore foundational Inuvialuit perspectives on “nature” and the place of polar bears therein so that wildlife co-management partners and members of the scientific community better understand the premises underlying Inuvialuit thinking about polar bear abundance, distribution and condition in relation to climate change and harvesting.

As noted earlier, the knowledge documented here was derived primarily in response to a questionnaire administered during relatively brief interviews. Therefore, many matters were not addressed; for example, the place of polar bears within an Inuvialuit animal taxonomy (classification system), Inuvialuit knowledge of external and internal polar bear anatomy and sounds (vocalizations, etc.) made by the bears. Other matters could have been explored in greater detail, such as polar bear relations with other animals, their sensory faculties (sight, smell, hearing, touch), some aspects of their reproduction, such as copulation, and their life histories, including lifespan and aging patterns. Such gaps in the documentation of PBTK could be filled through supplementary interviews and participant observation with TKHs.

Various outsiders, as well as Inuvialuit researchers and co-researchers, will continue to investigate and observe the world of the polar bear in small and large ways in the context of any number of research and management initiatives. Some of these initiatives may relate only indirectly to polar bears because they focus on other animals or on ice, water and landscape features, but may still be important in polar bear ecology. Whether directly or indirectly related to polar bears, future research with Inuvialuit TKHs must not repeat the errors of the past, most importantly the all-too-frequent failure to document the TK of Inuvialuit guides, field assistants and co-researchers that is shared “informally” with outside researchers. This point was made by Peacock et al. (2011: 379–380): *[i]nformal TEK has long been acquired through consultations on research proposals and results, as well as by researchers living in communities, and working with local people during field studies. Incorporation of TEK gathered in this manner is poorly documented and therefore it is often mistakenly reported that scientists do not incorporate TEK.*

The systematic documentation of PBTk is essential no matter what the research context is, and new documentation protocols are required that make use of best social science practices (e.g., Tobias 2009). TK research is not “common sense” — for it to be done properly requires training and the application of robust methods. Thus, while Peacock et al. (2011) recommend that “researchers better document their use of TEK in research publications and when communicating with co-management boards and communities,” the recommendation falls short of what is required. Appropriate TK research methodologies must be employed from the start, and researchers must be trained in both the nuances of TK research, a subject of social science inquiry, and in the subtleties of Inuvialuit language (Inuvialuktun and English) and worldview.

Endnotes

Notes to Section 1 — Introduction

1. When referring simply to “seals,” TKHs generally mean ringed seals.
2. For more detailed information about Inuvialuit history, culture and the IFA, see Alunik, Kolausok and Morrison (2003); Bandringa and Inuvialuit elders (2010), Burn (2012); Condon (1996), Farquharson (1976), Hart, Amos and ICRC (2004) and Usher (1976). See also www.jointsecretariat.ca and www.inuvialuit.com.
3. In outlining the objectives of the First International Scientific Meeting on the Polar Bear in Fairbanks, Alaska (6–10 September 1965), chairperson C. Edward Carlson quoted United States Senator E.L. Bartlett: “Scientists know very little about the habits or habitat of the polar bear. They know very little about polar bear movements, reproduction, longevity, or population structure. They do not even know the answer to the basic question whether there is but one population of polar bears moving from nation to nation on the slowly revolving ice pack, or whether there are two or more populations” (Carlson 1966: 7).
4. Note the parallel with the use of local knowledge in the early days of fisheries management, as reported by Schneider, Alcock and Ings (2008: 88). “Based on our review of the documents for the cod fishery, we developed a descriptive model of shifting information sources in science-based fisheries management. During the first phase, scientists gather knowledge of the fishery from fishers informally.... ”
5. Peter Esau and Geddes Wolki were interviewed for the 2010 Inuvialuit Polar Bear Traditional Knowledge Study. In Harington’s 1968 report on polar bear denning habits, he acknowledged the assistance of six Inuit, among them Noah Elias and Tim Lennie of Sachs Harbour. In his methods statement he said, “To study polar bear denning habits it is, of course, desirable to find as many dens as possible. This was accomplished by travelling through regions where dens were reported frequently by local inhabitants.... Finding dens is often difficult, and experienced Eskimo assistants aided me greatly (1968: 6). When discussing core denning areas, he noted, “In some cases, information on polar bear dens or denning habits was obtained from Eskimos.... Most data used were provided by Eskimos I knew well, or had travelled with for extended periods” (ibid., 8).
6. Stirling and Andriashek gathered data on the distribution of polar bear maternity dens by direct observation and by interviewing Inuvialuit polar bear hunters (1992: 364). They acknowledge the “advice, information, and assistance” they received from 17 Inuvialuit hunters, six of whom were interviewed for the 2010 Inuvialuit PBTk study. In the acknowledgements to the 2011 edition of *Polar Bears*, Ian Stirling said he is “grateful to the following Inuk hunters from whom I learned a great deal over the years: the late Andy Carpenter, the late Fred Carpenter, Albert Elias, Peter Esau, Ipeelie Inookie, John Lucas, the late Wallace Lucas, the late Jimmy Memorana [Memogana], David Nasogaluak, the late Henry Nasogaluak, Fred Wolkie, Geddes Wolkie, and the late Fred Wolkie Sr.” (2011: xi). Five of these men were interviewed for the 2010 Inuvialuit PBTk study. See Stirling’s brief account of Ulukhaktok hunter Jimmy Memogana and biologist Tom Smith’s close call with a polar bear. Memogana most certainly saved his own and Smith’s lives, and his sage advice to Stirling on another occasion may well have prolonged the latter’s life as well. “The point of these stories,” says Stirling, “is that one always has to be alert in polar bear country. Or, as Jimmy once said to me while we were working on the sea ice, ‘If you don’t keep looking, the bear is gonna get you’” (ibid., 57). Referring to Memogana as a “walking encyclopedia of life on the sea ice,” Stirling credited the Inuvialuk for recommending a frozen seal pup to train a Labrador retriever to sniff out seals, “‘like the old people used to do long ago,’ Jimmy said” (ibid., 181).
7. Dan Slavik’s Master of Science in Rural Sociology thesis was completed in the fall of 2013 after this report had been finalized for review by Inuvialuit HTC’s and other bodies (see Slavik 2013). As a result, PBTk from Slavik’s master’s research was not compared to that documented in the context of the Inuvialuit PBTk study and is not referenced here.
8. The Inuit term *qaujimajatuqangnit* [cow-yee-ma-ya-tu-kang-eet], means “things they have known for a long time.” According to Thorpe et al. (2001: 4), this is “knowledge, insight, and wisdom that is gained through experience, shared through stories, and passed from one generation to the next. More than just knowledge, as commonly defined, [it]... includes a finely tuned awareness of the ever-changing relationship between Inuit and *nuna* (the land), *hila* (the weather), wildlife, and the spiritual world.” Inuit studies scholar Jean Briggs notes that the Inuit conception of “knowledge” is more complex than the Euro-North American one. “Facts by themselves do not constitute knowledge. Words you get out of a dictionary do not constitute knowledge. Stuff you learn in school is not knowledge. To know something, you have to live it, know how it behaves, how you have to treat it, how it fits into your life” (pers. comm., Peter Armitage, 17 April 2009).

9. Rather than use technical terms for the participants in this study (e.g., “informant”), the study team adopted terms more familiar to the Inuvialuit: “Traditional Knowledge Holder,” “interviewee” and “participant.”
10. “Map biography” refers to a method of recording spatial information (e.g., knowledge of where polar bear dens have been seen in the past) on maps. In many studies, hard-copy National Topographic System or custom maps have been used as base maps on which to document various use and occupancy or TK features (see Tobias 2009).

Notes to Section 2 — Inuvialuit Polar Bear Traditional Knowledge

11. Many other Arctic peoples share the Inuvialuit concern with safety. The nearby Yup’ik are a good example: “Of all the tools men and women needed to travel in and harvest from *yuilquq* (the wilderness or uninhabited place, lit., ‘place without *yuit* [people]’), perhaps the most important was their understanding of how to navigate safely over the landscape in extreme and changeable outdoor conditions. Expert knowledge of tides, clouds, stars, wind, and weather in their hunting areas was essential not only for success but for survival. Elders willingly shared skills that they considered most important for travelling, especially during fall, regarded as potentially the most dangerous season” (Fienup-Riordan and Rearden 2012: 164; see also Johansson and Manseau 2012: 178).
12. See the useful discussion of Inuit “safety culture,” including the role of elders in communicating safety to younger people, in Johansson and Manseau (2012). “Safety culture” refers to “the values, beliefs, and norms that guide the way a certain group of people understand and respond to safety issues” (ibid., 186). “Safety knowledge is fundamental to the way Inuit interact with their environment, and communities themselves, while dealing with unprecedented socioecological change, identify safety as a major local concern” (ibid., 179). For the Copper Inuit, some of whom settled in Ulukhaktok in the 1960s, Diamond Jenness noted that at freeze-up, around the time of WWI, “[n]o Eskimo was so foolhardy as to venture out more than three or four miles, lest a sudden gale should break the unstable field into a maze of drifting floes” (Jenness 1928: 187).
13. According to Johansson and Manseau (2012: 181–2), “what was identified as the greatest risk [by their Inuit research participants] was a lack of preparedness, experience, and knowledge regarding travel in the local environment. Perceived risks associated with travel on the land and ice greatly increased if the traveler lacked the knowledge and ability to read their environment, to predict travel conditions, to use alternative routes or safe shelter areas, and so on.”
14. He told Peter Armitage about shooting his first polar bear at the age of nine.
15. See Fienup-Riordan and Rearden’s discussion of Yup’ik *qanruyutet* (oral instructions) (2012: 21–26). One of the Yup’ik TKHs, John Phillip, “shared the admonition to follow the *qanruyutet* when in danger rather than one’s own mind: ‘When we faced danger down on the ocean, sometimes our hearts pounded very hard. Even though we were afraid, they cautioned us not to show panic or act in haste. A person is told not to follow their own judgement down [on the ocean]. If he recalls his instructions when he encounters danger, one can bring the *qanruyutet* before himself... and attempt to survive using them when he comes upon bad weather’” (ibid.). See also Thorpe’s discussion of Inuit *maligaghat*: rules that “must be adhered to since they are necessary for the good of everybody” (2004: 63). In addition, see Jean Briggs’s discussion with CBC Ideas host, Paul Kennedy: “It is essential to them to be able to think through situations rationally and quickly when they are out on the ice hunting. Let’s say they are alone; something happens. ‘What do I do? Think!’.... Remember that we live in a society where there are lots of experts around you can consult. If my computer acts up, I don’t have to figure out what’s wrong. I call the Help Desk. But they’re on their own, and they have to be able to deal with situations on their own. They do try to go off in pairs, let’s say, or two or three to hunt together, because it’s much less dangerous to have two or three than to be all by yourself. But you could get into a situation where you were alone. And you had to deal with it, and there’s nobody to telephone. It’s not just in the technical realm, but it’s also in the social and emotional realm” (Briggs 2011).
16. “When you’re out there, sometimes when there’s a lot of bears, you always sleep really light so you could listen to its footprints when it’s coming in. And like they say, if you got a dog, that’s your best friend” (PIN 28, Tuktoyaktuk). See the discussion of “safety in polar bear country” in Keith et al. (2005: 86–90). “Safety depends on being prepared. When camping, one can have a dog tied outside to provide a warning of the approach of a polar bear” (ibid., 86). See also Bennett and Rowley, quoting Yapitee Amagualik, Tununirmiut (2004: 285): “When you live in an area where there are lots of bears around it is a bit scary to think they might come into your camp during the night. Since my uncle’s dogs were good polar bear hunting dogs, we always knew if a bear was approaching our camp.”

17. According to Johansson and Manseau (2012: 182), “Inuit hunters have to be mentally strong and self-sufficient. Ensuring one’s safety not only involves responding to risky situations but investing in the process it takes to truly understand the environment and how humans should behave within it. For this reason, their response to risk is largely focused on ongoing learning. Participants explained that they learned how to be safe in their environment through two main means: from information imparted to them from their family and the greater community, and through personal experience when travelling on the land and sea.”
18. Thorpe (2004: 61) makes this point with respect to the Inuit: “[A] young boy will learn more from watching and listening to his grandfather hunt a caribou and then experiencing the hunt himself, than by reading a book about hunting.”
19. The term “wayfinding” rather than “navigation” is used in this report for a reason. Wayfinding better describes the complex manner in which Inuvialuit/Inuit travel across ice and tundra. This is not navigation if that term means that “one must possess some representation of space — a map — whether internal or external, inscribed in the mind or on a sheet of paper, within which every object or feature in one’s environment is assigned a determinate location” (Ingold 2000: 235). In contrast, wayfinding describes a process whereby “one knows the way in terms of the specific order in which the surfaces of the environment come into or pass out of sight as one proceeds along a path.... Thus to travel from place to place involves the opening up and closing off of vistas, in a particular order, through a continuous series of reversible transitions” (ibid., 238). An Inuvialuit polar bear hunter is much like a Micronesian seafarer who “feels his way towards his destination by continually adjusting his movements in relation to the flow of the waves, wind, current and stars” (ibid., 239). In addition to this observational, sensory repertoire there are the patterns of drifting snow and other skills adapted to the Arctic environment. See also Tversky’s concept of “cognitive collage” (1993).
20. See the concept of *techne* (skill and craft knowledge) as used by ancient Greek philosophers such as Plato and Aristotle (www.scribd.com/doc/99709486/On-Techne-and-Episteme, accessed 14 April 2013). In the social sciences, “embodiment,” “habitus,” and “mimetic learning” all refer to a bundle of “subtle forms of cultural learning” including “motor learning, skill acquisition, perceptual training, social interaction,” etc. (Downey 2010: 35). “‘Embodied knowledge’ is the body, the organic entity modified by behaviour, training, and experience, deeply encultured,” and “enskillment is the patient transformation of the novice, the change of his or her muscles, attention patterns, motor control, neurological systems, emotional reactions, interaction patterns, and top-down self-management techniques” (ibid.). One Inuvialuit example is knowing how to walk on thin ice, something that a person knows how to do but which cannot be taught to a novice by verbal means alone. Inuvialuit acquire “top-down self-management techniques” when learning how to control their fear of polar bears or dangerous sea ice and in developing the mental and physical capacity to live outdoors in extreme cold.
21. “As the prevailing wind sweeps across the frozen, flat expanse of sea or tundra, it carves out a pattern in the ice-crusted snow. The *sastrugi*, small ridges of hard snow running parallel to the prevailing winds, are more reliable than a compass needle for the traveller seeking direction. In severe weather, maintaining the relative alignment of the *sastrugi* to the line of travel is one of the few resources left to a hunter unable to see more than a few metres in front of him” (Pelly 1991: 61). “When travelling over flat areas devoid of large landmarks or in conditions of poor visibility, hunters looked for other indicators of direction. Snow formations called *qimugjuut* and *uqaluraiit*, created by the prevailing wind, were among the most reliable direction indicators” (Bennett and Rowley 2004: 115, 435); see also Ishmael Alunik’s discussion of “navigating on the tundra” (Alunik, Kolausok and Morrison 2003: 154) and Fienup-Riordan and Rearden’s discussion of travelers using hard-packed *iqalluguat* to orient themselves (2012: 200).
22. Wong et al. (2011) provide a western scientific assessment of the accuracy of Inuit track-reading.
23. Wong et al. (2011: 146) report that the Gjoa Haven, Taloyoak and Cambridge Bay Inuit participants, “examined the size of footprints to estimate the size of Polar Bears, and all participants observed weather and snow conditions or hardness and softness of prints to estimate the age of a track. Participants generally associated soft footprints with fresh tracks and hard footprints with old tracks.”
24. At the 2013 PBEC workshop PIN 117 restated this observation concerning the difference between male and female polar bear tracks. His father taught him that male tracks have heels, while female tracks are more round and point inwards (pigeon-toed). This is consistent with track observations by other PBTK study participants. “The males have a heel and the females don’t” (PIN 134, Sachs Harbour). “Females don’t have heels [whereas] the male bear would have a heel; difference in the tracks” (PIN 139, Sachs Harbour). It is

also consistent with what Tim Lennie told the biologist C.R. Harington (1963: 18–19); that “he had found differences between adult male and female tracks: females tend to turn their fore paws in farther when walking, and their hind paws rarely show heel marks except under ideal conditions for preservation of prints, whereas male ‘heel’ marks are pronounced on their hind paw prints.” According to Keith et al. (2005: 94), “the sex of a polar bear is readily distinguished by reading its tracks. As a rule, a female track is more round than a male’s. The track of a male is more elongated than that of a female.” Gjoa Haven TKH, David Aglukkaq, said that “male tracks land more on the heels and the females do not land too much on the heels” (ibid.). In contrast, Wong et al. (2011: 146) report that their research participants generally estimated the sex of a polar bear “by observing footprint orientation, size, and shape. Participants indicated that male footprints were more oriented inwards, toward the centre of the track, than female footprints. One participant indicated after his interview that adult male footprints are turned in because their shoulder muscles are more developed, and that the footprints of young males and females are less turned in.

25. See Laugrand and Oosten’s discussion of how polar bears have taught hunting skills to the Inuit (2007a: 360, 362, 380). See also Nelson’s point that “since the bears presumably took to the ocean ice well before the Eskimos [Inupiat] did, it does not seem improbable that the Eskimos learned certain of their seal-hunting techniques by watching them” (Nelson 1969: 189).
26. Note the Yup’ik concept *ella*, “translated as ‘weather,’ ‘world,’ ‘universe’ and ‘awareness,’ depending on context” (Fienup-Riordan and Rearden (2012: 59). Paul Tunuchuk’s explanation of the term resonates with the Inuvialuit understanding that polar bears teach us about themselves and the environment they live in: “Everything inside *ella* has customary teachings and instructions attached to it — air, land and water. And they mention that we must treat it with care and respect. What will become of us if we don’t treat it with care?” (ibid.).
27. Usher (1972: 179) noted that the Sachs Harbour Inuvialuit “are strongly technologically oriented.” Rifles, canoes, outboard motors, radios and other items of modern technology have long been a part of their lives. “They pursue a contact-traditional activity, to be sure, but in a modern context” (ibid.).
28. See the reference to ENR’s tag kit in Note 37.
29. Note the parallel with Yup’ik knowledge and practices concerning the weather in relation to travel and harvesting on land, water, snow and ice. “Weather observation and prediction were both routine and essential parts of life. Every part of the natural world was carefully observed and communicated.... Men needed to understand coming weather before venturing from home.... Everyone was taught to observe the weather” (Fienup-Riordan and Rearden 2012: 94–95).
30. Usher cites the example of “field science programs [that] have been employing aboriginal Northerners since at least the 1960s, including some who are elders today. They are aware of what scientists actually do and find out, and even if they do not agree, they have considered scientific knowledge critically against their own” (Usher 2000: 185). See also Armitage 2007: 12–18; Ellis 2005: 71; Stevenson 1996: 280–282; and Thorpe 2004: 61.
31. “[T]here can be no clean boundary between what is known and acted upon locally, and other ways of trying to understand the world. Thus it is conceivable that particular hunters might try to ‘mix’ orally inherited knowledge with hypothetical-deductive knowledge of particular scientists whom they deem to have valuable first-hand experience. This raises the prospect of a ‘hybrid’ form of knowing that is neither traditional nor urban-scientific but something new developed in response to changed conditions” (Thorpe 2004: 61).
32. He is probably referring to Portable SSB Transceivers, SBX-11A radio telephones.
33. See www.weatheroffice.gc.ca/city/pages/nt-19_metric_e.html and www.accuweather.com/en/ca/canada-weather.
34. For more information on this land claims agreement, see www.irc.inuvialuit.com/about/finalagreement.html (accessed 27 May 2013) and the agreement itself at www.inuvialuitland.com/resources/Inuvialuit_Final_Agreement.pdf (accessed 27 May 2013).
35. The co-researcher thought the person holding the meeting was Canadian government biologist Evan Richardson. “A lot of that [information] came from the satellite collars; when they put the collars on the bears, off in Alaska in particular. They started to see them denning on the ice.”

36. See Thorpe's discussion concerning hunters who may blend "orally inherited knowledge with hypothetical-deductive knowledge of particular scientists whom they deem to have valuable first-hand experience" (2004: 61). One TKH interviewed for this study was married to a marine mammal biologist whose science had an influence on his thinking about climate change and seals: "[T]he seals to have young, they gotta have enough snow to go into the den.... The sea ice is hard to say... you have old ice in order for the seals to make a den and there is no snow in.... My ex [-wife] is a biologist, so now she say seals are having a hard time to make dens for their young now.... She is a marine biologist.... We did a lot of studies in the delta with the ring seals. Hard to find enough snow for the dens.... Early '70s, '60s-'70s, get a lot of snow in them years." PIN 147, Paulatuk
37. The 2011–12 polar bear tag kit provided by the GNWT Department of Environment and Natural Resources to HTC's and polar bear hunters includes the schedule of honoraria for providing samples and information, guidelines for polar bear hunters, a checklist for successful polar bear hunters in the ISR, maps of the polar bear hunting areas that hunters can mark their kill locations on, an information sheet concerning harvests of previously captured, marked and tranquilized bears, directions with illustrations concerning how to measure the length and girth of a polar bear and collect the uterus and ovaries, and a "Polar Bear Score Card: A Standardized Fatness Index" prepared by Polar Bears International/World Wildlife Fund. Hunters are asked to include the geographic coordinates of the harvest if they are carrying a GPS. Otherwise, they must mark the harvest location on a map.
38. The straight-line length is measured from the nose of the polar bear to its tail.
39. In answer to the question, "What were the signs you would look for to tell you a polar bear was sick?" PIN 134 responded, "Just the way it moves. You see a little bit of it in Ian Stirling's book. He has some very good photos in there."
40. The text from which this paraphrase and quote are taken is a little difficult to understand due to the fact that the TKH's imperfect command of English as a second language. The text reads, "One time he [Ian Stirling] was talking about seals in June when ice was narrow. Say he seen a long line of it in the crack. I understand it right away. I seen it before that too. He say he thought he seen something; here he seen a bunch of seals lined up, close to a hundred. That's in Cape Parry when they didn't let us in there. I say after I tell him I wouldn't tell you used to run into that kind of seals. When sea is narrow, seals must fish smart in those, polar bears can't fit it. Soon as the crack is a little wider, that is what Ian Stirling was telling us. He said he don't know when he get a little while and must have think it was new to the people, what they heard was new. And when I told him that's what I always say; as soon as the crack gets a little wider, they don't [get] hauled up no more. So I told him must have been smart if those polar bear can swim through that crack. He laughed for a while, and he said, "Every time I see something new to me, somebody been there already." But it's true, you know. Here I am trying to find out why they don't stay out in the crack anymore. Narrow one" (PIN 149, Paulatuk).
41. For more on this topic, see Section 3.6 "Polar bears eating other polar bears."
42. Thorpe notes, furthermore, that "[t]his emphasis on nearby environs may be explained as being part of a cultural norm whereby people are not comfortable speaking about that which they have not seen" (Thorpe 1994: 60).
43. "Living memory" refers to "living-memory recall." According to Tobias (2009: 441) this is a "recall interval covering the period of time starting with a respondent's earliest childhood memories and ending with the date of the interview."
44. Herschel Island is identified as a polar bear hunting area in Hart, Amos and ICRC. (2004: 76; see also Inuvik Community Corporation, Tuktuuyaqtuuq Community Corporation and Aklarvik Community Corporation 2006: 11–34).
45. Hart, Amos and ICRC (2004: 76) note that "one of the primary areas for hunting polar bears was off the east coast of Cape Bathurst, particularly around Whale Bluff (*Kuuruq*).
46. In the mid-1980s some Ulukhaktok hunters used the aircraft chartered to pick up sport hunters at Melville Island to transport themselves and their gear to the same area. They returned by snowmobile. "I did go to Melville Island, but that's by airplane. That's cheating a little bit, but we got one [an aircraft], anyway.... They had sport hunters down there. They were done. So, I asked Hunters and Trappers [Committee] to see if we could kind of split a charter with them when they come back. They said "sure." Well, we got 12 polar bear tags for Melville, and we were happy" (PIN 125, Ulukhaktok).

47. Figures 8 and 9 in Slavik (2010) erroneously depict Inuvialuit polar bear harvesting on the north side of Melville Island and far into M'Clure Strait between the northwest tip of Banks Island and Prince Patrick Island. The mapping methodology was based on narratives and drawing highly generalized circles on small-scale maps. Furthermore, no TKHs from Sachs Harbour participated in the October 2009 Tuktoyaktuk workshop where PBTk locations were discussed.
48. The Proceedings of the *Eighth Working Meeting of the IUCN/SSC Polar Bear Specialist Group* note that effective 31 December 1980 a quota of 12 polar bear harvests was assigned to Melville Island, but the communities to which the quota applied are not mentioned (Stirling and Calvert 1985: 117). The *Proceedings of the Ninth Working Meeting* note that effective 31 December 1984 the quota for Melville Island was 12 bears alternating yearly between Sachs Harbour and Ulukhaktok (Holman) (Calvert et al. 1986: 32). GNWT Department of Environment and Natural Resources data show 68 polar bear harvests at Melville Island from 1980 to 1991, 21 of which were by guided sport hunters.
49. Ten of the 49 participants in this project, including Peter Esau, Edith Haogak, Frank Kudlak, Martha Kudlak, Robert Kuptana, John Lucas Sr., David Nasogaluak, Morris Nigiyok, Geddes Wolki and Sandy Wolki, were also interviewed for the PBTk study (Nagy 1999: xv).
50. See also Usher's description of polar bear hunting areas used by Sachs Harbour Inuvialuit in the mid-1960s. "The southwest coast of Banks Island, particularly around Nelson Head and Cape Kellett, provides good denning habitat for polar bears.... Bears are killed whenever and wherever they are seen, and as a result many are taken close to the village, often in association with seal hunting, at least in summers when ice is prevalent. Sometimes special bear hunting trips are made in spring to Nelson Head or north of Storkerson Bay. Occasionally bears are seen and killed along the traplines. Of a total of 59 bears killed [between July 1, 1964 and June 30, 1967], 45 were taken near Sachs Harbour and eight near Nelson Head. This pattern is understood to be typical, except that the Sachs area is perhaps overrepresented, since there were very few successful spring hunting trips during the years under study" (1970b: 73, 75–77).
51. "To most, hunting polar bear was both opportunistic — for example, if they were hunting seals or saw a bear while travelling — and deliberate, from tracking bears with dog teams to using set-guns" (Slavik 2010: 15–16).
52. The Government of the Northwest Territories set the first quotas on the number of polar bears that could be killed by each community in 1967–68 (Kwaterowsky 1967; Schweinsburg 1981; see also Brower et al. 2002: 363 and Fikkan, Osherenko and Arikainen 1993: 104).
53. Snow conditions on the hillsides vary from one year to the next, depending on wind direction. They influence hunter decisions about which routes to take between Aklavik and the coast. "[It's best for us] when it's a west wind because we ride better [along the hillsides] from Shingle to Herschel Island.... It's smoother for us going there than to go over the rough ice.... We always ride along the hills when we're coming back [from the North Slope] because if we get something, we ride along the hills. If we get nothing, we always go out east of the island, and we check when it's right, and we always go to Stokes [Point]. Then we come inland, along the shore. And if we can't go to Stokes, we always try to hit the ocean right away on this side, then stay on the ocean, because we always look out on the ocean. Then we check for polar bears, because sometimes they be close inland" (PIN 13, Aklavik).
54. Although safety is a prime concern, Inuvialuit hunters also purposefully camp in high traffic areas for polar bears to maximize their chances of encountering and harvesting the animals. It is unclear from the interview transcripts how many hunters establish camps away from these areas due to safety concerns. Nonetheless, there is no doubt that having guard dogs and exercising extreme vigilance are normal safety strategies when camping in a high-traffic area.
55. A *manaq* is a wooden float with hooks to retrieve dead seals in open leads. It has a long line attached to it (Albert Elias, pers. comm. to Peter Armitage, October 2013).
56. These are portable SBX radio telephones.
57. These walking sticks would also be used to probe the snow for ringed seal breathing holes, check for bad ice, etc.
58. See also Amos Tuma's mention of "spring bait (*isibyuraq*)" and related discussion in Hart, Amos and ICRC (2004: 71). "The term 'spring bait' is used and could refer to a piece of sharpened, folded baleen that is wrapped with fat and then frozen. Once eaten it uncoils and pierces the animal's stomach."

59. The set-gun is a type of trap. One of the problems with using them is that polar bears used to scavenge dead bears before the trapper had a chance to claim the kill (PIN 137, Sachs Harbour). See <http://pbsg.npolar.no/en/agreements/agreement1973.html> for the text of this agreement, which does not specifically mention set-guns. Article III.1(d) reads “Subject to the provisions of Articles II and IV any Contracting Party may allow the taking of polar bears when such taking is carried out... by local people using traditional methods in the exercise of their traditional rights and in accordance with the laws of that Party.” Set-guns are not considered a traditional method. Agnes Nasogaluak spoke of set-guns in the context of the Aulavik Oral History Project: “They used to have traps, too and it came against the law too, later on. Guns — they set guns on icebergs” (Nagy 1999: 128). Writing from the perspective of the mid-1960s, Usher noted that “[a] few bears are killed each year with set guns, usually in the late winter. These guns (usually old shot guns) are set in a pit in the snow, with bait wired to the trigger, and then covered with a snow block. The bear smells the bait, breaks into the pit, and by moving the bait pulls the trigger so that he will generally be shot in the head” (1970b: 76). See also Nelson (1969: 199) and Randa (1986: 188).
60. Wenzel (1983) provides a succinct description of a hunt by Kuganayuk Inuit in May 1979 involving men, women, children, snowmobiles and dogs. The anatomy of this hunt resembles that described by a number of Inuvialuit participants in the 2010 interviews, in particular the way that dogs were used in pursuit of a bear. See also the descriptions of Inuit/Inuvialuit polar bear hunting with dogs in Keith et al. (2005: 54–58), Balikci (1970: 78), Bennett and Rowley (2004: 44), Laugrand and Oosten (2007b, 363–364), and Usher (1970, V2: 76).
61. Note Fienup-Riordan and Rearden’s point for the Yup’ik that “No discussion of traveling on the land would be complete without mention of the teams of dogs that accompanied travelers. Men spoke with affection about their dogs, praising them not only for their strength and stamina but for their intelligence” (2012: 181).
62. See Usher (1972) concerning the impact of snowmobiles on harvesting by Sachs Harbour Inuit, and Thorpe (2004: 68) with respect to the impact of snowmobiles on harvesting and travel by Inuit living just to the east of the Inuvialuit in the Kitikmeot region of Nunavut — “The snowmobile was another key factor in advancing hunting technology. Travel by snowmobile is much faster than by dogteam, such that hunters spend less time travelling the land to search for caribou.... As has been observed in other aboriginal communities today, people more often hunt using numerous short trips of a few days’ duration than of the traditional long trips.... As a result, hunters spend less time on the land and more time in communities.”
63. The Inuvialuit adopted snowmobiles over a ten-year period starting in the early 1960s. According to Usher (1972: 172), “Snowmobiles were first introduced to Banks Island in 1961, when three of the leading trappers purchased them;” however, these pioneering machines were unreliable and difficult to operate and maintain. More reliable snowmobiles were obtained by Sachs Harbour hunters and trappers later in the decade, so that the transition to them was virtually complete by 1972 (*ibid.*, 180). Snowmobiles were introduced at Ulukhaktok about 1972, “at which time hunting and trapping activities were still carried out completely by dog team. In a period of just a few years, dog teams dropped out of use completely as people opted for the snowmobile as a faster and more convenient mode of transportation. Nevertheless, a few people maintained their dog teams for expressive purposes. Now that sports hunting for polar bear is becoming a profitable pursuit, more dog teams are coming back into use. The snowmobile, however, remains the primary mode of transportation for all hunters and trappers” (Condon 1983: 41).
64. His comment resonates with Thorpe’s observations regarding contemporary hunting by Inuit living in the Kitikmeot region: “With the snowmobile able to bring the hunter faster and farther on the land and the rifle extending the hunting range, it is easier and usually more fruitful to hunt caribou. Diminished are the requirements for such *pitquhiit* as patience and stealth, once critical when hunting was a cooperative effort” (2004: 69). *Pitquhiit* is an Innuinnaqtun term referring to “cultural beliefs, traditions and customs” concerning Inuit interrelations with animals (*ibid.*, 57).
65. This point was made in part by Tuktoyakatuk hunter PIN 43 — “Because you gotta remember every storm that you have, which direction. Really important is knowing the wind and the past storms. Because what you’re doing is you’re reading it when you go out there; you’re reading the ice, what the storm did with the ice.”
66. “Glassing” refers to the use of binoculars. Telescopic rifle sites are used for the same purpose. “Iceberg” is the English word that the Inuvialuit use for large, vertical pile-ups of ice, built of large blocks of thick, multi-year ice created by the colossal forces of wind, tide and current. It does not mean ice from calving glaciers. Beaufort Sea icebergs could at times be taller than single-story Inuvialuit houses. As a result of climate change such

- configurations of ice are no longer seen (see Section 4). Keith et al. (2005: 115) note that Gjoa Haven Inuit also define “iceberg” in this way when speaking English.
67. “Back in the day, you can get a seal and use that for bait.” (PIN 163, Paulatuk)
 68. A straight bow is made from a single piece of wood; a compound bow uses a levering system of pulleys and cables to bend the bow.
 69. This can be compared to Noah Siakuluk’s account from the Amitturmiut (Foxe Basin/Igloodik and Sanirajak region), “It is said that as the bear attacks one should not get out of the way of the bear to the right side of the bear, but one must get out of the way to the left side of the bear. It is said that when a polar bear is attacking it tends to move its left forelegs first, so when the bear tries to bite you it will find it more difficult to reach out because the left foreleg is going to get in the way. That was how I was told. I did not learn these from personal experience but did what I have heard. Only then did I try these things from what I have heard” (Bennett and Rowley 2004: 46). See also Laugrand and Oosten’s discussion of the dangers of hunting polar bears: “The hunters who spend time hunting bears know the behaviour of the bear so that they know how to dodge the bear” (2007a: 364); and Randa, who states that the tactic adopted by the hunter takes into account the apparent preference of the polar bear for his left paw (1986: 176). Last, see Nelson (1969: 201): “The [Wainwright, Alaska] Eskimos believe that polar bears are left-handed, and that if a hunter is charged, he should wait until the bear is very close and then run to its right side. The left paw is so quick that it is harder to avoid a mauling from that side.”
 70. See also Inuvik Community Corporation, Tuktuuyaqtuuq Community Corporation and Aklarvik Community Corporation (2006: 11–32).
 71. “Us women, we never skin them — just the men skin them. We do fleshing.” PIN 141, Sachs Harbour.
 72. When a certain amount of fat is left on the pelt, its weight helps to drag it away from the peritoneum and muscles during the skinning process.
 73. The period shortly before freeze-up is the one time of the year when Sachs Harbour residents are most likely to see polar bears in or very close to their community. Polar bear visits to the community appear to have increased over the last few years, an observation discussed at greater length in Section 5.4.
 74. This is from an e-mail from Marsha Branigan, Manager, Wildlife Management, Inuvik Region, Dept. of Environment and Natural Resources, Government of the NWT to Peter Armitage, 19 March 2013.
 75. Two Inuvik hunters said during the October confirmation workshop in their community that they follow polar bear tracks and hunt the animals far out on the ice in the Mackenzie Delta. They cannot see the land when they are that far out and rely on their GPS units to find their way back to shore and the community.
 76. Stored/cached meat will spoil quickly if the weather is too warm.
 77. It is not always clear whether what is said is the informant’s view or that of the interpreter. On the same topic, this TKH also said, “We used to tell [location of dens] with dogs ; the dogs used to smell it.... your dogs could smell it three, four, five miles, eh? But when you’re driving with a big machine, two miles, you can’t smell it. You just pass it. You can’t see the hole” (PIN 122, Ulukhaktok). Amitturmiut (Foxe Basin) Elder Felix Alaralak also spoke of the role of dogs in finding dens: “When the polar bear were in their dens, the dogs would find the dens. Then a hole was made in the den. There might be a dog that wanted to enter the den, so the dog was allowed to enter. The bear inside the den went after the dog so the dog would flee, with the polar bear at its heel. Once the polar bear had broken through the den in pursuit of the dog, it was shot” (Bennett and Rowley 2004: 63).
 78. Harington reported (1961: 13) that “[e]xisting legislation...prohibits the killing of females accompanied by cubs under one year of age, and forbids the taking of cubs under one year of age in the District of Keewatin and the District of Franklin (excepting Banks and Victoria Islands).”
 79. Writing about the economy of Banks Island in the late 1960s, Usher noted, “Some of the best trappers run 800 to 1,000 traps on lines up to 300 miles long.... During the years 1945-48, several trappers were running lines of 100 to 200 miles in length, with 600 or even 800 traps, and making trips of 10 to 14 days or more, much as is done today. A few of the best trappers were spending up to 75 per cent of their time on the trail, making trips of 17 or 18 days” (1970a: 21, 75). See also Usher’s description of trapping (*ibid.*, 48–49).
 80. During the 2013 PBEC workshop, a TKH from Inuvik said that the structured demands on a hunter’s time made by wage labour reduce flexibility and the time available to hunt opportunistically, and this affects their

knowledge of polar bears. They must plan well in advance if they wish to take longer periods of time off work to go hunting, when polar bear hunting conditions are good. Otherwise, their hunting is restricted to weekends, when conditions may not be very good.

81. Similar observations were provided by another hunter from Sachs Harbour, who also said that the population decline in his village has negatively affected participation in harvesting activities. “The other thing is, there’s a lot less people in town.... A lot of the young people don’t really go out too much.... There’s very few people who actually clean the bears up in town; take care of them, flesh them, things like that. And the other big thing is the TV and computer. That’s a biggest thing, I think. I’m sure [if not for] TV and computers, people would be more out on the land. Because even for caribou now, they’re not heading out much — they’re not.” PIN 135, Sachs Harbour
82. See Government of Nunavut (2009: 161–162).
83. Income from guiding polar bear sport hunters can be significant. According to Foote and Wenzel (2009: 17), “A polar bear guided hunt is expensive by any standard. Client-hunters typically pay about \$35,000 to the southern expeditors, of which approximately 43 percent (in the case of Taloyak) to about 60 percent (in Resolute Bay) enters the northern communities”; see also Slavik 2009). Although sport hunting has suffered from the American ban, the market for polar bear pelts is currently “very healthy” with large pelts (i.e., > 8 feet) selling to taxidermists for \$9,000 or more, and some hunters receiving as much as \$16,000 at auction for prime pelts. Furthermore, within the last several years, new markets for polar bear pelts have emerged, such as wealthy Chinese and business interests, such as hotels (François Rossouw, Traditional Economy and Fur Management, Department of Industry, Tourism and Investment, GNWT, pers. comm. to Peter Armitage, 7 March 2013).
84. If any generalization is possible concerning trends in aboriginal harvesting across northern Canada, it is that no generalization can be made because of the lack of longitudinal harvest or participation rate studies. Anecdotal information from several researchers conflicts: in some communities harvesting and life on the land remain important; in others, participation rates and harvesting have crashed (Adrian Tanner, Craig Candler, Lindsay Staples, Patt Larcombe and Terry Tobias pers. comm. to Peter Armitage, March 2013).

Notes to Section 3 — The world of the polar bear

85. See the Canadian Oxford Dictionary, 2004.
86. See Campbell and Reece (2005: 1107); see also Clément (1995) for an in-depth presentation of Innu (Montagnais) zoological knowledge.
87. This is a giant topic, far beyond the scope of this study. An Inuvialuit theory of the polar bear mind would presume that polar bears have a mind. This would enable the Inuvialuit to understand the mental states of polar bears in order to explain and predict their behaviour. The mental powers of polar bears include the ability to hear conversations and understand human language far beyond the normal audible range of humans. See Hallowell (1926) and Innu views concerning the great intelligence of black bears in Armitage (2007: 54–55) — “Why mashku (black bear) is intelligent and other notes.”
88. According to Fienup-Riordan (1999: 4–5), Yup’ik elders view “geese as sentient creatures, possessing awareness of their surroundings and corresponding decision-making capabilities.... Geese are not the only creatures that possess awareness and merit respect. Many Yupiit view other animals as sentient creatures, capable of responding. From the powerful bear to the small, apparently insignificant tundra lemming, each is a thinking, feeling being.”
89. See Joe Nasogaluak’s narrative on the topic of “jumpy” bears: “The polar bear couldn’t get any seal and that is why it was so skinny. The elders said that when a hunter is supposed to get the bear and also those that are barked at by dogs, these are the bears that are unable to ever hunt again. Then they become very skinny to the point of starvation. This is what the old-timers spoke about. Even when a seal comes up the breathing hole, the seal is startled and goes back down. The old-timers say this is what happens to polar bears that were supposed to be caught by a hunter but escaped. From a very long time ago we call them *kayaaniq*. Those that are very skinny even though there are a lot of seals around. They are very able and have good eyesight and have their teeth yet. Something happens and they can no longer hunt for seal. They say they become jumpy when a person misses it and it can no longer get food. This is what the old-timers say. The bears become very hungry and skinny and are very dangerous” (Hart, Amos and ICRC 2004: 79).

90. In reviewing the draft of this report, PIN 43 noted that polar bears also stop to sniff the air.
91. According to Laugrand and Oosten (2007a: 360), Pangnirtuuq Inuit elders said that polar bears “are said to have *isuma* (capacity to think like humans)” for a variety of reasons, one being the fact that they “employ ingenious strategies to reach their goals. A case in point is the hunting technique of killing a walrus with a stone or a piece of ice.” Frédéric Laugrand provided the link between the Inuktitut syllabic text of Pauloosie Angmarlik’s polar bear narrative and clarification concerning Angmarlik’s use of the term *isuma* [*ihuma*] (e-mails to Peter Armitage, 23 April 2013). Jean Briggs read this narrative and confirmed the use of the term *isuma* in it. Briggs cautions that “*isuma* should not be thought of as an ‘entity’; it’s more like a capacity or even a process” (e-mail to Peter Armitage, 25 April 2013).
92. The relationship between changing sea ice, polar bear condition, abundance and distribution is complex, and the TKHs interviewed for this study hold a diversity of views about the matter. Section 5.7, which deals with climate change effects on polar bears, addresses it in greater detail.
93. Inuvialuit meanings of these English-language terms are similar but not identical to those of ice scientists. See Wadhams (2000: 57–58): “In official definitions... ice which has survived a single summer season of partial melt is called **second year ice** and ice which is older than this is called **old ice**. In practice, partly because of the difficulty of visually discriminating between second-year and old ice, and partly because all ice older than first-year has certain shared properties, such as greater strength, any ice older than first-year is usually simply classed as **multi-year ice**” [bold and italics in the original].
94. Inuvialuit, Inuit, Inupiaq, Yup’ik and Greenlandic dialects contain numerous ice-related terms (see Krupnik et al. 2010; Weyapuk and Krupnik 2012).
95. This is from the workshop group translator, Ulukhaktok, 12 October 2012 (recording file ulukhaktok12oct2012-5.mp3 TC 15: 15). A number of Kangiryuarmiutun terms were used for the ice features discussed in relation to this pressure ridge.
96. Inupiaq from Wales, Alaska refer to the “open lead’s shadow... on low clouds above” as *uingum taggaa* (Weyapuk and Krupnik 2012: 30).
97. See Wadhams (2000: 65) regarding “frost smoke.”
98. TKHs frequently used personal pronouns such as “he” to refer to polar bears, even when referring to females, as is the case here. This may reflect deep-rooted ideas about the personhood of polar bears; the fact that they share many human characteristics including *ihuma* (“mind”).
99. One Ulukhaktok TKH used the word “glacier” for multi-year ice (PIN 117).
100. Changing ice and weather conditions are explored at greater length in Section 4.1.
101. When they are liberated from the surrounding ice in the spring, become free floating in the ocean, and then freeze into the young ice the following fall/winter, they are called icebergs.
102. “Glassing” refers to scanning the icescape or horizon using binoculars or a rifle scope.
103. This narrative is from the Paulatuk confirmation workshop, 30 October 2012.
104. This narrative is from the Paulatuk confirmation workshop, 30 October 2012.
105. This narrative is from the Paulatuk confirmation workshop, 30 October 2012.
106. Artificial islands were constructed in the Beaufort Sea in the 1970s and 1980s for use as platforms for oil and gas exploration drilling rigs. They were constructed of material mostly dredged from the sea bottom.
107. The confirmation workshop was held in Inuvik on 20 October 2012.
108. According to the Melville Island harvest data provided by the GNWT, the first harvests here were in 1982 and the last in 1991. The harvests took place in the context of subsistence and guided sport hunting.
109. It is not clear in the interview transcripts what the TKHs mean by “migration,” and how the term differs from “movement” or other words used to talk about polar bear travel. Moreover, Inuvialuit use of such terms may not be identical to the way biologists use them.
110. PIN 135’s map biography shows an arrow drawn north-south along the west coast of Banks Island that is labelled “M-1 Fall,” suggesting that polar bears travel in this direction each fall. Unfortunately, the N-S arrow is not “verbally anchored” in the interview transcript; there is no specific mention of it in the transcript.

111. “They were really hefty bears then, nice polar bears, they were beautiful, they were awesome polar bear hides.... And they were all healthy” (PIN 143, Sachs Harbour).
112. The term *nuajvik* means a “gathering,” presumably of polar bears in this context.
113. This reference is cited more completely in Section 5.4, where the TKH adds that they saw lots of polar bears in this area for a few years until a bowhead whale carcass that had been stuck in the ice near Herschel Island, with many bears feeding on it, drifted out to sea..
114. Given the nature of the research participant sample and the map biography method used to document their spatial knowledge, this map necessarily shows *some* of the locations where polar bears or their tracks were seen. The study team does not know how representative this sample is in relation to the total number of such sightings remembered by all Inuvialuit hunters and other community members.
115. This was in early October 2010.
116. This was reported by Sachs Harbour TKHs at the community confirmation meeting in October 2013, and the Inuvik workshop in January 2013.
117. This was according to PIN 100 (Inuvik); however, a reviewer of the draft PBTk study report, who was not a TKH interviewed for the study, said the earliest evidence of a grizzly bear in these regions dates to 1952 or 1953.
118. “I see some polar bears killed by grizzly bear over here.... Wynniatt Bay. Even little ones, mother and cubs, they were killed by a grizzly around there” (PIN 121, Ulukhaktok).
119. Grizzly and polar bears may have to share a bowhead carcass with wolves and wolverines as well as one another. “Once in a while, that bowhead would be drifting along here from the Alaska side, I guess, and that’s when there’s lots of animals. There’s wolverines and... wolves.... Just right on the beach, some place around there, when they’re wounded by Barter Island, I guess” (PIN 14, Aklavik).
120. David Kuptana from Ulukhaktok shot a hybrid bear just west of the community on 8 April 2010. CBC Radio recorded the event: “The unusual-looking bear caught the attention of biologists after David Kuptana, an Inuvialuit hunter, shot and killed it on April 8 on the sea ice just west of the Arctic community, formerly known as Holman. The bear had thick white fur like a polar bear, but it also had a wide head, brown legs and brown paws like a grizzly. Kuptana said he shot the bear from a distance after it scavenged through five unoccupied cabins near Ulukhaktok, then tried running toward the community. Wildlife DNA analysis shows the bear was a second-generation hybrid, officials with the N.W.T. Environment and Natural Resources Department said in a news release Friday. The bear was the result of a female grizzly-polar hybrid mating with a male grizzly bear, according to the department. “This confirms the existence of at least one female polar-grizzly hybrid near Banks Island,” the release said. “This may be the first recorded second-generation polar-grizzly bear hybrid found in the wild” (www.cbc.ca/news/canada/north/bear-shot-in-n-w-t-was-grizzly-polar-hybrid-1.870506, accessed 17 September 2013).
121. See two accounts of Roger Kuptana’s client, Jim Martell, killing a hybrid near Nelson Head on April 16, 2006 (www.cbc.ca/news/canada/story/2006/05/10/pizzly-golar-bear.html and <http://news.nationalgeographic.com/news/2006/05/bear-hybrid-photo.html>, accessed 17 April 2013).
122. “I have never seen a polar bear eat berries or geese or caribou” (PIN 138, Sachs Harbour).
123. With respect to feces, a Paulatuk hunter described how “[o]ne time outside of Franklin Bay, I seen a polar bear that had shit, but it had kind of bones in it. Kind of lumpy. I don’t know what the heck he was eating to make him [shit] like that. Usually they just have the oil, and when they get fat. But this one... did something different, and I couldn’t really tell what was in it. Even the colour wasn’t black; it was different. I don’t know what he was eating though.... He was in good shape” (PIN 158, Paulatuk)
124. See Paulatuk TKH confirmation workshop, 30 October 2012.
125. This was in April, circa 2006.
126. Although technically the term “cannibalism” may refer to any animal that consumes the flesh of its own kind, its use risks imposing human values upon other animals, i.e., the taboo concerning humans consuming human flesh. There is no such taboo among polar bears. Claims by animal rights organizations that link climate change to polar bear “cannibalism” may well exaggerate its frequency (www.all-creatures.org/articles/env-cannibal.html, accessed 27 May 2013).
127. All of the accounts of polar bears hunting bearded seals are for the Tuktoyaktuk and Paulatuk areas.

128. Referencing the PBTK of the Wainwright, Alaska, Inupiat, Nelson reports: “If the breathing hole is in thin young ice, the bear simply waits until the seal comes and then smashes the surrounding ice with the front paws, simultaneously crushing the seal’s skull. If the ice is thicker, the bear excavates the ice all around the hole, weakening it sufficiently so that it can carry out the same method of killing. It always fills the excavated area with snow so that when the seal swims up underneath, it cannot detect any change” (1969: 187–188).
129. See Laugrand and Oosten (2007a: 361): “Waiting at the seal-breathing hole, the bear lures the seal to its death by scratching with its claws on the ice to arouse the seal’s curiosity. The animal is then dispatched with a blow of the bear’s paw. Inuit elders say that hunters just imitate this technique. They replace the claws by a small implement that produces the same effect and use a harpoon instead of the paw.”
130. These are the parietal bones of the cranium.
131. “You look at the lungs and that too, but every time we do that everything’s good” (PIN 151, Tuktoyaktuk).
132. Co-researcher Charles Pokiak explained that the gun was kept outdoors because “in the wintertime when you keep taking it in the igloo or in the house it will get condensation and your gun will not work.”
133. It is not clear what this TKH means by “rangy.” According to the *Canadian Oxford Dictionary 2004* it means “having a long, slender form.”
134. “We take the hide, we quarter it out, we take the back straps for the dogs and of course we’re taking the feet for food. But no, we never, never did open the inside” (PIN 163, Paulatuk).
135. One or more TKHs interviewed for an Inuvialuit Settlement Region Traditional Knowledge Report (Inuvik Community Corporation, Tuktuuyaqtuuq Community Corporation and Aklavik Community Corporation 2006: 11–31) spoke of “*pualrisiktualuit*,” a “polar bear that has paws as huge as a shovel.”
136. These are approximate years.
137. He thought that PIN 38 would know the name.
138. One or more TKHs interviewed for an *Inuvialuit Settlement Region Traditional Knowledge Report* (Inuvik, Tuktuuyaqtuuq Community Corporation and Aklavik Community Corporation 2006: 11–31) spoke of a “bear that you get once in a while that has a longer neck; it’s high and pure white, but looks like a weasel and runs fast like a weasel — *tiriaranaq...[tiriarnaq]*.”
139. During the Inuvik confirmation workshop on 20 October 2012, PIN 102 said that polar bears have very good noses. When a male gets the scent of a female, he goes straight after her; his nose is better than a GPS (paraphrase, Peter Armitage diary, note 20 October 2012).
140. This refers to the fall rut; the TKH was interviewed in early November 2010.
141. Distance Early Warning Line (DEW Line) sites were assigned names such as PIN-1, BAR-1, BAR-2, etc.
142. The study did not determine if there is a range of OPTs concerning the time of the year when females give birth. PBTK study participants were not asked directly about this matter, and this is the only statement on the topic (and it was made in passing). PIN 142 did not explain how he knows when females give birth, that is, whether the OPT was based on direct observation or some other method.
143. Some Algonquian-speaking peoples in eastern Canada note that black bears consume birchbark just prior to denning, perhaps in order to inhibit defecation during the hibernation period. See Armitage (2007: 61) and Clément (1995: 288–290) for information obtained from Quebec and Labrador Innu concerning black bear hibernation and fecal or intestinal plugs.
144. They were coming from Kaktovik, Alaska.
145. Some TKHs said they had not heard of polar bears denning on the ice, and one said that they certainly do not “because there’s not a lot of snow.... They make dens in a place where there’s lots and lots of snow” (PIN 101, Ulukhaktok, translation).
146. This could have been the same den location as that identified in the previous Ulukhaktok narrative. Both dens were observed on the ice in Wynniatt Bay in the 1970s.
147. With respect to this TKH’s reference to a female polar bear as “he,” it should be noted that there are no gendered pronouns in the three Inuvialuktun dialects or in any other Inuktitut dialects. This explains why bilingual speakers of English and Inuvialuktun tend to use such pronouns interchangeably, particularly “he” and “she.” They also frequently use the narrative present/historical present when describing past events (see Nagy 2006: 75).

148. The den location data from the PBTk study map biographies are not sufficiently accurate to permit an analysis of the location in relation to terrain features such as slope or solar orientation. See the discussion of spatial data limitations in Appendices 1 and 2.
149. “The ones [dens] on the island is always facing south.... The ones on the coast, facing west” (PIN 134, Sachs Harbour).
150. An Aklavik TKH said that he “sure wouldn’t want to slide down in their den because they’re pretty dangerous when they’ve got cubs” (PIN 14, Aklavik).
151. “They’re actually really thin on the top so they can breathe” (PIN 122, Ulukhaktok, translation). “But on the top where the den is, it’s going to be a thin part” (PIN 117, Ulukhaktok).
152. Giuggioli and Bartumeus define “fidelity” as the “recurrent visit of an animal to a previously occupied area” (2011: 1).
153. Using a 1: 250,000 base map, community researchers asked TKHs to show where they had observed a female with cubs of the year or tracks of females with cubs of the year. They also asked what direction the tracks were heading. See the Spring Sighting of Female and Cubs Form, which is part of the Polar Bear Local Knowledge Survey Form Spring 2008 (Richardson, Branigan and Stirling 2008).
154. Animals that die for no apparent reason appear to be of special concern to aboriginal peoples in many parts of Canada (e.g., see Armitage 2007: 78–79).
155. A collapsed den at Coney Lake, as reported by another Aklavik hunter, is probably the same one that Douglas Irish discovered. “And in previous years, like, years and years before, another hunter had found just east of there, like at Coney Lake... a polar bear with a young one, where the den had collapsed, and they were both dead inside the snowbank” (PIN 19, Aklavik).
156. This was recorded at the Paulatuk TKH confirmation workshop, 30 October 2012.

Notes to Section 4 — Climate change observations

157. See the trip reports and final report from the “Inuit Observations on Climate Change” project, International Institute for Sustainable Development, Winnipeg, Manitoba, www.iisd.org/casl/PROJECTS/inuitobs.htm (accessed 27 May 2013). Of the 47 “community knowledge experts” who worked on that project, 14 were interviewed for the PBTk study: Larry Carpenter, Joe Kudlak, Trevor Lucas, Peter Esau, John Keogak, John Lucas Jr., Geddes Wolki, Edith Haogak, Roger Kuptana, John Lucas Sr., Samantha Lucas, Lena Wolki, Frank Kudlak, and Martha Kudlak (see Section 2: “Team Members” of *Inuit Observations on Climate Change: Final Report*).
158. In the context of the Sachs Harbour-IISD collaborative study John Lucas Sr. talked about how the wind continuously broke up the newly forming autumn ice (see Jolly et al. 2002: 110).
159. I1 is the location of the floe edge before 1986, he explained.
160. “We were sixty miles out and didn’t even reach where there’s movement of ice, where you got current and wind moving the ice. We felt it was far enough, being sixty miles up.... We couldn’t see anything. You’re just going out there, just knowing your position. Once you go out there about twenty miles, you got no sign of life; there’s no rig in McKinley Bay and everything disappears. You’re just out there by sense of direction and knowing where you are.” (PIN 43, Tuktoyaktuk)
161. Regarding “the smell of the dog team trails didn’t bother the bears; because it was good hunting,” the TKH means that there were good seal-hunting conditions for polar bears. When asked if the pressure ridge had always been there, PIN 117 responded “yes.” When asked if the ridge is still there today, the hunter responded “no.”
162. Gjoa Haven Inuit define “iceberg” the same way when speaking English, per Endnote 66 (Keith et al. 2005: 115). The term does not refer to glacial ice.
163. See also Wadhams (2000: 69, 71).
164. This is a reference to the water vapour that forms over open water when the air temperature is lower than the water temperature. Inuvialuit frequently refer to it as “smoke.”
165. In 2010 Canadian Thanksgiving was celebrated on October 11.

166. Candle ice is a “form of rotten ice; disintegrating sea ice (or lake ice) consisting of ice prisms or cylinders oriented perpendicular to the original ice surface; these ‘ice fingers’ may be equal in length to the thickness of the original ice before its disintegration” (American Meteorological Society; see http://glossary.ametsoc.org/wiki/Candle_ice, last accessed 16 September 2013).
167. A third Ulukhaktok hunter also mentioned how unpredictable wind directions have become. “[Now] the wind is really easy to pick up. And also, when it gets really strong wind, right the next day, it just switches around.” (PIN 117, Ulukhaktok).

Notes to Section 5 — Are there changes in abundance, distribution, and condition?

168. This problem occurs frequently in the news media, with its method of trying to balance different perspectives. For example, an extremely marginal flat-earth proponent can receive news coverage equal to that of well-established scientific professionals. In statistics, an “outlier” is a “result differing greatly from others in the same sample” (*Canadian Oxford Dictionary 2004*).
169. At the Polar Bear Environmental Change workshop in January 2013 two TKHs (PIN 136 and 138) said they disagree with this statement. They do not believe that polar bears can catch seals in open water, i.e., without nearby ice.
170. The two Paulatuk hunters at the Polar Bear Environmental Change workshop in January 2013 said this statement about polar bears not wintering in Browns Harbour is incorrect. The bears do not summer there, they said. The section of transcript from which this statement was taken was sent back to PIN 159 for confirmation by the HTC staff person. No changes were requested by PIN 159.
171. In practice, these questions were not always asked in exactly this way, and there were supplementary questions. See Appendix 2.
172. The transcript is garbled. The TKH seems to be saying that there are polar bears in the Russian part of the Arctic, where there is more ice.
173. During the 2010–11 season, 22 polar bears were harvested from a quota of 28. In 2011–12 the quota was 28, with 22 harvests, and in 2012–13 the quota was 28, with 23 harvests (Government of Northwest Territories 2012: 30; Marsha Branigan, pers. comm. to Peter Armitage, 8 October 2013).
174. When “distribution” was included on the PBEC workshop agenda, it was understood from reviewing interview questions and responses that TKHs had for the most part combined the concept with that of local abundance; that is, places where they habitually encountered polar bears, such as important headlands and other features that protrude into the Beaufort Sea. In fact, it is not clear whether the TKHs recognized the distinction made by biologists and ecologists between “abundance” and “distribution.” Biologically speaking, “distribution” refers to the geographic range or spatial arrangement of a species: where they are found on the planet. “Abundance” refers to areas where a species is found in larger numbers relative to other areas. See Campbell and Reece (2005: 1081).
175. In practice, these questions were not always asked in exactly this way, and there were supplementary questions. See Appendix 2.
176. TKHs from Inuvik and Aklavik had little to say about changes in maternity den locations and their numbers.
177. In practice, these questions were not always asked in exactly this way, and there were supplementary questions. See Appendix 2.
178. TKHs from Inuvik and Aklavik had little to say about changes in maternity den locations and their numbers.
179. Two Paulatuk hunters (PIN 163 and 164) marked two den locations on the north side of Fiji Island during their 2010 interviews.
180. It is not clear what he means by “observation of polar bear dens.” Presumably, this means his observations concerning the number and locations of dens.
181. “Stink oil” refers to aged oil rendered from bearded seal fat.
182. TKHs mentioned two polar bear visits to the Aklavik and Inuvik areas during their 2010 interviews and 2012 confirmation workshops. See Nelson’s discussion of visits by starving polar bears to Inupiat whaling camps in the Wainwright, Alaska, region (1969: 203).

183. Marsha Branigan indicated during the workshop that these observations about high seal mortality had been observed elsewhere in the western Arctic over the previous few years, and that the cause is currently unknown.
184. For more information on the GX Technology Ltd. (GXT) seismic surveys in 2010, see www.neb-one.gc.ca/clf-nsi/rthnb/pblcrgrstr/pblcrgrstrsrchv/gxtbfirtsncnd/nvrnmntlscrnngprpt-eng.pdf (accessed 27 May 2013) and www.aadnc-aandc.gc.ca/eng/1314983577776/1314983984416 (accessed 27 May 2013).
185. See www.beaufortrea.ca and www.beaufortrea.ca/wp-content/uploads/2013/03/10.2-N-Snow-Polar-Bears-in-the-Offshore-Beaufort.pdf (accessed 7 Oct. 2013).
186. Note Usher's observation for the mid-1960s: "In years when Amundsen Gulf and the Beaufort Sea are ice free, there are no bears at all (although they have on occasion been sighted swimming tens of miles from the nearest ice or land). If a heavy concentration of ice persists throughout the summer, bears may remain in or close to the area, and will be more available to hunters not only in the summer but often in the following winter as well. In 1966, when ice persisted around Sachs Harbour for much of the summer, an unusual number of bears were taken in that season" (1970b: 74). Usher does not mention the source of these observations, but presumably he learned of such matters directly from the Inuvialuit.

Notes to Section 6 — The importance of polar bears to the Inuvialuit

187. "They used them for polar bear pants, or inside the snow house we used them for mattress bottoms 'cause you can't get wet, instead of caribou" (PIN 141, Sachs Harbour).
188. References to "mythology" and "myth" here do not mean that the events related by such narratives are less real than other stories such as eyewitness accounts. Generally, myths describe events in "mythic time," long before present-day Inuvialuit, their parents, and grandparents were born.
189. The role played by polar bears in the Inuvialuit domestic economy is described briefly by Slavik (2010: 11–14, 24–29) with respect to clothing, meat for dogs and human consumption, income from the sale of pelts, and guided sport hunts.
190. For a useful overview of Inuvialuit guided polar bear sport hunting and its economics, see Slavik 2009. See also Slavik 2010: 24–26.
191. In 2008, "the polar bear was listed in the U.S. as 'threatened' under the *Endangered Species Act* (ESA), thereby triggering a prohibition on the importation of polar bear trophies (whether hides, skulls, claws, etc.) into the U.S." (Slavik 2009: 65).
192. Inuvik hunters used all three of their quota tags in 2011–12 and 2012–13 (Government Northwest Territories 2012: 32; Marsha Branigan, pers. comm. to Peter Armitage, 8 October 2013).
193. These places are located in Prince Albert Sound.
194. This is a translation by Jerry Akoakhion for PIN 120, 17 February 2010.
195. At this point in the narrative the translator says, "He said he doesn't really remember exactly the full story anymore."
196. At this point the translator says, "And there's a lot of stories of animals turning into human beings. So, that's just one little aspect of it." It is not clear whether this comment was made by the TKH or only the translator.
197. Here the translator says, "Our language is kind of complicated at times, to get the right translation. So, it's searching for the proper word, really having to use descriptive words."

Notes to Section 7 — Summary

198. Another major contribution to the documentation of Inuvialuit TK is the ethno-botany book published by the ICRC (Bandringa and Inuvialuit Elders 2010).
199. The emphasis in the original. See www.inuvialuitland.com/resources/Inuvialuit_Final_Agreement.pdf, pp. 6, 45, 56–57.
200. See IFA s.14 (5): "The relevant knowledge and experience of both the Inuvialuit and the scientific communities should be employed in order to achieve conservation."
201. See www.enr.gov.nt.ca/_live/pages/wpPages/Evidence_of_Sex.aspx (accessed 22 November 2013).
202. See www.enr.gov.nt.ca/_live/pages/wpPages/bow_hunting.aspx (accessed 22 November 2013).

203. See www.enr.gov.nt.ca/_live/pages/wpPages/Where_to_Attach_Tags.aspx; and www.enr.gov.nt.ca/_live/pages/wpPages/Tagged_or_Collared_Animals.aspx (accessed 22 November 2013).
204. See www.enr.gov.nt.ca/_live/pages/wpPages/Problem_Bears.aspx (accessed 22 November 2013).
205. See www.enr.gov.nt.ca/_live/pages/wpPages/Exporting_Wildlife.aspx (accessed 22 November 2013).
206. See <http://env.gov.nu.ca/node/136> (accessed 12 November 2013).
207. For an example of one of these plans, see www.jointsecretariat.ca/pdf/eisc/CCP_Ulukhaktok.pdf (accessed 10 October 2013).
208. This may imply that an Inuvialuit perspective on “nature” and polar bears cannot be conceived or expressed by people who speak only English. In the absence of evidence to the contrary, it is assumed that both Inuvialuktun and English can equally formulate and express Inuvialuit PBTK in all its richness and nuance. Nonetheless, although an exploration of both the Inuvialuktun AND English linguistic foundations of PBTK is required, priority should be given to Inuvialuktun, given the fragility of the language and the diminishing number of elders who speak it fluently.
209. An Inuvialuit dictionary comparable to the Wales Inupiaq Sea Ice Dictionary (Weyapuk and Krupnik 2012) would be useful. For a start, it would facilitate greater precision in communicating Inuvialuit observations related to the different types of ice associated or not associated with polar bears.

Appendices

Appendix 1. PBTK study methods statement

History

As noted at the beginning of the report, in the late 2000s the Wildlife Management Advisory Councils (North Slope and Northwest Territories) (WMACs — NS/NWT) and Inuvialuit Game Council (IGC) foresaw the need for a Polar Bear Traditional Knowledge (PBTK) study in the Inuvialuit Settlement Region (ISR) to inform management of human activities in relation to polar bears. The study was initiated at a time when the status of Canadian polar bear populations was being reassessed in the context of the Canadian government's Species at Risk Act and international deliberations related to protecting the bears under the Convention on International Trade in Endangered Species (CITES). The study was conducted as an evolving collaboration of biologists from the Governments of Yukon, Northwest Territories (NWT) and Canada (Environment, Parks Canada), in cooperation with the Inuvialuit, represented by the IGC and local Hunters and Trappers Committees (HTCs). Responsibility for the cooperative management of the study was assumed by the WMACs (NS/NWT), which were established under the terms of the Inuvialuit Final Agreement (IFA). A working group was established to oversee the project on behalf of the WMACs and to work with IGC staff to facilitate its implementation.

The main elements of the study's work plan and research design were completed in 2009, and were informed by a search of known databases to amalgamate and review potential sources of local and traditional knowledge of polar bears in the ISR. To this end, a gap analysis of the information currently available was conducted with the aid of an annotated bibliography of Inuvialuit PBTK (Marshall and Maraj 2009).

In its final iteration, the PBTK study Proposal and Workplan (17 December 2009) noted that TKHs in each community would be interviewed to obtain information regarding these topics:

- ecological aspects of a polar bears, seals and their worlds;
- characteristics of weather and sea ice;
- changes to sea ice and weather patterns that might affect polar bears;
- changes in the distribution of polar bears, their size, and other indicators of body condition (pelt, fat), denning, prey (numbers, distribution, community assemblage or types of prey available), population (numbers, abundance), and how other species interact with polar bears;
- indigenous management strategies for polar bears;
- historical and current hunting patterns;
- historical land use and occupancy patterns; and
- changes in the way people use polar bear habitat.

These survey themes/categories are reflected in the questionnaire used during the study interviews (see Round 1 and Round 2 questionnaires below).

Ethics clearance

Ethics clearance for the PBTK study was obtained from the Aurora Research Institute in January 2010. The Institute licenses research in accordance with the NWT's *Scientists Act*. A Polar Bear Traditional Knowledge Study Information Sheet and Consent Form was prepared for use with each interviewee (see below). The Information Sheet explained the purpose of the research, the disposition of the data and other matters, while the Consent Form was intended to document the written, informed consent of participants and any restrictions regarding the use of their data.

Researchers retained

Once the research design had been completed and toolkit assembled (questionnaire, map biography base maps, consent form, etc.), Dan Slavik¹ was contracted to conduct interviews with Traditional Knowledge Holders (TKHs) in each of the six Inuvialuit communities, in conjunction with local co-researchers and youth participants.

Questionnaire development

A late draft of the questionnaire was tested during pilot interviews with PIN 3 and PIN 100 in Inuvik on 29 January 2010. The slightly revised final version of the questionnaire contains 145 written questions (see Round 1 questionnaire below).² However, given the semi-structured interview method adopted, the actual number of questions asked during the interviews varied considerably from one TKH to the next. For example, fewer questions were asked when it was determined that the TKH had limited knowledge of a particular topic. Numerous supplementary questions were asked with TKHs who had deep experience with and hence knowledge of a topic.

The conduct of the interviews

During the winter of 2010, 29 men and women from Inuvik, Aklavik and Ulukhaktok were interviewed concerning their knowledge of polar bears. As a result of a review of the data from that round of interviews, new marking conventions for the map biography component³ were introduced and a revised questionnaire with supplementary questions/information was developed so that the researchers could probe more deeply into certain topics during the interviews (see Round 2 questionnaire, below). Interviews continued with 43 TKHs the following October and November in Sachs Harbour, Paulatuk and Tuktoyaktuk.

At the end of the interview period that November, a total of 72 Inuvialuit TKHs had been interviewed for the PBTk study. It should be noted that although 72 TKHs were interviewed, six joint interviews were conducted involving two interviewees each (66+6=72). The vast majority of the interviews were conducted during single sessions lasting a maximum of three hours. However, interviews were conducted over multiple sessions with four TKHs, three sessions in the case of PIN 129, two in the case of PIN 134, and two in the case of PIN 164 and PIN 164, the latter a joint interview. TKHs were paid \$200 per interview, community co-researchers were paid \$150 per interview or \$250 per day, and youth observer/assistants were paid \$50 per interview.

Research products at the conclusion of the interviews included audio and video recordings of the interviews, map biographies, completed Mapping Reference Tables (which recorded attribute data recorded on the biographies), and polar bear-related photographs taken by several TKHs, all of which were archived at the Joint Secretariat office in Inuvik (at the time of report completion).

Interview timeline

Two rounds of interviews were conducted:

- Inuvik, 29 January to 14 February 2010;
- Ulukhaktok, 16 February to 23 February 2010;
- Aklavik, 25 February to 1 March 2010;
- Sachs Harbour, 16 October to 24 October 2010;
- Paulatuk, 28 October to 4 November 2010; and
- Tuktoyaktuk, 8 November to 15 November 2010.

Community co-researchers and youth participants

The names of the community co-researchers (fieldworkers, translators) and youth participants who worked with Dan Slavik in the conduct of the PBTk interviews are listed in Table 1. The purpose of including youth in the interviews was to facilitate the transmission of PBTk to Inuvialuit youth. Translation was required in interviews with nine TKHs: eight in Ulukhaktok and one in Sachs Harbour. TKHs are identified by their Participant Identification Numbers (PINs) in the section discussing “sample” below.

Table A1. Community co-researchers and youth participants

Community	Community co-researcher	Translator	Youth participants
Aklavik	Andrew Archie		
Inuvik	Jeremy Hansen		
Paulatuk	Denise Wolki, Lauren Ruben		Payden Ruben, Lauren Ruben
Sachs Harbour	Allison Raddi	Jean Harry	
Tuktoyaktuk	Charles Pokiak, Devalynn Pokiak		Bradley Voudrach, Devalynn Pokiak
Ulukhaktok	Victoria Akhiatak, Laverna Klengenberg	Jerry Akoakhion, Alice Kaodloak	David Kanayok Jr., Tony Alanak

Transcription and review of transcripts

The English-language parts of the interview audio recordings were transcribed using Express Scribe and saved as Microsoft Word documents. A total of 4,764 pages of single-spaced transcript text (double spacing between paragraphs) resulted from the transcription efforts. Interview transcripts ranged in length from a low of 17 pages to a high of 168, with 72 pages the average for 66 transcripts.

The Joint Secretariat (JS) sent the draft transcripts back to each of the study participants for verification by way of their community HTC. However, evidence that the participants actually read and verified their transcripts is equivocal. The evidence takes the form of changes to the Microsoft Word file names in the corpus of transcripts used for NVivo processing. Transcripts that were reviewed by TKHs have file names containing the words “verified and few edits made,” “verified and no edits made,” “verified and one edit made” or “corrected 14 May 2012.” Two study participants from Inuvik, 12 from Ulukhaktok, one from Aklavik and one from Tuktoyaktuk sent verified transcripts back to the JS. One participant from Sachs Harbour and one from Paulatuk specifically requested that their interview transcripts and other data remain confidential (anonymous); however, it is not known whether they reviewed their transcripts. Thus, in total, there is evidence that 16 TKHs reviewed and verified their transcripts. The status of the remaining transcripts is unknown.

Consultants retained

The transcripts and map biographies comprise the core database for the PBTk study. Consulting anthropologist Peter Armitage was retained late in 2011 to work with the database and write this report. Geomatics and spatial data specialist Stephen Kilburn joined the study shortly thereafter to handle the spatial data aspects of the research. Armitage returned to the six Inuvialuit communities in October 2012 to review the draft results with the TKHs. In January 2013, a Polar Bear Environmental Change (PBEC) workshop was held with a small group of the TKHs to interpret observations, propositions and theories (OPTs) from the 2010 interviews related to changes, if any, in polar bear abundance, distribution and condition (see below).

Toolkit

The primary data documentation instrument used in the PBTk research was an interview questionnaire supported by the following tools:

- paper copies of ten custom base maps for recording PBTk and land-use features (i.e., making informant map biographies). See spatial data methods in Appendix 2;
- a PBTk study map legend for use with the map biography portions of the interview questionnaire. The legend provides the data-marking conventions for the map biographies. See spatial data methods in Appendix 2;
- a hardcopy Microsoft Excel spreadsheet called a Mapping Reference Table (MRT), used to record attribute data associated with features marked on the map biographies. Data were recorded by hand on MRTs by co-researchers during the interviews. These data were subsequently entered into the digital Microsoft Excel spreadsheet versions. See spatial data methods in Appendix 2;
- diagrams of polar bears from the Polar Bears International (PBI)/World Wildlife Fund (WWF) Polar Bear Score Card: A Standardized Fatness Index that is currently included in the ENR polar bear tag kit. This diagram shows five polar bear conditions — “skinny,” “thin,” “average,” “fat” and “very fat” — with each condition numbered one to five respectively.⁴ Research participants were asked to rate the bears they had seen or harvested according to this index. However, in practice these graphics were not used systematically from one interview to the next, and when they were used, polar bear condition ratings were not consistently dated. Furthermore, almost none of the TKHs used these descriptors unless they were prompted by the interviewers. It appears, therefore, that the rating index and its terms are not part of their everyday thinking or discourse concerning polar bears, even though the index is a co-management tool. For these reasons, no quantitative analysis could be undertaken with the numerical condition data that the index generated and they were not included in the section of the report dealing with polar bear condition;
- a collection of 17 photos showing different sea ice conditions. The photos were taken by Jodie Pongracz during aerial surveys along the Yukon North Slope and NWT as far as the Tuktoyaktuk peninsula in April 2010, and therefore could not be used during the previous winter’s interviews in Aklavik, Inuvik and Ulukhaktok. Ice condition photos 1–12 were used in interviews in the fall of 2010 in Sachs Harbour and Paulatuk, plus an additional five (1–17) in Tuktoyaktuk. Because they were taken in a limited geographical area during a time period that does not represent all relevant ice conditions throughout the year, and were not used systematically in all of the interviews, the photos and much of the related TKH commentary were not used in this report;

- marine mammal photos used as prompts (i.e., photos of bearded seals, ringed seals, harbour seals, beluga whale, narwhal whale, bowhead whale, gray whale). These prompts were rarely used during the interviews;⁵
- a polar bear denning diagram showing three chambers, a female bear and three cubs. This diagram was rarely used during the interviews;⁶
- a table called a “Critical Events Timeline” listing 19 “benchmark” years or periods such as the “arrival of reindeer” in 1935, the “opening of the Dempster Highway” in 1979, “signing Inuvialuit Final Agreement,” “establishment of Nunavut,” etc. In practice, this timeline was not used during the interviews. Instead, the primary method by which observations or activities were dated was through reference to decades or the actual year they occurred (e.g., ’70s, ’80s, late ’60s, last year, 1961, etc.). Numerous other timestamps were also used, such as “when I was younger,” “long time ago,” “nowadays,” “today,” “over your lifetime,” “my grandfather’s time,” “historical,” etc.
- use and occupancy maps for the Inuvialuit region published in Inuit Land Use and Occupancy Project. Volume Three: Land Use Atlas (Freeman 1976). Maps 1–20 depict hunting and trapping for Aklavik, Inuvik, Tuktoyaktuk, Paulatuk and Sachs Harbour for a variety of time periods, including pre-1955, pre-1959, 1928–61, 1955–74, 1959–74 and 1962–74. Maps 40–44 depict hunting and trapping areas for Holman Island (Ulukhaktok) for the periods 1923–39, 1939–65 and 1965–74. These maps were rarely used during the interviews;⁷
- a Polar Bear Traditional Knowledge Study Information Sheet and Consent Form. All interviewees signed consent forms;
- a list of Inuvialuktun terms relevant to the PBTk study (e.g., for polar bears, seals, other animals, ice, weather, hunting and travelling) derived from Ronald Lowe’s Basic Siglit Inuvialuit Eskimo Dictionary⁸ and a list of “Siglitun words related to marine resources and their use” authored by the Inuvialuit Cultural Resource Centre;
- a Sony IC digital audio recorder with flash memory, recording in wav format;⁹ and
- a Canon 5D digital single-lens reflex camera for recording HD video.¹⁰

TKH sample

A total of 72 people were interviewed from the six Inuvialuit communities during 66 interviews: 29 in the winter of 2010 (Round 1) and 43 in the fall of 2010 (Round 2). TKHs were selected to be interviewed primarily on the basis of recommendations by the community HTC. Attempts were made to interview all of the recommended TKHs; however, in some cases people declined the interview or were unavailable because they were not in the community or for some other reason. Some TKHs were interviewed because they were frequently recommended by interviewees when asked, “Who else in the community is knowledgeable about polar bears?” Furthermore, some additional TKHs were added to the sample in order to avoid data saturation for particular geographic areas and to enrich the range of experiences related to polar bears (e.g., women who fleshed bears, younger and older hunters).

The community members who were interviewed are listed in Tables A2 to A7, along with their community affiliation, gender, year of birth, an indication of whether they had personally harvested polar bears at any point in their lives, and the date(s) when they were interviewed. Of the 72 TKHs interviewed, eleven were women and ten had never harvested polar bears. Of the latter group, seven TKHs were women and three were men. They were included in the sample because they handled polar bears in some way (e.g., fleshing the hide), they had observed polar bears or their tracks, and/or had learned about polar bears from their elders and other relatives. The youngest person interviewed was born in 1982; the oldest was born in 1915. The average birth year of the interviewees was 1948, meaning that their average age was 62 years. The breakdown of interviews by community and gender is as follows:

- 5 people (all men) were interviewed in Inuvik;
- 15 people (including three women) were interviewed in Ulukhaktok;
- 9 people (including two women) were interviewed in Aklavik;
- 14 people (including four women) were interviewed in Sachs Harbour;
- 13 people (including two women) were interviewed in Paulatuk; and
- 16 people (all men) were interviewed in Tuktoyaktuk.

Table A2. Inuvik TKHs interviewed for the PBTk study

PIN	Gender	Birth year	Harvested PB?	Interview date
3	M	1966	yes	29 January 2010
100	M	1928	yes	29 January 2010
2	M	1934	yes	13 February 2010
102	M	1953	no	13 February 2010
103	M	1965	yes	14 February 2010

Table A3. Ulukhaktok TKHs interviewed for the PBTk study

PIN	Gender	Birth year	Harvested PB?	Interview date
114	M	1946	yes	16 February 2010
117	M	1959	yes	16 February 2010
120* ¹¹	M	1937	yes	17 February 2010
101*	F	1915	no	17 February 2010
121	M	1946	yes	18 February 2010
125	M	1947	yes	18 February 2010
127*	F	1942	yes	19 February 2010
116*	M	1943	yes	19 February 2010
119*	F	1938	yes	20 February 2010
115	M	1943	yes	21 February 2010
126*	M	1934	yes	22 February 2010
122*	M	1939	yes	22 February 2010
123	M	1954	yes	22 February 2010
124*	M	1938	yes	23 February 2010
113	M	1960	yes	23 February 2010

Table A4. Aklavik TKHs interviewed for the PBTk study

PIN	Gender	Birth year	Harvested PB?	Interview date
106	M	1948	no	25 February 2010
107	F	1936	no	25 February 2010
13	M	1964	yes	26 February 2010
19	M	1956	yes	26 February 2010
15	M	1936	yes	27 February 2010
111	F	1937	no	27 February 2010
17	M	1928	yes	28 February 2010
14	M	1939	no	1 March 2010
12	M	1960	yes	1 March 2010

Table A5. Sachs Harbour TKHs interviewed for the PBTk study¹²

PIN	Gender	Birth year	Harvested PB?	Interview date
130	M	1929	yes	16 October 2010
136	F	1941	no	16 October 2010
141	F	1931	no	16 October 2010
129*	F	1930	yes	17 October 2010, 19 October 2010, 23 October 2010
128	M	1933	yes	17 October 2010
137	M	1960	yes	18 October 2010
134	M	1968	yes	19 October 2010, 20 October 2010
131	M	1951	yes	21 October 2010
135	M	1959	yes	21 October 2010
139	M	1974	yes	22 October 2010
133	M	1958	yes	23 October 2010
132	M	1946	yes	23 October 2010
143	F	1951	no	23 October 2010
138	M	1951	yes	24 October 2010

Table A6. Paulatuk TKHs interviewed for the PBTk study

PIN	Gender	Birth year	Harvested PB?	Interview date
158	M	1965	yes	28 October 2010
144	M	1971	yes	29 October 2010
150	F	1967	yes	29 October 2010
149	M	1936	yes	31 October 2010
165	F	1946	no	31 October 2010
164	M	1943	yes	31 October 2010, 2 November 2010
145	M	1966	yes	1 November 2010
162	M	1933	yes	1 November 2010
147	M	1952	yes	2 November 2010
160	M	1962	yes	2 November 2010
159	M	1969	yes	3 November 2010
163	M	1962	yes	3 November 2010
142	M	1963	yes	4 November 2010

Table A7. Tuktoyaktuk TKHs interviewed for the PBTk study

PIN	Gender	Birth year	Harvested PB?	Interview date
161	M	1954	yes	08 November 2010
33	M	1946	yes	09 November 2010
42	M	1963	yes	09 November 2010
44	M	1954	yes	10 November 2010
27	M	1946	yes	10 November 2010
43	M	1949	yes	10 November 2010
140	M	1927	no	11 November 2010
29	M	1939	yes	11 November 2010
23	M	1939	yes	11 November 2010
25	M	1937	yes	11 November 2010
28	M	1942	yes	12 November 2010
22	M	1931	yes	12 November 2010
26	M	1944	yes	13 November 2010
38	M	1933	yes	13 November 2010
151	M	1982	yes	15 November 2010
24	M	1952	yes	15 November 2010

NVivo coding method

The principal investigators of the PBTk study were confronted with the need to organize, classify, query and analyze a large quantity of information embedded in narratives recorded during interviews with 72 Inuvialuit TKHs. A well-known computer program for facilitating these tasks is NVivo.¹³ NVivo is a qualitative data analysis (QDA) program. It is “designed for qualitative researchers working with rich text-based and/or multimedia information, where deep levels of analysis on small or large volumes of data are required.”¹⁴

NVivo’s method is quite simple at one level. The analyst/coder highlights a section of text in a transcript and assigns a code to it, resulting in the coded section being copied to a “node.” This is a kind of storage box for text from multiple transcripts that are related thematically in some way. For example, all text related to polar bear den locations would be held in the same node. It forms a digital file that can be retrieved and analyzed at will. Furthermore, the same text can be coded more than one way, assigning it to multiple nodes if necessary. This process greatly reduces the need to review each individual transcript every time an analysis of all observations or comments by all interviewees is required on a given theme, and it ensures that important text can be examined from one or more thematic perspectives.

The 65 nodes used to code and analyze the 66 PBTk study transcripts and their descriptions are listed in Table A8. Once the coding of the interview transcripts was completed, the contents of the 65 nodes were exported as Microsoft Word documents. All subsequent textual analyses undertaken for this report, and all narratives reproduced here, derive from these documents.

NVivo was also used to create a classification table, which is a spreadsheet for recording demographic data from the transcripts and fieldwork research notes related to the TKHs. The data fields in the table include the interviewee's name, gender, community affiliation, place of birth, birth date, age category, date of first polar bear kill (if known), date of last polar bear kill (if known), whether he or she had ever harvested a polar bear, his or her Inuvialuktun language capacity and whether he or she required translation during the interview.

Table A8. Nodes, associated codes and their description

Node name and label	Description
1. Additional comments relating to polar bears (ADDITIONAL COMMENTS)	Miscellaneous information that the informant thinks is important regarding polar bears that was mentioned during the interview.
2. Interesting note (INTERESTING NOTES)	Miscellaneous comments not covered by other codes or key comments that could be prioritized for reporting purposes.
3. Interview questions (QUESTIONS)	Interview questions as they were asked during the interview. All coded.
4. Inuvialuit and changes with polar bears (INUVALUIT AND CHANGES RE POLAR BEAR)	Discourse related to the effects of changes in polar bear abundance, distribution, etc. and reduced hunting of polar bears on Inuvialuit culture, identity, way of life on the land, transmission of knowledge to younger generations, etc. ¹⁵
5. Linguistic (LINGUISTIC)	Inuvialuktun terms, linguistic aspects of PBTk, TKH's Inuvialuktun capacity.
6. Map biography code (MAP BIO CODE)	The verbal anchors for marked land use and PBTk features on the map biographies.
7. Other Hunters Knowledgeable (IDENTIFIED AS KNOWLEDGEABLE)	Discourse regarding other people who are knowledgeable about polar bears.
8. Photo comments (PHOTO)	Discourse related to photos shown to Dan Slavik or mentioned during the interview.
9. Science (SCIENCE)	References to biologists and other researchers with whom the TKH has interacted. Also, where the TKH's discourse can be linked to an external researcher such as a biologist or scientific research including collars, tracking, darting, etc.
10. Traditions (TRADITION)	Comments about tradition and preservation of traditional Inuvialuit ways.
Background and land use	
11. Annual activities (ANNUAL ACTIVITY)	Annual activities of the TKH.
12. Background (BACK)	Biographical information concerning the TKH, e.g., name, birth date, birth place, communities lived in throughout life, first time hunted bears, last time hunting bears, etc.
13. Camps (CAMPS)	The locations, name and time period of camps used by the TKH and other Inuvialuit.
14. Knowledge constituted (KC)	Information concerning how the TKH's knowledge (or that of other Inuvialuit) is constituted with respect to polar bears, including knowledge transmission from Elders, biologists, communication with people in other communities, mass media, etc.
15. Land use (LU)	Information related to the TKH's land use, including spatial aspects, i.e., where the TKH hunted polar bears, seals and other animals. Spatial information regarding where TKHs travelled while hunting, travelling between communities, etc. May include length, time of year, mechanism of travel, frequency of trips and change over time. ¹⁶
16. Land-use methods (LU METHODS)	Discourse related to methods of land use, e.g., hunting, travelling, wayfinding, butchering methods/practices, skills related to walking on ice, etc.

17. Polar bear harvest (KILL)	Information related to polar bear kills, including the location where the TKH or others killed polar bears for any reason. This includes places where sport hunters guided by Inuvialuit killed polar bears (all time periods). ¹⁷
18. Snowmobile (SNOWMOBILE)	Discourse regarding the use of snowmobiles.
19. Timestamps (TIMESTAMPS)	Any type of temporal marker that can be used to date land-use activities or PBTk, e.g., months (January), decades ('60s, '80s), specific dates/years, rough time markers such as "long ago," "old days," etc.
Human bear interactions	
20. Human bear interaction experiences (HBI EXP)	Discourse related to close calls/encounters/experiences with polar bears. What the polar bear did and what the TKH did. Comments on the age/sex of the bear.
21. Human bear interactions and changes in (HBI CHAN)	Comments on whether bears come around the community or camps, and if this has changed over time. Observations regarding any polar bear problems, what kind of problems and their causes. Whether there are more, the same number or fewer problems with bears, and whether the types of problems (if they exist) have changed. Where the problems are occurring and whether the locations have changed over time.
Management¹⁸	
22. Management (MANAG)	Discourses concerning TKH (and those of the Inuvialuit) customs, practices and beliefs related to monitoring and organizing their relations with polar bears and other animals. ¹⁹ How the Inuvialuit monitor changes in polar bear abundance and deal with problems related to this. An indication of how much polar bear harvesting was occurring before quotas (1968), and whether there were traditional ways to make sure people did not over-harvest polar bears. ²⁰ Also, the customs, practices, beliefs and social relations among the Inuvialuit that determine (control) their access to different parts of their territory and the animals (including polar bears) found there. This may include decision-making related to how, when, where and why to kill polar bears and in what numbers. This does not include discourses related to polar bear harvest quotas.
23. Polar bear quota, tags and regulations (QUOTA)	TKH discourses related to government polar bear harvest quotas and government hunting regulations.
Bear condition	
24. Condition (CONDITION)	General comments regarding the condition of bears, not necessarily tied to time, regions, seasons, etc. Assessments of a polar bear's condition based on examining the skinned bear.
25. Condition different across time (COND TIME)	Comments regarding whether polar bear condition has changed over time; reasons this may be happening.
26. Condition different between regions (COND REG)	Comments related to whether polar bear condition differs between areas.
27. Condition different between season (COND SEAS)	Comments related to whether polar bear condition changes between seasons.
28. Condition Inuvialuit assessment of (COND INUV)	How people know if a polar bear is in good "shape" ("healthy"). Comments describing polar bears in good health, words used.
Bear mortality, health and sickness	
29. Cannibalism (CANN)	Discourse related to polar bears eating their own kind and its causes.
30. Mortality (MORT)	Comments on how polar bears die, apart from being harvested. Comments on sightings of dead bears and reasons for death.
31. Sickness, disease, age (SICK AGE)	Discourses related to sick or elderly polar bears, causes of sickness. Whether polar bear "health" has changed over time. ²¹
Behaviour and characteristics	
32. Bear behaviour (BEHAVIOUR)	General comments regarding bear behaviour and characteristics. Age- or sex-specific information about polar bear behaviour. Characteristics not covered by condition or health nodes (e.g., shape of tracks). Size of bear. References to polar bears killing seals in open water are coded under "Feeding Ecology."

33. Grizzly Polar Bear (GRIZ PB)	Discourses related to grizzly bears and/or interactions with polar bears, cross-breeding, predation by one animal of another, etc.
34. Mating (MATING)	Discourses related to polar bear mating.
Denning ecology	
35. Den change (DEN CHAN)	Information regarding how polar bear denning may have changed. This may apply to the timing of denning, changes in denning habitat, changes in den locations and numbers, etc.
36. Den location (DEN LOC)	Information regarding the spatial location of dens.
37. Den mortality (DEN MORT)	Any observations of polar bears dying in dens.
38. Den site characteristics (DEN CHAR)	Information about den sites and the dens themselves. What types of places do you find dens, what is the snow like, etc.
39. Denning general comments (DEN GENERAL)	Comments regarding the structure of dens, internal characteristics. Any information about dens that does not have to do with location, mortality, site characteristics or patterns of entry/emergence and which sexes den.
40. Denning patterns (sex, timing) (DEN PATT)	Information regarding when bears enter and emerge from dens, which bears den (males, females, females with cubs, etc.). Are patterns different between regions (i.e., do bears farther north enter dens earlier than bears in the south).
Distribution and abundance	
41. Abundance (ABUN)	Relative statements of abundance. Quantity assessments can be general statements about "lots" or "not many," etc.
42. Abundance change (ABUN CHAN)	Change in abundance. Also predictions or speculation about future abundance of polar bears.
43. Bears sighted (SIGHTED)	Information regarding all of the bears seen and harvested throughout the TKH's lifetime. Key information includes location, quantitative information (number of sightings per year in each area, number of family groups, number of individuals, males and females). Information concerning young bears, where they are seen and when.
44. Distribution (DIST)	Many of the references to bear sightings/harvests have been coded under "Bears sighted" to be inclusive of all details. Thereafter, details regarding distribution are covered by this code. It includes all generalizations, including the response to the question, "Are there places where the people in your community know to go see bears?"
45. Distribution change (DIST CHAN)	Changes in polar bear distribution (location).
46. Distribution female bears (DIST F)	Where females or females with cubs are found.
47. Distribution male bears (DIST M)	Where male bears are found.
48. Movement patterns (MOVE PATT)	Information regarding any polar bear movement patterns. Are polar bears seen travelling in a certain direction at certain times of the year? Ideas as to why movements occur.
Feeding ecology	
49. Feeding changes (FOOD CHAN)	Comments related to changes over time in the type of seals that polar bears eat. Comments regarding whether the part of the seal that is eaten changed over time (i.e., before, they used to eat fat only, now they eat everything). Thoughts on why changes have occurred, if they are mentioned.
50. Feeding differences based on age, sex (FOOD DIFF)	Comments related to the particular age or sex of seals eaten by polar bears. Comments related to differences in the age or sex of bears in relation to eating seals.
51. Food (FOOD)	Discourse related to what polar bears eat (e.g. ringed seal, bearded seal, whales, grass, etc). Comments on which type of seals are eaten, what parts of seals are eaten. Comment on whether prey items are eaten all seasons. Other food items bears may eat.
52. Hunting methods (HUNT METH)	Comments on how polar bears hunt, whether this changes with the species hunted and/or season.

53. Prey abundance/condition (PREY ABUN)	Comments about whether the body condition or numbers of prey species have changed over time. Relative statements of abundance (e.g., “lots” or “tons” of seals).
54. Prey distribution/habitat (PREY DIST)	Comments on where polar bears hunt seals (generic), whales, etc. Also descriptions of seal den characteristics, habitat, ice features (which may later be coded in habitat as well). Comments on whether the distribution (location) of prey has changed over time.
55. Prey distribution (location) bearded seal (PREY DIST BEARD)	Discourse related to where polar bears hunt bearded seals, habitat characteristics (e.g., ice features) where these seals are hunted by polar bears, etc. Such discourse may be coded with polar bear habitat codes as well). Comments on whether the distribution (location) of bearded seals has changed over time.
56. Prey distribution (location) ringed seal (PREY DIST RING)	Discourse related to where polar bears hunt ringed seals. Habitat characteristics (e.g., ice features, den characteristics), where these seals are hunted by polar bears, etc. Such discourse may be coded with polar bear habitat codes as well). Comments on whether the distribution (location) of ringed seals has changed over time.
Polar bear habitat	
57. Habitat characteristics (HAB CHAR)	Information about the sea ice or land where polar bears are seen. Any descriptors of habitat where polar bears are seen, or habitat features known to be important to them. The time of year that polar bears are seen using these habitats should be included (provides info. on seasonal habitat use). Also note areas that limit where bears can go; areas that are not good polar bear habitat.
58. Habitat location (HAB LOC)	The location of important habitats spatially. When an area is identified without any characteristics mentioned, it can be coded to “Habitat location.”
59. Habitat use, change in (HAB USE CHANG)	Discourses related to changes in how polar bears are using habitat. Are bears using the same habitat as they used to? Are they using the same types of ice as they used to? If there has been change, what is the cause?
Sea ice, weather and climate	
60. Effects of climate, weather and sea ice changes on polar bears (IMPA SI ON BEAR)	Discourses regarding how climate, weather and sea ice changes may affect polar bears. Have bears adapted, and if so, in what way?
61. Open water (OPEN)	Areas of open water, in the past and recently, including open leads.
62. Sea ice (SI)	Information regarding different types of ice, a description thereof, where these types are found, and when. Discourses regarding places to avoid or go to due to ice conditions.
63. Sea ice change (SI CHAN)	Information regarding changes in sea ice conditions over time. Some of this information may be initially coded to “Sea ice.” If there is only information regarding ice conditions, and no comparison is made to variable ice conditions over time, the comment should be coded to “Sea ice.” ²²
64. Sea ice freeze-up and break-up (SI BREAK FREEZE)	Discourse related freeze-up and break-up, and how this has changed over time. ²³
65. Weather climate environment (WEAT)	Discourse related to how the weather, climate and physical environment have changed. Also references to changes in other animal populations, their behaviour, etc. ²⁴

Table A9. PBTk study: division of labour regarding tasks and responsibilities.

Tasks	Person(s) primarily responsible
Study objectives, research design, toolkit	Ramona Maraj, Marsha Branigan, Jodie Pongracz
Literature reviews in support of the research design, data analysis, etc.	Shelley Marshall, Ramona Maraj, Peter Armitage
Technical review of research design, questionnaire, work-plan, budgets, etc.	Lindsay Staples, Frank Pokiak, Jennifer Lam, WMACs, Marsha Branigan, Evan Richardson, Joel Ingraham, Molly Kirk, Shelley Marshall, Dorothy Cooley, Steve Mackinson, Vicki Sahanatien, Lisa Christensen, Barney Smith, Dan Slavik, Jodie Pongracz
Research ethics application (Aurora Research Institute)	Ramona Maraj, Marsha Branigan
PBTk study management and support	WMACs, IGC, in particular Larry Carpenter, Lindsay Staples, Jennifer Smith, Christine Cleghorn, Marsha Branigan, Jennifer Lam, Rosa Brown, Alex Bradley, Bruce Hanbidge
Pilot interviews to test the questionnaire	Ramona Maraj, Marsha Branigan, Dan Slavik with PIN 3 and PIN 100
Interviews with TKHs in 2010	Dan Slavik and community co-researchers Allison Raddi, Denise Wolki, Lauren Ruben, Charles Pokiak, Devalynn Pokiak, Jeremy Hansen, Victoria Akhiatak, Laverna Klengenberg, Andrew Archie
Translation during 2010 interviews	Jean Harry, Jerry Akoakhion, Alice Kaodloak
Logistical support of community interviews	Jennifer Lam
Transcription of interview audio recordings	Joyce Bachli, Patricia Davison
Design of NVivo data processing methods	Jodie Pongracz, Peter Armitage
NVivo data processing, coding	Peter Armitage, Jodie Pongracz
Spatial data management, geomatics and cartography	Stephen Kilburn, in consultation with Peter Armitage
Processing of Evan Richardson maternity den spatial data, integration with PBTk 2010 Study	Stephen Kilburn
Confirmation workshops and meetings, October 2012	Peter Armitage with support from Alex Bradley, Marsha Branigan, Jennifer Lam, Helen Kitekudlak and Robert Kuptana
2013 PBEC workshop with TKH group, facilitation, technical support, January 2013.	Peter Armitage, Steve Baryluk, Marsha Branigan, Jennifer Lam, Jennifer Smith, Alex Bradley
Report writing	Peter Armitage (main body of report), Stephen Kilburn (spatial data methods), with content contributions and copy edit/review by Lindsay Staples, Larry Carpenter, Marsha Branigan, Jennifer Smith, Rosa Brown and Christine Cleghorn
Validation of Inuvialuktun vocabulary in the report, translation, additional vocabulary, editing	Lillian Elias, Robert Kuptana, Albert Elias, Beverly Amos, Emily Kudlak
Review of draft reports	Lindsay Staples, Larry Carpenter, Marsha Branigan, Jennifer Smith, Christine Cleghorn, Rosa Brown, WMACs, HTCs, Dan Slavik, Rob Florkiewicz, Patricia Halladay (editing, layout)
Report photos	John Lucas Sr., John Lucas Jr., Robert Kuptana, David Kuptana, Pat Ekpakhohak, Jean Ekpakhohak, Tony Green, Jonas Meyook

Confirmation workshops and public meetings (2012)

These were the objectives of the confirmation workshops and public meetings in October 2012:

- by way of workshops, brief TKHs who had been interviewed in 2010 regarding the study's progress;
- summarize the observations and findings emerging from the study;
- confirm spatial data that were recorded on map biographies during the 2010 interviews;
- obtain feedback concerning how to interpret key findings related to polar bear abundance, distribution and condition;
- outline the remaining steps required in order to complete the study; and,
- brief community members regarding the study's progress at community meetings to which the general public was invited.

Community tour and follow-up

During the four-week period 5 October to 2 November, 2012, Peter Armitage travelled throughout the ISR to conduct community confirmation workshops and public meetings. Early in October 2012, prior to the commencement of the community visits, he met with the WMACs to review study progress and devise the process related to the upcoming PBTk study community confirmation workshops and public meetings. A number of apparently contradictory propositions had emerged from the interview transcripts concerning changes to polar bear abundance, distribution and condition. For this reason, the WMACs made the decision to hold a Polar Bear Environmental Change (PBEC) workshop with a small group of TKHs in the near future to interpret and contextualize key observations, propositions and theories (OPTs) in the transcripts. The explanations documented during this PBEC workshop would be used in the report to contextualize key propositions related to changes (if any) in polar bear abundance, distribution and condition (see below).

PBTk study community confirmation workshops and public meetings were held according to the following schedule:²⁵

- Ulukhaktok, 11–15 October
- Sachs Harbour, 16–18 October
- Inuvik, 20–21 October
- Tuktoyaktuk, 22–23 October
- Aklavik, 25–26 October
- Paulatuk, 30–31 October

TKHs from the 2010 interviews were paid honoraria of \$250 for a full day and \$150 for a half day to attend the workshops, while HTC directors were paid \$150 to attend the public meetings. Rapid sequential translation between Kangiryuarmiutun and English was provided during the Ulukhaktok workshop while simultaneous translation using headsets was provided at the public meeting there. No translation was required at workshops or public meetings in any of the other Inuvialuit communities.

Participation

Of the 72 TKHs interviewed in 2010, 37 participated in the confirmation workshops. In total, 45 people, including HTC directors and TKHs from the 2010 interviews, participated in the public meetings. Only TKHs participated in the workshops. TKHs, HTC directors and the public at large were invited to the public meetings by way of direct phone contact by WMACs representatives or HTC staff, and through public posters.²⁶ In Tuktoyaktuk, the public meeting was also advertised on community radio. The details concerning workshop and public meeting participation by community are as follows:

- Ulukhaktok — workshop (12 PBTk study TKHs), public meeting (11 Inuvialuit, 5 of them HTC directors);
- Sachs Harbour — workshop (6 PBTk study TKHs), public meeting (6 Inuvialuit, 5 of them HTC directors);
- Inuvik — workshop (3 PBTk study TKHs), public meeting (1 Inuvialuit, no HTC directors);
- Tuktoyaktuk — workshop (3 PBTk study TKHs and one additional TKH), public meeting (>11 Inuvialuit, 4 of them HTC directors and 3 TKHs who did not participate in the workshop);
- Aklavik — workshop (3 PBTk study TKHs and one additional TKH), public meeting (6 Inuvialuit, 5 of them HTC directors);
- Paulatuk — workshop (10 PBTk study TKHs), public meeting (>12 Inuvialuit, including 8 PBTk study TKHs and 6 HTC directors). An additional workshop was held in Inuvik for two PBTk study TKHs from Paulatuk who could not participate in their community workshop or meeting.

Confirmation process

Digitally projected Microsoft PowerPoint slide presentations were the primary tool used during the community workshops and public meetings. Facilitators reviewed the history of the PBTk study and summarized the knowledge and key propositions emerging from the 4,764 pages of interview transcripts and map biographies. This is some of the content covered during the workshops and public meetings:

- a brief review of the history of the study, including the timing of the 2010 interviews, and research work following the interviews (e.g., transcript coding, creation of geo-database, etc.);
- an overview of how Inuvialuit know what they know about polar bears;
- the presentation of small-scale projected maps showing the geographic extent of PBTk features mapped in 2010 using map biographies;
- a summary of the topics covered by the study, including

- what polar bears eat,
 - where they get it (habitat),
 - polar bear mating,
 - polar bear den locations, den characteristics, when females and cubs come out of their dens, number of cubs,
 - the great intelligence of polar bears,
 - how mother polar bears teach their cubs,
 - whether male polar bears den,
 - polar bear-grizzly hybrids,
 - polar bear movement patterns,
 - how polar bear die (other than by being hunted by humans),
 - abundance (whether and where there are few or many polar bears),
 - distribution (where Inuvialuit have encountered polar bears over the years),
 - condition (how Inuvialuit evaluate the health of polar bears, and related observations),
 - changes in polar bear abundance, distribution and condition,
 - management of polar bear harvesting before and after tags/quota, sport hunting,
 - Inuvialuit worldview in relation to polar bears,
 - the value of polar bears to Inuvialuit,
 - Inuvialuit knowledge of ice, water and land, and
 - methods of harvesting polar bears.
- the presentation of several small-scale thematic maps showing PBTK features from the 2010 map biographies, including ice features and artificial islands, polynyas, polar bear feeding locations, den locations, mortality locations and movement patterns, as well as polar bear abundance, harvest and signs locations;
 - examples of TKH narratives from the transcripts that illustrate the richness of the PBTK documented during the 2010 interviews, as well as key propositions related to polar bear abundance, distribution and condition;
 - the next steps to complete the study, including review of the draft report by the WMACs and IGC, and the proposed PBEC workshop with a group of TKHs for the purpose of interpreting key OPTs related to polar bear abundance, distribution and condition.

The spatial data recorded during the 2010 interviews using the map biography method were reviewed during the workshops but not the public meetings (see “Spatial data component” below).

All workshop and public meeting proceedings were digitally audio recorded (MP3 format); a DVD of the recordings was sent to the WMAC (North Slope, or NS) and the WMAC (NWT) for archiving. Time and budget constraints did not permit the transcription of the recordings. However, the recordings facilitated subsequent examination of key discussions; notes taken during the workshops and meetings pointed to relevant recordings.

Spatial data component

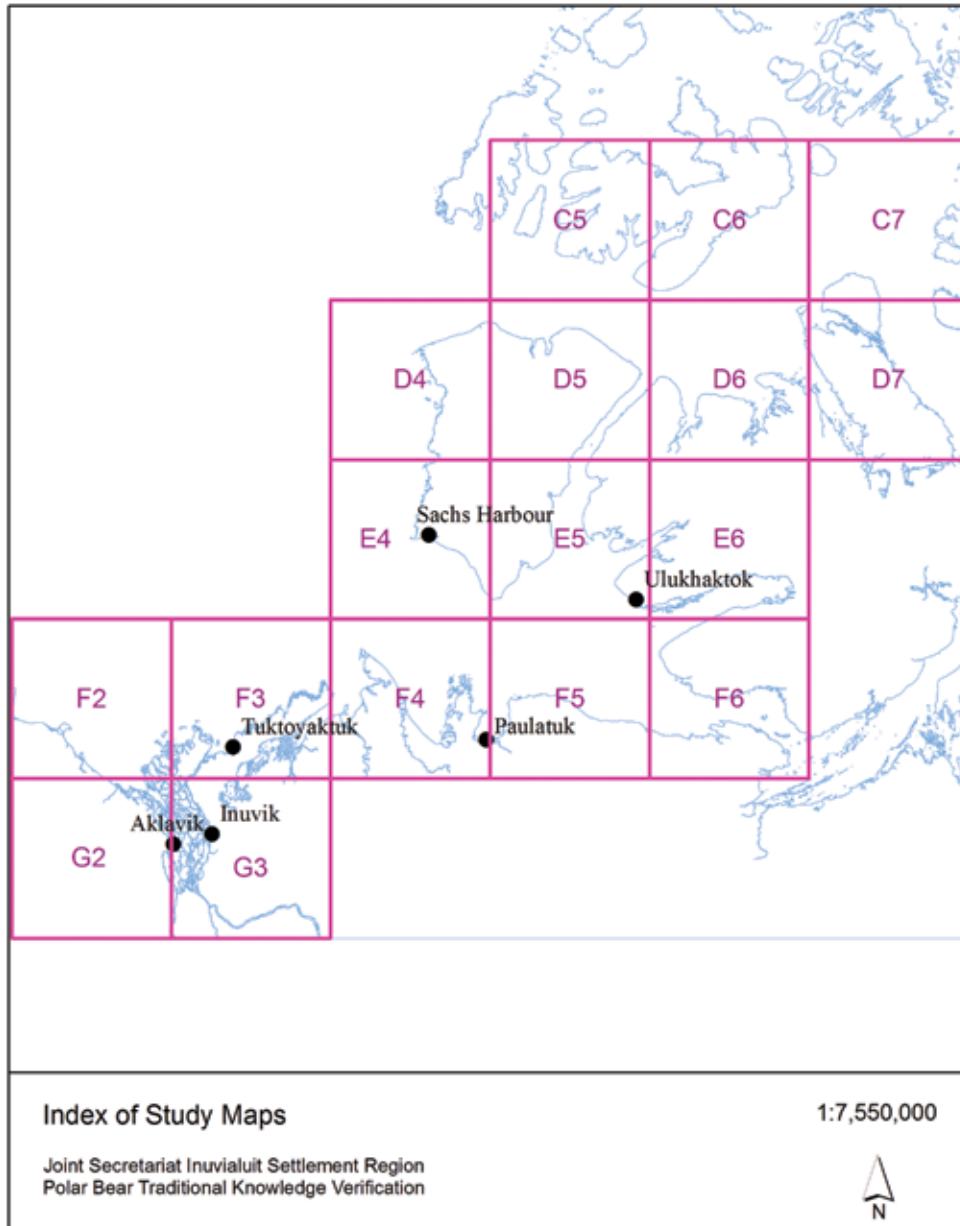
It was recognized at the outset that there would be limited opportunities to review the spatial aspects of the PBTK that had been marked on map biographies in 2010, given time and budget constraints. Nonetheless, a number of marked features that appeared to be errors of interpretation or marking on the part of the researchers needed to be checked. Seeking guidance from TKHs regarding the interpretation of ice features was also an objective, as was more accurate marking of polar bear maternity dens, most of which were originally georeferenced using coarse polygons or lines on the 2010 map biographies. In general, TKHs would have an opportunity to identify any glaring errors of omission or PBTK feature marking. To this end, TKHs were asked the following questions whenever the opportunity arose during the community workshops:

- To your knowledge, is anything marked on these maps now incorrect/a mistake?
- If yes, do you know if it was previously correct but has changed? When was it true?
- Are there areas on these maps where you know something should be marked but nothing is?
- Most of the information on these maps was collected on much less accurate maps. Can you mark the locations more accurately (in particular, polar bear maternity dens)?

The geo-database had been completed during the summer of 2012. It included digitizing all of the marked PBTK features on the map biographies and organizing the descriptive information that had been recorded on Mapping Reference Tables (see Appendix 2 regarding spatial data). These tables were subsequently wedded to the point, line and polygon files in the ArcGIS geodatabase. The maternity den and related data from the Richardson, Branigan and Stirling study from 2008 were entered into the geodatabase. This geodatabase was used to generate three sets of custom designed maps at 1:250,000 scale showing (1) composite PBTK map biography data from 2010; (2) map biography ice feature data; and (3) map biography PBTK features.

The PBTK and ice features depicted on these maps included polynyas, rubble ice, pile-ups, floe edges, leads, pressure ridges, multi-year ice, landfast ice, polar bear den locations, sightings of mothers with cubs, polar bear feeding locations, polar bear harvest locations, where signs (e.g., tracks) of polar bears were encountered, where polar bears were observed, where dead polar bears were observed, areas of polar bear abundance and polar bear movement patterns. Seventeen maps were created for the composite set in order to cover the PBTK study area (Map A1) and seven ice feature and seven PBTK feature maps were created in order to facilitate better map-reading by TKHs, especially for areas with a lot of data. In total, 31 maps were available for use during the community workshops. In practice, however, only the 17 composite maps were used to confirm the 2010 map biography features and mark additional PBTK features.

Map A1. PBTK study area and index to composite and thematic maps used during the workshops



In total, 101 map biography features were corrected or added to the custom base maps. These maps were sent to Stephen Kilburn for digitizing and integration into the ArcGIS geodatabase. The geodatabase was used to build new composite maps as well as individual TKH maps in order to illustrate important aspects of Inuvialuit PBTK in the study report (see Appendix 2 for more information concerning spatial data methods).

Feedback from Traditional Knowledge Holders

A great many points related to polar bears were discussed during the four weeks of workshops and public meetings in the six ISR communities. Those most relevant to the confirmation process relate to interpretations of sea ice, changes in polar bear abundance, distribution and condition, and the depiction of ice features and polar bear movement patterns on the confirmation maps (derived from the 2010 map biographies). These are the most salient points:

- Trends in polar bear abundance, distribution and condition must be interpreted/analyzed in terms of an understanding of considerable seasonal variation in sea ice conditions and polar bear movement patterns. Polar bear behaviour and the habitat they live in are extremely complex; this complexity cannot be ignored when considering the effects of climate change on polar bears;
- In some places along the Yukon North Slope and outer Mackenzie Delta offshore areas the depiction of polar bear movement patterns on the maps is inaccurate because it suggests that polar bears moved in only a west-to-east direction across Mackenzie Bay, and in a spiral fashion just north of Tuktoyaktuk. In response to TKH feedback, a spiral feature was targeted for removal from the database, while additional lines and arrows were drawn on the confirmation maps to more accurately show movement directions;
- In Tuktoyaktuk, one TKH was unwilling to mark floe edge, pressure ridges and other ice features on the confirmation maps because he felt there was too much annual variation in the location of these features. The study team considered trying to map the extremes in the location of these features in order to represent in some way the effects of climate change on sea ice, and hence Inuvialuit polar bear harvesting activities, but in the end gave up on this exercise. As a result, the locations of mapped ice features could not be confirmed in Tuktoyaktuk. The fact that many of the ice features mapped on the 2010 map biographies were not dated aggravates this problem. For example, no pattern is apparent in a spread of lines along the outer Mackenzie Delta offshore areas that represent different locations of floe edges within the living memory of the TKHs familiar with that region, because many of the lines were not dated. Furthermore, this spread may simply represent yearly variation in the locations of floe edges rather than a trend in receding main ice towards the shoreline. In general, these mapping problems mean that the study team cannot generate composite ice feature maps that illustrate TKH narratives about the effects of climate change on sea ice (e.g., unsafe, unpredictable, thinner, rougher ice since about 1990, the contemporary total absence of multi-year ice, etc).
- In Sachs Harbour, one TKH said there tends to be [his words] more polar bears visiting the community in recent years, compared to the past. However, no trend was apparent based on a reading of transcripts for the Sachs Harbour TKHs.
- Considerable discussion took place in Paulatuk concerning English-language terms for various ice conditions. It is not always clear in the transcripts what TKHs mean by terms such as “main ice,” “old ice” and “icebergs.” Some discussion occurred to clarify these and other terms associated with ice conditions. This and other discussions informed ice terminology and descriptions in the PBTk report;
- Some TKHs were critical of terms such as “expert” and “informant” to describe the people interviewed in 2010, preferring “Traditional Knowledge Holder” (TKH). “We’re not the experts, the elders are,” said one workshop participant.
- In Ulukhaktok a number of TKHs talked critically of present-day regulations that prevent them and their relatives in Kugluktuk and Cambridge Bay from harvesting in adjacent areas where they once lived, travelled and harvested on either side of the present-day Northwest Territories and Nunavut border. They felt strongly that hunters should be able to hunt in both areas. There were some comments that hunters from Kugluktuk continue to harvest into ISR territory and that this is unfair given the restrictions on Inuvialuit harvesting in Nunavut.
- Some TKHs were very reluctant to comment on the accuracy of PBTk features mapped by people who were not present at the workshops. Those TKHs may have different knowledge of polar bears in mapped areas that are unknown to the people present at the workshops, and only they can properly confirm their data on the maps. This reluctance extended to mapped features that are overly generalized (e.g., using large sausage-like polygons to depict maternity den locations) and which could be more accurately depicted by points.
- In Inuvik, one TKH stressed the importance of being careful with any proposition that is nothing more than speculation rather than a statement of direct observation or fact.
- The protection of personal identities through the use of Participant Identification Numbers (PINs) received widespread support by the participants in the workshops and public meetings.

Comments on the confirmation meetings

The workshop process used during the confirmation process was not appropriate for systematic, detailed review of the spatial PBTK marked on the map biographies during the 2010 interviews because of time and budget constraints.²⁷ Moreover, there was limited time to review all of the TKH information in detail, in part due to the sheer quantity of the information documented in 2010 and the fact that it could only be presented textually and orally during the confirmation meetings. TKHs who participated in the confirmation workshops could not devote the considerable amount of time necessary to listen to summary information recited point-by-point from the 2010 transcripts.

Despite these limitations, the confirmation process greatly facilitated the acquisition of badly needed contextual information concerning the six ISR communities, polar bear biology and habitat, and the ongoing importance of polar bears to the Inuvialuit. It helped build rapport with numerous TKHs. A smaller group of TKHs was asked to participate in the PBEC workshop to interpret and contextualize key OPTs related to polar bear abundance, distribution and condition. In addition, the process facilitated a far greater appreciation of the difficulties of documenting certain types of Inuvialuit PBTK, particularly knowledge related to sea ice habitat and depicting it using the map biography method. It is clear that the map biography method is limited in its ability to accurately record the locations of pressure ridges, open leads and other sea ice features.

Most importantly, discussions with a number of TKHs pointed clearly to the need to take account of a highly complex, dynamic and changing environment when interpreting Inuvialuit OPTs concerning polar bear abundance, distribution and condition. In other words, any trends in polar bear abundance, distribution and condition must be interpreted/analyzed in terms of an understanding of considerable seasonal variation in sea ice conditions and polar bear movement patterns.

Polar Bear Environmental Change workshop, January 2013

It became clear during the NVivo coding process that TKHs had a range of observations and perspectives on change-related matters. For example, some thought that there are less polar bears compared to when they were younger, while others thought the numbers are pretty much the same in their areas. Some thought that polar bears are skinnier today compared to the past. There was no consistent pattern in these apparently differing views, in relation to the age of the hunters or their affiliations with a particular community or polar bear hunting area.

Rather than attempt to interpret Inuvialuit change-related observations and perspectives using quantitative or other means, the study team asked a group of Inuvialuit TKHs to interpret the interview data. To this end, a Polar Bear Environmental Change (PBEC) workshop was held in Inuvik with 12 Inuvialuit participants, all of whom had been interviewed as part of the 2010 PBTK study.

The methodological details of the PBEC workshop are provided in Chapter 5.

Review of the draft report

In early December 2013, a draft of the PBTK study report was sent to the TKHs for their review and comment by late January 2014. TKHs were asked to review their individual narratives, as well as references to their communities. This was done by sending a letter to each TKH indicating his or her PIN, the pages that the PIN appeared on, and pages where their community was mentioned. Comments were received from individual TKHs from Aklavik, Paulatuk, Ulukhaktok and Sachs Harbour. The Aklavik, Sachs Harbour, Paulatuk and Tuktoyaktuk HTCs also provided comments. The two WMACS, the IGC, the GNWT and the Yukon Government were also asked to review and comment on the document by late January 2014. The draft report was provided to Environment Canada in mid-February, with comments requested by early March. Comments were received from the WMAC (NS) and the IGC.

Limitations of the research

Although this is a Traditional Knowledge study, it was shaped from the start by the structures and needs of wildlife management institutions and organizations responsible for polar bear management in the ISR.²⁸ The questionnaire structured the responses and contoured the knowledge. For example, the concept “population” was used frequently in the interviews to talk about polar bears both in the aggregate and also as discrete biological groups.²⁹ However, there is no historical evidence that Inuvialuit thought of polar bears in the western Arctic in terms of their membership in Southern Beaufort, Northern Beaufort or Viscount Melville populations (or subpopulations), and it appears that concept of a “population” is not indigenous to the Inuvialuit. As a result, questions that make use of certain terminology risk being misunderstood by research participants or distorting their expressed ideas and intended meanings. The single most important limitation of the PBTK study is its ambition. It attempted to accomplish a great deal in the space of a single

interview lasting less than three hours with a large toolkit and lengthy questionnaire. The scope of the study and the knowledge that it sought to elicit exceeded what a questionnaire-based survey could practically accomplish. As a result, many topics were not given full consideration; some were not addressed at all. For example, certain basic biological or physiological information (such as the number of teats) that would be known to all Inuvialuit polar bear hunters is not mentioned in the interviews.

Moreover, the study adopted quantitative and qualitative approaches via survey questions that would facilitate quantitative analyses of matters related to changes (if any) in polar bear abundance, distribution and condition on the one hand, and qualitative descriptions of polar bear behaviour, habitat and other aspects of their biology on the other. The length of the questionnaire meant that questions could not be asked systematically of every participant. Statistical analysis could not be applied meaningfully to the data because of this, and also because of inconsistent sampling strategy. Attempts by other studies to quantify qualitative TK data, for example by tabulating the number of participants who advanced particular propositions related to change, run two risks: (1) they oversimplify complex and nuanced observations and thinking about change; and (2) they serve limited analytical purpose where quantitative differences may not be statistically significant in a small sample size. This matter is discussed at greater length at the beginning of Section 5.

As noted in the main body of the report, community researchers working on a 2008 research project that focused on polar bear denning and post-denning behaviour (Richardson, Branigan and Stirling 2008) interviewed many of the people from Aklavik, Inuvik and Tuktoyaktuk who were interviewed for the 2010 PBTK study. Questions related to denning were not asked of interviewees during the latter study if they had already been interviewed in 2008, which means that most of the information in this report related to reproduction comes from TKHs who were not interviewed in 2008, in particular, those from Paulatuk, Ulukhaktok and Sachs Harbour.

Another limitation of the study is the map biography method that was used to document the spatial aspects of Inuvialuit PBTK. The varied and small-scale base maps on which participants marked harvest locations, maternity den sites and other features imposed significant limits on the spatial accuracy of the data. This also limited the data's utility for future purposes such as the mitigation and monitoring of the impacts of offshore oil and gas exploration and extraction activities. Furthermore, mapping ice features is extremely difficult given their annual variation and the fact that they are often observed when TKHs are travelling beyond sight of land. The lack of visible landmarks in such cases makes it difficult to triangulate the positions of, or otherwise georeference, offshore ice features. To complicate matters even more, a significant number of the ice features documented by way of the map biographies were not dated, meaning that their locations could not be studied over time in relation to climate change and its impacts on polar bears and Inuvialuit harvesting activities.

It became clear during the October 2012 confirmation meetings in Ulukhaktok and Sachs Harbour that the data marked on the 2010 map biographies significantly under-represents the extent and intensity of Inuvialuit polar bear harvesting and travel activities in the Melville Island-Viscount Melville Sound area. People from Ulukhaktok and Sachs Harbour have been travelling and guiding sport hunters there at various times over the last twenty years. Some additional PBTK features were marked on the confirmation maps, but the relative lack of PBTK documentation for this area remains a data gap, one that can only be filled through supplementary interviews with TKHs. Methodological issues related to spatial data are discussed at greater length in Appendix 2.

Apart from the spatial knowledge recorded on maps (map biographies), most information obtained during the PBTK study interviews was verbal; that is, oral responses to questions or other statements were elicited exclusively in the context of verbal interactions with the interviewers concerning polar bears.³⁰ These interactions were audio recorded and subsequently transcribed, as noted previously, meaning that the major source of "data" for this report takes the form of texts: questions, answers and longer narratives by the participants.

Virtually all of these texts required editing for inclusion in this report. They are all referred to as "narratives," although this term is somewhat misleading if readers are led to believe it refers exclusively to an uninterrupted account or description of events, behaviours, conversation or other social and natural phenomena. Many of the edited texts excerpted from individual transcripts certainly took this form. However, in most cases, the narratives included here are very much the construct of the report's lead author, in particular where interviewer questions have been removed from the text.³¹ This approach was adopted in order to make the texts more readable, although it removes them one step further from the "raw" oral statements of the interviewees. In all cases, the study team attempted to remove the interviewers' voices from the narratives without distorting the meaning conveyed by the TKHs.

In any event, the PBTK presented in this report very much takes the form of narratives, and in that respect, it resembles to a significant extent the "data" presented in the report of the Aklavik Oral History Project (Nagy 1999) and Uqalurait: An

Oral History of Nunavut (Bennett and Rowley 2004). The former project endeavored to “record an aboriginal perspective of Inuvialuit history” and in so doing relied entirely on elder narratives as the primary source of data (Nagy 1999: xv).

The English-language parts of the audio recordings of the interviews were transcribed by people who are not Inuvialuktun speakers. Inuvialuktun narratives were not transcribed and translated into English. That means that the study team was entirely dependent on the transcriptions of the translations provided during the interviews for the data processing and analysis undertaken for this report. In addition, while technical Inuvialuktun vocabulary embedded in primarily English narratives was transcribed, the spellings were usually approximate and required validation by Inuvialuktun speakers in all three dialects of the language.

A total dependence on English-language narratives comes with a price, as explained by Murielle Nagy (2006: 71): *Since oral narratives are often the major sources of information with which anthropologists will work, the recorded interviews need to be transcribed and translated. However, translations are not perfect duplicates of the original narratives; they are only equivalents.... Although translators do their best to transfer into another language what the narrators have said, there are times when the original meaning of words and expressions is distorted, if not lost, during the translation process. Furthermore, once anthropologists interpret translated narratives, there is another level of translation going on, and if the translations do not represent the intention of the narrator, elements of the narratives may be misinterpreted.*

Throughout the transcripts of the PBTK interviews, translators and bilingual interviewees frequently used the present tense when talking about past events. The same phenomenon was noted by Nagy in reference to the Inuvialuit texts she worked with.

One issue that particularly interested me in the English translations I worked with was the pervasive use of the present tense. Although these dialects all have a “present declarative” form that can be used in some contexts to refer to an event that is past... the English translators often chose to use the present tense in English (Nagy 2006: 75).

Nagy (2006) provided the following reasons for the extensive use of the present tense in translation to English:

- “once the speaker makes it clear that he or she is going to talk about past events ... there is no need to emphasize that the story is happening in the past; hence the use of narrative present”;
- “use of the narrative present also indicates that telling a story means to reenact particular experiences and to perform it”; and
- when narrators talked about the past, “they did not seem to go back into time but rather into the places where events happened” [space and time merged linguistically].

Many bilingual participants in the PBTK study also frequently used the present tense in describing past events as the result of the influence of their maternal language on their English-language communication. For example, note the use of the present tense in the following unedited interview text:

I was sixteen years old bunch of people you know they go ahh open water so when they reach open water ahh you know they try to get seal so me I walk down by the edge you know towards North and I see one bear and sneak to him and you know I'm laying there when they see me and start to come to me I got ahh know white snow suit and black like then ahh you think I was a seal I guess ahh you know start come to me so I just wait for it and when it's close enough to shoot I shoot hit it alright but not so good too ahh my gun ahh sight not so good ahh so I stand around towards the open water ahh I was rooting it aiming him and finally you know you follow them like and I got it right there (PIN 25, Tuktoyaktuk).

In conclusion, two cautions are offered with respect to language matters. First, the narratives selected for this report may have been biased in favour of those that were more clearly expressed in English. This would favour unilingual English-speaking participants or people whose command of English as a second language was very good. People whose grammar and syntax were sometimes unclear and who otherwise had trouble expressing themselves in English may have been less likely to have their narratives included here. Second, the English language glosses of Inuvialuktun discourses may have oversimplified or distorted the original meanings such that whatever richness and detail they provided in that language were lost in translation. In such cases, their narratives were likely to have been excluded from the report. A solution to this problem, one not adopted in this study, would have been to undertake post-interview close translations of their maternal language discussions.

Round 1 (winter 2010) interview questionnaire

Polar Bear Traditional Knowledge Study Interview Instrument 2009/2010

Date: _____

Preamble: _____ Interviewee: _____

Thank you for coming

Start time: _____

Introduce yourself

Mention the youth worker

Mention the community interviewer

This is about polar bears

You get to review the transcript.

- Letter from WMAC chairs.
- Review and Sign consent form.
- Cheque from HTC.
- Ensure noises in the room are off.
- Ensure interviewer is comfortable.
- Turn audio and video recorder on.

Number	Questions	Category [Exercise]	Notes
0(1)	Can you please tell me your name and when and where you were born? What communities/camps have you lived in throughout your life?	Introduction/ Ice-Breaker	
0(2)	When was the last time you hunted bears? When did you start hunting bears?	Ice-Breaker/Hunt- ing/Time Markers	
1(1)	What (and when) were some important/memorable events in your life that impacted your hunting and how did these affect your relationship with polar bears? For instance do you remember when people started getting snow machines? Are there some other significant events that might help us talk about bears? [Prompts: How about when most people started working? How about the DEW Line construction? The signing of the IFA? Moving to this community?] Can you tell me how long ago these things were?	Time Markers [Critical Events]	
1(2)	I am going to show you a drawing. This drawing will help us understand the time of year in which things happen. I have labelled spring, summer, fall and winter on it. I have also labelled ice freeze up and ice break up on it and few activities that bears do. Can you tell me what the main activities you and other people are doing during the spring, summer, fall and winter? [Prompt: Use Diagram A. Put these activities in the circle labelled humans].	Time Markers [Seasonal Calendar]	

2(1)	It is important for us to know the location of bear sightings and harvests you have made over your life. Can you show me where you see or have seen bears, how many you see in these places, and what the condition of these bears were? Are there places where the people in your community know to go see bears? [Prompt: relate the distribution to the time of year markers identified in the previous question. Try to get information on small spatial scale and general spatial scale. Try to get quantitative information such as number of sightings per year in each areas, number of family groups and number of individuals, males and females: How about bears with young ones? Where do you see those and when? Use map with traditional names and places or local names].	Bear population and distribution [Mapping Exercise]	
2(2)	Have you or have you not seen changes in the number of bears in these areas since you were young? If so, what types of changes? [Use map with traditional names and places or local names; use interviewee defined time markers to get a timeline of the changes].	Bear population and distribution [Mapping Exercise]	
2(3)	What did your elders tell you about the number of bears in these areas? [Use map with traditional names and places or local names: Prompt: try to determine if the interviewees elders are great grandparents, grandparents or parents].	Bear population and distribution [Mapping Exercise]	
3(1)	Apart from hunting bears, how do polar bears die? Do you know if this has changed since you were young? Any change from what your elders told you?	Well-being and behaviour	
3(2)	Clarifications on 3(1) Have you ever seen a dead bear - other than the ones harvested? Why do you think they died? Did you see this when you were young? Did the elders ever talk about this? Have you ever seen a sick bear? What did you see that let you know it was sick? Did you see this when you were young? Did the elders ever talk about this? Have you ever seen anything strange when you skinned or butchered a bear? What? What do you think caused it? Did you see this when you were young? Did the elders ever talk about this? [Prompts: If interviewee has not discussed, ask specifically about staving or drowning bears].	Well-being and behaviour	
3(3)	How do you know a bear is in good shape (healthy)? Before you harvest it and after you harvest it? I am going to show you some pictures of bears in different shape. Do you have any words to describe these bears?	Well-being and behaviour [Polar Bear Health Prompts]	
3(4)	Do bears look better/worse/or the same as when you were young? If yes, why do you think this is happening? When did you notice this change happening? [Note to interviewer: Avoid using the word "health". Some individuals confuse health of a bear with population health.]	Well-being and behaviour	
3(5)	How did your elders describe the physical condition of bears? Can you tell me some of the words they used?	Well-being and behaviour	
4(1)	What types of ice do bears use? Can you describe the condition of the ice for each type of ice? What time of year? Do bears with young ones use ice differently? Do young bears use ice differently - the bears that just left their mother? [Use Diagram A to help structure the conversation to show the time of year that bears use the ice and the things that are happening with the ice]	Habitat [Sea-Ice Pictures, Seasonal Calendar]	
4(2)	Can you show me on a map where I might find the different types of ice? When? Has the distribution of the different ice types changed? [Use map with distribution of sea ice during different times of year].	Habitat [Mapping Exercise]	

4(3)	Do you remember your elders telling you anything about the sea ice, places to avoid or places to go due to ice conditions?	Habitat	
4(4)	Can you tell me about freeze up and melt? Have you seen changes in your lifetime? What about based on what the elders told you? [Prompt: May use Diagram A. Try to get at time of year, rate of thaw/freeze, etc. May use a map of the Beaufort Sea Ice]	Habitat [Seasonal Calendar, Mapping]	
4(5)	How does the weather affect the ice that bears use? [If needed, use Diagram A to show how the weather changes over the year and what bears do in relation to the weather]. Have you seen any changes to this type of weather since you were young? What did your elders tell you about how weather used to affect the ice?	Habitat [Seasonal Calendar, Mapping]	
4(6)	Are there types of ice that limit where the bears can go? Are the types of ice that bears use changing? How? [Use map of sea ice to show where these types of ice may be].	Habitat [Mapping Exercise]	
5(1)	If the weather has changed, how have bears been affected? Have they adapted successfully or not?	Adaptation	
5(2)	If the ice has changed, how have the bears been affected? Have they adapted successfully or not?	Adaptation	
6(1)	What do bears eat? Do you see differences between what males and females eat? How about bears with young ones? [Have pictures of different species of seals and whales on hand].	Food of bears	
6(2)	Can you show me where are these things found? What time of year are they found there? [Sea Ice Map and Diagram A]	Food of bears [Seasonal Calendar, Mapping]	
6(3)	Have the places that you find these things changed since you were young? How have the seals changed? How have the whales changed? Are there more, less or the same number of seal or whale carcasses washing up on shore? [Prompt: has the distribution of seals or whales changed? Has their body condition changed? Have the numbers changed?]	Food of bears [Mapping]	
6(4)	Have you noticed polar bears eating other foods more — foods such as grass, waterfowl, caribou or berries? Where do you see them eating these foods? [Use Local name map].	Food of bears [Mapping]	
6(5)	Have you noticed any differences in what the bears eat now versus from when you were young? Any differences between male and female bears? [Let interviewee answer and then prompt: Have you seen bears taking young or old seals? Do they take the males or females or both? Are they eating different parts of the animals?]	Food of bears	
6(6)	Have you ever seen bears eating other bears? Do you see it more or less now than when you were young?	Food of bears	
7(1)	What are your hunting trips like? How do you travel now? How long do you travel for?	Hunting	
7(2)	Can you show me where you hunt bears now? Are there places that you don't hunt anymore? Are there new places you hunt? Can you show me where your elders used to hunt bears? I have some maps from interviews back in the '70s. Can you tell me if the harvesting area has changed since these maps were made? [Prompt: If different ask "Why don't you hunt this area? Use map with traditional names and places or local names; use historical maps. We are trying to get a quantitative measurement of the physical distance and changes in the distance].	Hunting [Mapping]	

7(3)	When do you hunt bears? Has the time of year that you hunt polar bears changed over the years? Why? [Use map with traditional names and places or local names].	Hunting [Seasonal Calendar]	
7(4)	Have your hunting trips changed over the years? Why have your trips changed? [Prompts: Have they changed because of wage work or full time employment, because you can't afford to, etc..., because of the time required or the availability of new equipment, etc...?]	Hunting	
8(1)	What types of places do bears den? What types of snow do they need? Can you show me these things on a picture of a den? [Diagram B]	Denning	
8(2)	Can you show me on the map where you have seen dens? [Prompt: Have ever seen dens on the ice? For each den ask (when yr-month), how you noticed the den (tracks bears hole) how many bears? Check to see if the interviewer has already answered these questions during Evan's interview].	Denning [Mapping]	
8(3)	Do all bears den? Are there differences in males and females denning?	Denning	
8(4)	Have you seen bears that have died in dens?	Denning	
8(5)	Do you see any changes in dens? [Prompt: where dens are located, the type of snow bears are using, the timing of bear denning, changes in who is denning - males. Have maps and diagram available]	Denning [Mapping, Den Picture]	
8(6)	Has the number of dens you see changed over time? Why? [Interviewer prompt: Do you travel more or less in areas where there are dens? Why?]	Denning	
9(1)	Do bears come around the community? Has this changed since you were young?	Living with bears	
9(2)	Are people or are people not having problems with polar bears? If so what types? Are there more, less or the same amount of problems as when you were young? [Interviewer to clarify whether seeing bears more often is around the communities or on the land].	Living with bears	
9(3)	If there has been a change: Why do you think this is?	Living with bears	
9(4)	If they answer yes above: Can you show me where these problems are happening? Have the places where conflicts happen changed since you were young? Are they the same places that your elders had problems?	Living with bears [Mapping]	
10(1)	Can you tell me the important things that you would tell your children if they were to go polar bear hunting? What are the things that you do when you harvest a bear? How do you show respect? Are there rules that you follow?	Management	
10(2)	What are the things your elders taught you so that you can hunt a bear? Are there traditional values about harvesting bears? Do any apply today?	Management	
10(3)	Are there traditional ways to make sure people don't kill too many bears? Are these still being used since quotas came in?	Management	
10(4)	Did your elders hunt bears with young ones? Were there different values when you saw a bear with young ones?	Management	
10(5)	Did hunting change when snowmobiles arrived? How? Is it or is it not important to hunt polar bears by dog team? If yes, why?	Management	
10(6)	How do the Inuvialuit monitor change in the polar bear population? What are the types of things that you look for to know that the population is doing well?	Management	

10(7)	How would or do the Inuvialuit cope with change to polar bears and polar bear habitat? What would (or do) you do if bears were skinnier or harder to find? If there was less sea ice?	Management	
11(1)	Is there anything else that you think is important and that you want to tell me about polar bears?	End	
11(2)	Who else in the community is knowledgeable about polar bears? If you were interviewing other Inuvialuit about polar bear, is there a question you would ask them that you are curious about?	End	
11(3)	That is all I have for questions for you. Do you have any questions for us?	End	

Thank you for taking the time to do this interview. I will follow up with you if we have any further questions.

Finish time: _____

[Turn tape recorder off.]

Post-interview checklist

- Do you know the timeline associated with their elders (parents, grandparents, great grandparents).
- All consent forms are signed and name is given to HTC for honorarium.
- Discussed and signed the "Access to Harvest Data" Consent form.

Round 2 (fall 2010) interview questionnaire

Polar Bear Traditional Knowledge Study Interview Instrument 2010

Date: _____

Preamble: _____ Interviewee: _____

Thank you for coming

Start time: _____

Introduce yourself

Mention the youth worker

Mention the community interviewer

This is about polar bears

You will have the opportunity to review the transcript.

- Letter from WMAC chairs.
- Review and Sign consent form.
- Cheque from HTC.
- Ensure noises in the room are off.
- Ensure interviewer is comfortable.
- Turn audio and video recorder on.

Note: Column 1 includes the word “Old,” which references a similar question in the Round 1 questionnaire.

Number	Questions	Category [Exercise]	Notes
0 (1) Old 0 (1)	Can you please tell me your name and when and where you were born? What communities/camps have you lived in throughout your life?	Intro	
0 (2) Old 0 (2)	Are you still going out polar bear hunting? When was the last time you hunted bears? When did you start hunting bears?	Hunting	
1 (2) Old 7 (2)	Can you show me where you travel and hunt bears now?	Hunting	
1 (3) Old 7 (2)	Are there places that you don't travel and hunt anymore? Are there new places you hunt? Can you show me where your elders used to hunt bears? I have some maps from interviews back in the '70s. Can you tell me if the harvesting area has changed since these maps were made? (continued from 9.6) [Prompt: If different ask “Why don't you hunt this area?” Use map with traditional names and places or local names; use historical maps.	Hunting	Is where you travel and hunt now different from where you use to? Can you show me where you use to travel/hunt? Did you ever hunt with your elders; did they hunt in different places? If yes, why don't you hunt in these areas any longer?
1 (4) Old 7 (1) Old 7 (3) Old 7 (4)	What are your hunting trips like? How long do you travel for? When do you hunt bears? Have your hunting trips changed over the years? Why have your trips changed? Has the time of year that you hunt polar bears changed over the years? Why? How do you travel now? [Prompts: Have they changed because of wage work or full time employment, because you can't afford to, etc., because of the time required or the availability of new equipment, etc.?]. [Use map with traditional names and places or local names].	Hunting	How long is each trip? How many trips do you make each year? What time of year do you go? How do you travel (i.e. dogsled or Skidoo — if this changed over time — note when). Have your trips changed in terms or length (number of days), how often you go, time of year, and Why?
Old 1 (1)	What (when) were some important/memorable events in your life that impacted your hunting? Can you tell me how long ago these things were? How did these affect your relationship with polar bears? For instance do you remember when people started getting snow-machines? Are there some other significant events that might help us talk about bears? [Prompts: How about when most people started working? How about the DEW Line construction? The signing of the IFA? Moving to this community?]		
Old 2 (1)	I am going to show you a drawing. This drawing will help us understand the time of year in which things happen. I have labelled spring, summer, fall and winter on it. I have also labelled ice freeze up and ice break up on it and few activities that bears do. Can you tell me what the main activities you and other people are doing during the spring, summer, fall and winter? [Prompt: Use Diagram A. Put these activities in the circle labelled humans].		

2 (1) Old 2 (1)	Are there places where the people in your community know to go see bears? Can you show me where you see or have seen bears? When do you see them there? How many you see in these places, and what the condition of these bears were? [Prompt: relate the distribution to the time of year markers identified in the previous question. Try to get information on small spatial scale and general spatial scale. Try to get quantitative information such as number of sightings per year in each area, number of family groups and number of individuals, males and females: How about bears with young ones? Where do you see those and when? Use map with traditional names and places or local names].	Habitat	Can you show me areas where you see bears?
2 (3)	Do you know why the bears are in these areas that you see them (What activities are they doing i.e., feeding, mating (fighting, etc)?	Habitat	
2 (4) Old 4 (1) Old 4 (6)	What types of ice do bears use? Can you describe the condition of the ice for each type of ice? What time of year? Are there types of ice that limit where the bears can go? Are the types of ice that bears use changing? How? [Use map of sea ice to show where these types of ice may be]	Habitat	Can you describe what the ice/land is like in the areas you see bears? [Ice features: young/annual/old ice; landfast(flat) /rubble/rough ice; open leads/no open water... dirty ice/grey ice/blue ice] What time of year do you see bears in these areas?
2 (2) Old 4 (1)	Do bears with young ones use ice differently? Do young bears use ice differently — the bears that just left their mother? [Use Diagram A to help structure the conversation to show the time of year that bears use the ice and the things that are happening with the ice]	Habitat	Do you see males in different places than you see females? [map] Why? What time of year? What is the ice/land like in these areas? Do you see females with young cubs (cubs born this year) (or their tracks) in different areas than other bears [map]? Why? What time of year? What is the ice like/land like in these areas? Do bears of different ages use ice differently — explain?
2 (5)	Do polar bear movements follow seasonal patterns? Where do they go in spring, break-up, summer, freeze-up, winter [map]	Habitat	Have you seen any changes in bear movements over the years?
3 (1) Old 2 (2) Old 2 (3)	Have you (or have you not) seen changes in the number of bears in these areas since you were young? If so — what type of changes? What did your elders tell you anything about the number of bears in these areas? Use map with traditional names and places or local names: Prompt: try to determine if the interviewees elders are great grandparents, grandparents or parents].	Distribution Abundance	Have you seen any changes in where you see bears or the number of bears you see in these areas? [map]

4 (1) Old 4 (2) Old 4 (3) Old 4 (4)	Can you show me on a map where I might find the different types of ice? When? Has the distribution of the different ice types changed? [Use map with distribution of sea ice during different times of year].... Do you remember your elders telling you anything about the sea ice, places to avoid or places to go due to ice conditions? Can you tell me about freeze up and melt? Have you seen changes in your lifetime? What about based on what the elders told you? [Prompt: May use Diagram A. Try to get at time of year, rate of thaw/freeze, etc. May use a map of the Beaufort Sea Ice]	Climate	Have you seen any changes in the amount or type of the sea ice? Where did you see these changes [note on map]? Do you have any idea why these changes occurred?
4 (2) Old 5 (2)	If the ice has changed, how have the bears been affected? Have they adapted successfully or not?	Climate	If changes in sea ice have been noted, ask: Do you think these changes have affected polar bears? How? Do you think they have affected seals? How?
4 (3) Old 4 (5) Old 5 (1)	Have you seen any changes to this type of weather since you were young? What did your elders tell you about how weather used to affect the ice? If the weather has changed, how have bears been affected? Have they adapted successfully or not?	Climate	Have you seen any changes in the weather since you were young? If changes in the weather have been noted, ask: Do you think these changes have affected polar bears? How? Have they affected seals, How?
5 (1) Old 8 (3)	Do all bears den? Are there differences in males and females denning?	Denning	
5 (2) Old 8 (2)	Can you show me on the map where you have seen dens? [Prompt: Have ever seen dens on the ice? For each den ask (when: year-month), how you noticed the den (tracks bears hole) how many bears? Check to see if the interviewer has already answered these questions during Evan's interview].	Denning	Have you seen any polar bear dens, are you aware of any denning areas [mark on map] (note, do not ask, if interviewed by Evan)?
5 (3) Old 8 (1)	What types of places do bears den? What types of snow do they need? Can you show me these things on a picture of a den? [Diagram B]	Denning	What about the land, ice or snow make it suitable for a den/or are important for denning?
5 (4) Old 8 (5)	Do you see any changes in dens? [Prompt: where dens are located, the type of snow bears are using, the timing of bear denning, changes in who is denning — males. Have maps and diagram available]	Denning	Have you seen a change in where polar bears den since you were young? (i.e., did they previously den places they no longer den, or do they den in places they never use to? [map]
5 (5) Old 8 (6)	Has the number of dens you see changed over time? Why? [Interviewer prompt: Do you travel more or less in areas where there are dens? Why?]	Denning	

5 (6) New	When do female bears go in and come out of the den? Has this changed since you were young? Do you know where females go after they come out of the den? How many young cubs do female bears have? Is this different in different areas? Has this changed overtime? How many older cubs do you see with the mother? Is this different in different areas? Has this changed over time?	Denning	
5 (7) Old 8 (4)	Have you seen bears that have died in dens? Why/how?	Denning	
6 (1) Old 6 (1) Old 6 (4)	What do bears eat? Where do you see them eating these foods? [Use Local name map].	Feeding	Which kind of seals do bears eat (species: ringed/bearded)[local names/pics]? Has this changed over time? If they eat both, which species do they prefer? What age and sex of seals do polar bears eat? Has this changed over time? If more than one type is eaten, what is their preference?
6 (2) Old 6 (1)	Do you see differences between what males and females eat? How about bears with young ones? [Have pictures of different species of seals and whales on hand].	Feeding	Do male and female polar bears eat different types (species/age/sex) of seals? Do young polar bears eat different types of seals than older bears?
6 (3) Old 6 (5)	Have you noticed any differences in what the bears eat now versus from when you were young? Any differences between male and female bears? [Let interviewee answer and then prompt: Have you seen bears taking young or old seals? Do they take the males or females or both? Are they eating different parts of the animals?].	Feeding	Does a bear eat the fat or meat or both (of prey species)? Has this changed overtime? How often do you see this, and when? Why do polar bears do this?
6 (4)	How do polar bears hunt and catch seals?	Feeding	
6 (5) Old 6 (2)	Can you show me where are these things found? What time of year are they found there? [Sea Ice Map and Diagram A]	Feeding	Where do polar bears catch seals [map] location and ice features (ice types, lair, breathing hole, etc.)? Do polar bears catch seals (ringed/bearded) in all seasons of the year? Does the way polar bears hunt change between seasons?
6 (6) Old 6 (3)	Have the places that you find these things changed since you were young?	Feeding	Do you find ringed seals in the same areas every year? Has where you find them changed over the years? [Seal Range Map] Do you find bearded seals in the same areas every year? Has where you find them changed over the years? [Seal Range Map]

6 (7) Old 6 (3)	How have the seals changed? [Body condition/numbers] How have the whales changed? Are there more, less or the same number of seal or whale carcasses washing up on shore? [Prompt: has the distribution of seals or whales changed? Has their body condition changed? Have the numbers changed?]	Feeding	
6 (8) New	Have you noticed polar bears eating other foods more — foods such as grass, waterfowl, caribou or berries?	Feeding	Do polar bears eat anything else besides seals? If so, what, where, when, how do they hunt — and which bears?
7 (1) Old 3 (3) Old 3 (5)	How do you know a bear is in good shape (healthy)? Before you harvest it and after you harvest it? I am going to show you some pictures of bears in different shape. Do you have any words to describe these bears? How did your elders describe the physical condition of bears? Can you tell me some of the words they used?	Condition	
7 (2) New	Does the condition of a polar bear change between seasons? If so, how? Does the condition of polar bears differ between areas (do you see thinner/fatter bears in certain areas?)	Condition	
7 (3) Old 3 (4)	Do bears look better/worse/or the same as when you were young? If changes noted ask: why do you think this is happening? When did you notice this change happening? [Note to interviewer: Avoid using the word “health.” Some individuals confuse health of a bear with population health]. Have you ever seen a starving bear? When? Why do you think it was starving?	Condition	
8 (1) Old 3 (2)	Have you ever seen a sick bear? What did you see that let you know it was sick? Did you see this when you were young? Did the elders ever talk about this? ... Have you ever seen anything strange when you skinned or butchered a bear? What? What do you think caused it? Did you see this when you were young? Did the elders ever talk about this? [Prompts: If interviewee has not discussed, ask specifically about staving or drowning bears]	Health/ Sickness	
8 (2) Old 3 (1) Old 3 (2)	Apart from hunting bears, how do polar bears die? Have you ever seen a dead bear - other than the ones harvested? When? Why do you think they died? Did you see this when you were young? Did the elders ever talk about this?	Health/ Sickness	Apart from hunting bears, have you ever seen a dead bear? When? Do you know why it died?
8 (3) Old 6 (6)	Have you ever seen bears eating other bears? If yes, when, where, and why do you think this happens?	Health/ Sickness	
9 (1) New	Have you had any close [“encounters”/“calls”/“experiences”] with polar bears? What did the bear do and what did you do? Do you know how old the bear was and whether it was a male/female? What was its condition? Do males behave differently than females? Do young bears behave differently than older bears?	Human/bear interaction	

9 (3) Old 9 (1) Old 9 (2) Old 9 (3)	Do bears come around the community? Has this changed since you were young? Are people or are people not having problems with polar bears? If so what types? Are there more, less or the same amount of problems as when you were young If change noted, why? If there has been a change, why do you think this is? [Interviewer to clarify whether seeing bears more often is around the communities or on the land]	Human/bear interaction	
Old 9 (4)	If they answered yes above: can you show me where these problems are happening? Have the places where conflicts happen changed since you were young? Are they the same places that your elders had problems?	Management	
10 (1) Old 10 (6)	How do the Inuvialuit monitor change in the polar bear population? What are the types of things that you look for to know that the population is doing well?	Management	What are the local indicators of polar bear population health?
10 (2) Old 10 (3)	In the days before quotas or the sale of polar bear hides, how much polar bear hunting was happening? Were there traditional ways to make sure people don't kill too many bears? Are these still being used since quotas came in?	Management	
10 (3) Old 10 (2)	What are the things your elders taught you so that you can hunt a bear? Are there traditional values about harvesting bears? Do any apply today?	Management	
10 (4) Old 10 (4)	Did your elders hunt bears with young ones? Were there different values when you saw a bear with young ones?	Management	
Old 10 (1)	Can you tell me the important things that you would tell your children if they were to go polar bear hunting? What are the things that you do when you harvest a bear? How do you show respect? Are there traditional rules that you follow?	Management	
10 (5) Old 10 (5)	Did hunting change when snowmobiles arrived? How? Is it or is it not important to hunt polar bears by dog team? If yes, why?	Management	
11 (1) Old 11 (1)	Is there anything else that you think is important and that you want to tell me about polar bears?	Conclusion	
11 (2) Old 11 (2)	Who else in the community is knowledgeable about polar bears?	Conclusion	
11 (3) Old 11 (3)	That is all I have for questions for you. Do you have any questions for us?	Conclusion	
Old 10 (7)	How would or do the Inuvialuit cope with change to polar bears and polar bear habitat? What would (or do) you do if bears were skinnier or harder to find? If there was less sea ice?		
	If you were interviewing other Inuvialuit about polar bear, is there a question you would ask them that you are curious about?		

Thank you for taking the time to do this interview. I will follow up with you if we have any further questions.

Finish time: _____

[Turn tape recorder off.]

Post-interview checklist

- Do you know the timeline associated with their elders (parents, grandparents, great grandparents).
- All consent forms are signed and name is given to HTC for honorarium.

Polar Bear Traditional Knowledge Study Information Sheet and Consent Form

Polar Bear Traditional Knowledge Study Information Sheet & Consent Form

The Hunters and Trappers Committees in Aklavik, Inuvik, Paulatuk, Sachs Harbour, Tuktoyaktuk, and Ulukhaktok, Wildlife Management Advisory Council (NWT), Wildlife Management Advisory Council (North Slope), Yukon Government, Government of NWT, and Canadian Wildlife Service and have undertaken a four-year traditional knowledge study of Polar Bears in the Beaufort Sea.

The purpose of the study is to gather local and traditional knowledge on polar bears and how changes to the climate may have affected polar bears and their habitat in the Beaufort Sea. This traditional knowledge will be combined with scientific information to help manage polar bears in the Beaufort Sea and ensure there are polar bears for future generations.

Through this interview project we are gathering traditional knowledge about polar bears and sea ice from people like you who have been active on the land. This work is valuable as we appreciate the importance of looking at polar bears and their environment from your perspective and experience, as well as through the information gathered by scientists. People will be interviewed in the communities of Aklavik, Inuvik, Paulatuk, Sachs Harbour, Tuktoyaktuk, and Ulukhaktok.

What type of information are we looking for in these interviews?
During the interview you will be asked questions about:

- Polar bear numbers, condition, range and habitat; and
- How polar bears are used now and how they were used in the past.

It would be great if you could also tell us a bit about yourself.

You can refuse to answer any question or stop the interview at any time. After the interview, you have two weeks to request that your information be withdrawn from the study and destroyed.

With your permission, your interview will be recorded to make sure the information is correct. The interview may also be videotaped, to be used for cultural educational purposes.

How will the information be used?

You will have the opportunity to review and make corrections to the summary to ensure that you are satisfied that they are accurate. We will provide you with a copy of the revised interview transcript and summary for you to keep.

Researchers and managers at the Hunters and Trappers Committee, the Wildlife Management Advisory Council (North Slope or NWT), Canadian Wildlife Service, Government of NWT may have copies of the interview transcript and summary of the study. The information in the interview transcript and summary

decisions about the conservation and management of polar bears, and their habitat, in the Beaufort Sea and inland. The original audio recording will be kept at your local Hunters and Trappers Committee and Joint Secretariat. Video recordings will be stored at the Joint Secretariat office for later use.

I give consent to you to make an audio recording of the interview.
 I give consent to you to videotape this interview in connection with this study.
 I give you consent to reproduce any additional photographs shared during the interview in reports or other communication materials associated with this project.

Following completion of the study, the Wildlife Management Advisory Council (North Slope or NWT) and your local Hunters and Trappers Committee will keep copies of the interview transcripts. The interview transcripts and summaries will not be released in the future for other purposes without your permission or the permission of the Wildlife Management Advisory Council (North Slope or NWT) and your local Hunters and Trappers Committee.

A report will be written using the information in the interview transcripts and summaries of all people who have been interviewed. This report will help researchers and managers at the Hunters and Trappers Committees, the Wildlife Management Advisory Council (North Slope and NWT), Canadian Wildlife Service, Yukon Government and Government of NWT make decisions about polar bears and their habitat in the Beaufort Sea and nearby mainland. The report will be made publicly available for anyone who wants to read, use and/or copy it.

We would like to include your name, photo, and biographical information in the report:

Please do NOT use my name in reports or other communication materials associated with this project.
 Please do NOT publish my photo and biographical information in the final report.

For more information contact:
 Wildlife Management Advisory Council (North Slope) 867-633-5476
 Wildlife Management Advisory Council (NWT) 867-777-2828
 Yukon Government, Department of Environment 867-393-7823
 Government of NWT, Department of Environment and Natural Resources 867-678-6670
 Aklavik Hunters and Trappers Committee 867-978-2723
 Inuvik Hunters and Trappers Committee 867-777-3671
 Paulatuk Hunters and Trappers Committee 867-589-3094
 Sachs Harbour Hunters and Trappers Committee 867-690-3028
 Tuktoyaktuk Hunters and Trappers Committee 867-977-2457
 Ulukhaktok Hunters and Trappers Committee 867-396-4808
 Interviewer (Dan Slavic) 780-718-2734

Participant: _____ Interviewer: _____
 Date: _____ Date: _____

Appendix 2. PBTK study methods statement — spatial data

This appendix details the methods and standards used when creating geospatial data for the Inuvialuit Polar Bear Traditional Knowledge Study of 2010 (PBTK2010) and for a polar bear den study conducted in 2008 by Richardson, Branigan and Stirling (PBTKDEN2008). It is an abbreviated summary of more detailed full methodology reports.³² The appendix also describes the updating of data resulting from verification meetings conducted in fall 2012 (PBTKVER2012).

PBTK2010 geospatial data creation

Study mapping methodology

PBTK2010 used elements of the map biography research approach. In map biography research, a study participant is asked a series of questions, and invited to point out locations on maps related to the questions. Locations are marked and coded using a code and sequence number. The combination of the code and sequence number together should uniquely identify a location for a participant, allowing it to be linked to information provided about it (captured in interviewer notes and an audio recording that can be transcribed so content can be summarized and categorized).

A variety of maps was printed to cover areas used by participants from different communities in the study area. Map scale varied between 1:500,000 and 1:750,000. Most maps were 48 inches wide by 36 inches high. A total of 118 maps were received: 51 for Round 1 interviews, 26 for Round 2 interviews, and 41 for Round 2b interviews (it is not known why Round 2 maps were divided in this way).

Categorized information was provided on a series of Microsoft Excel spreadsheets (Mapping Reference Tables, or MRTs), broken down by study participant. In these, features were assigned an identifier that joined the feature's code (B for polar bear observations, D for polar bear maternity den sites, I for ice feature sites, and K for polar bear feeding sites), an underscore, and two or three letters corresponding (for the most part) to the initials of the participant.

Data creation process

Scanned images of maps in a combination of TIFF and JPEG formats were provided. Scanning was done at 150 dpi using 24-bit colour.

Initially, some of the maps were georeferenced, while others were not. Maps were not printed with explicit georeferencing locations, although a very coarse longitude and latitude grid was printed. This provided between two and six locations that could be used, though often they were not well distributed across the map. However, the original base data used for map printing were available. When maps were not georeferenced, the following process was used:

1. The available longitude and latitude grid intersections were registered.
2. Registration points were added using recognizable water feature intersections (e.g., a visible intersection of a water line with a water body) from the original base data. Registration points were added until there were a sufficient number distributed across the map. Third-order polynomial transformation was used.

The average residual mean squared error for map registration was 169.451, while the maximum was 255.421. Since the highest map scale was 1:500,000, these values indicate relatively accurate registration.

For all maps, registration was checked by drawing each map image against the original base data and visually confirming that the fit was good.

Data were digitized using an on-screen scale at least thirty percent greater than the original map scale to assure that digital data were at least as accurate as the information marked on the original maps. Data were initially disaggregated by map sheet, except where features spanned more than one map sheet, in which case one map was chosen as the "home" of the feature and all parts from each map were digitized as a single feature. A formal quality assurance process was used to review digitized data and ascertain that they were error free. Geospatial data for all maps were then consolidated into a single study dataset.

All MRTs were merged into a single Microsoft Excel spreadsheet to allow linking to the geospatial data. The original identifier used in the MRTs was problematic because some study participants shared the same initials. To address this, a new identifier was generated that joined a participant number assigned to each participant, an underscore, the feature's code and the feature's sequence number.

Finally, the combined MRT spreadsheet was joined to the geospatial data, and a final geospatial dataset was created that included all MRT information.

Data limitations

- The base maps used for the map biographies have a number of shortcomings that may have affected the information marked.
- Base maps used a variety of scales between 1:500,000 and 1:750,000. This means that the potential accuracy of marked information is not consistent — some features might be understood to be more accurately recorded than others.
- The relatively small scale of base maps affects the accuracy possible for study participants.
- Base maps were created using base data with a nominal scale of 1:1,000,000. Mapping this information at larger scales might have affected the accuracy of information marked.
- Maps overlap in inconsistent ways, and do not have enough information marked to make it clear to the interviewer where they should be joined when building a mosaic (i.e., a composite comprising more than one map). Where features were marked that span more than one map, this resulted in inaccuracy.
- The maps do not cover the whole study area. For instance, no map includes an area between Melville Island and Victoria Island to the east of Banks Island. Any information study participants had for this area could not be recorded.

PBTB2008 geospatial data creation

Study instrument and methodology

No formal study methodology report and protocol were available at the time the geospatial data were created. However, a study proposal document (Survey of Local Knowledge of Polar Bear Denning Habitat and Areas Used by Females and Cubs of the Year in the Mackenzie Delta and Southern Beaufort Sea) that describes the proposed survey instrument in some detail was provided.

The survey instrument described in the study proposal includes a form with six parts:

- The first part seeks general information from the interviewee (name, community, years lived in community, birth community). It asks about activities on the land (cabins used in winter/spring [November to May], and which of these months these are used) and requests that travel routes and camp locations be marked;
- The second part asks about observations of polar bear dens. If dens have been observed or reported by other individuals known to the study participant, a Polar Bear Den Form is to be filled out for each den. These are to be coded with the letter D and a number;
- The third part asks about sightings of female polar bears with cubs. If females with cubs have been observed or reported by other individuals known to the study participant, a Spring Sightings of Females and Cubs Form is to be filled out for each sighting. These are to be coded with the letters FC and a number;
- The fourth part asks about polar bear hunting activities (if the person has hunted for subsistence, guided sport hunts, if sport hunting is an important source of income, what parts of harvested polar bears are used);
- The fifth part asks about observations of polar bears on land in the summer. If observations have been made, a Summer Sighting of a Polar Bear Form is to be filled out for each sighting. These are to be coded with the letters PB and a number;
- The sixth part asks three qualitative questions about changes in the number of bears or seals, and other observations.

Each of the separate forms asks a number of questions about the particular observation. The participant is asked if he or she can show on the map where the observation occurred, and whether the observation was made by the study participant (i.e., self-reported or not).

A map was prepared to record information for the study. It is a single 1:250,000 scale sheet, 60 inches (152 cm) wide and 36 inches (91 cm) high. The map uses a Lambert Conformal Conic projection, with the central meridian 135 degrees west (approximately the centre of the Mackenzie Delta), and standard parallels of 62 and 68 degrees north. Apparently, 1:250,000 NTS base data were used, including water lines, water areas, contours, community locations and roads.

Data creation process

To create georeferenced digital data for the survey maps, the first step was to scan the maps into digital images.

Maps were scanned into 400 dpi 24-bit colour TIFF images. The TIFFs were resampled to 200 dpi for geo-referencing and digital data creation to make them less demanding of the computer software and hardware.

Geo-referencing (registering the images to real-world coordinates) of the study maps was complicated by two issues:

- First, the maps (60 inches (152 cm) wide and 36 inches (91 cm) high) were stored folded and placed in 9- by 12-inch (23- by 30-cm) envelopes. When the maps were unfolded, it was impossible to entirely flatten out all the creases so that they would feed cleanly into the high-precision scanner. The wrinkling resulted in some unevenly distributed distortion in the images.
- Second, a projection graticule marked on the base maps is not labelled with coordinates.³³ A second, coarser graticule is included that denotes longitude and latitude, but it does not offer enough well distributed registration points for geo-referencing with the desired accuracy. (A minimal mapping unit of 0.5 mm was used on the original paper map, which converts to 125 m in ground units at 1:250,000 scale. Thus, 125 m or better was the target registration accuracy.)

Fortunately, the presence of the labeled longitude and latitude graticule allowed for coarse registration of an image and determination of the coordinates of the projection graticule.

The following process was used for geo-referencing images:

1. The four corners of each map were registered using the closest intersection points in the projection graticule.
2. Registration points were added, concentrating on sections of the coarsely registered map containing marked information. In ocean areas, projection graticule intersections were used. In land areas, recognizable water feature intersections (e.g., a visible intersection of a water line with a water body) were registered from the map image to the original 1:250,000 NTS data, which were downloaded from the Natural Resources Canada GeoGratis portal. Registration points were added until there was a good fit (measuring in ground units) between the original NTS data and the base features marked on the map. Third order polynomial transformation was used.

The average residual mean squared (RMS) error achieved for map registration was 122.06, with a minimum of 50.74 and a maximum of 394.74. However, these numbers must be considered with regard to the methodology used. Effectively, the applied methodology should compensate for image distortion by rubbersheeting³⁴ so that areas with marked data have a fairly high accuracy, although other areas of the map (without marked data) might be more inaccurately registered.

During digitizing, the original 1:250,000 National Topographic Database base data used was drawn to create the maps on top of the images. This provided a visual indication of how accurate registration was. In a few instances where particular areas of the map image diverged from the base data, features were digitized with reference to the base data.

Data were digitized using an on-screen scale of 1:150,000 or larger to assure that digital data were at least as accurate as the information marked on the source maps. Data were initially disaggregated by map sheet. A formal quality assurance process was used to review digitized data and ascertain that they were error free. Finally, geospatial data for all maps were consolidated into a single study dataset.

Information from paper study forms was transcribed into a single Microsoft Excel spreadsheet, with one line used for each form. A unique identifier was created by joining the participant's assigned identification number, an underscore, the item's code (D for den locations, FC for females and cubs locations, and PB for summer sightings of polar bears), and the item's assigned sequence number. This can be used to join the form information to the geospatial data.

Data limitations

Lack of a formal methodology report at the outset of the study required subsequent interpretation of directions regarding the mapping conventions that were given to the local researchers who did the interviewing. Additionally, some apparent deviation from the methodology described in the study proposal can be noted:

- maps sometimes include information not sought, including indications of ice floes, current, movement direction for polar bears, etc.;
- some forms do not have corresponding mapped features;
- some maps include features (code and sequence number) that are not recorded on corresponding forms;
- some maps include features with no sequence numbers;
- some forms are filled out in ambiguous ways; and,
- some questions seem to have been misinterpreted by study participants — in particular, the question about summer polar bear sightings on land seems to have been sometimes interpreted as asking for any observation of a polar bear on land or ice.

These issues mean that the dataset might not include all den locations or female and cub locations recorded on forms, and some locations recorded on the maps might not have corresponding records in the Microsoft Excel spreadsheet summarizing the information from the forms.

PBTKVER2012 data updating

A selection of polar bear observations, den locations, ice features and other information from PBTK2010, along with den locations and mother and cub observations from PBTKDEN2008, was mapped in support of information verification meetings held in fall 2012. Maps were prepared at 1:250,000 scale. Base features included water lines and areas, locations of artificial islands and contour lines. The contour interval used was 20 metres for the first 100 metres above sea level, then 100 metres thereafter. (The rationale for this was to avoid excessive map clutter from contours in mountainous parts of the study area, while retaining coastal detail that would help participants locate areas close to the coastal shoreline where polar bears den.) A series of 17 maps covering the study area was printed. Where density for the selection of features made it difficult to read a map, separate maps were printed for ice features and polar bear-related features.

After the verification meetings concluded, maps were scanned into 300 dpi 24-bit colour TIFF images. The images were georeferenced using a grid of spatial reference points that had been printed on the maps. A minimum of seven registration points was used. The average residual mean squared value was 32.297, suggesting relatively accurate registration.

Data were digitized using an on-screen scale of 1:150,000 or larger to assure that added digital data were at least as accurate as the information marked on the source maps. The information collected in PBTKVER2012 represents an update to that mapped in PBTK2010. There were four overriding verification categories: incomplete, not on map (new information added); improvements in accuracy (spatial representation of previously recorded information changed); incorrect (previously recorded information removed); known to be correct (no change to geospatial data).

The updated data were merged with PBTK2010 to create a final dataset to support report cartography and future activities.

Report cartography

The maps in this report use the coordinate reference system EPSG 3578 (Yukon Albers projection, NAD 1983 datum). The inset for Map A1, Study Area uses EPSG 3580 (Northwest Territories Lambert Conformal Conic projection, NAD 1983 datum). All maps are oriented to coordinate reference system (grid) north. For base data, all maps with the exception of Map A1 use National Topographic Database 1:250,000 water area and water line data, along with toponyms selected from data provided by the Government of the Northwest Territories. Contours were generated from Geobase 1:250,000 Canadian Digital Elevation Data. The contour interval is 100 metres, but coastal areas include the 20-, 40-, 60- and 80-metre contours. Map 1 uses 1:1,000,000 water line and administrative boundary data from the Natural Resources Canada Atlas of Canada National Scale Frameworks dataset.

Appendix 3. Change-related questions asked during the interviews

Throughout the 2010 interviews, the TKHs were invited to think about changes, if any, in the number of polar bears, their spatial distribution, den locations and denning behaviour and condition (i.e., physical health) in response to a number of questions that were set out in both versions of the questionnaire. Given the semi-structured interview method adopted for the study,³⁵ these questions were intended to give guidance to the interviewer during the interviews. This meant that he was given licence to modify the questions and presumably skip some of them depending on the flow of the discussion, and on an assessment of the TKH's experience, response burden and other factors. Thus, when it came to the actual interviews, there was some variation in the way the questions were asked. Some additional change-related questions were asked as well.

Questionnaire questions included:

- Are there places where the people in your community know to go see bears? Have you or have you not seen changes in the number of bears in these areas since you were young? If so, what types of changes?
- Do bears look better/worse/or the same as when you were young? When did you notice this change happening?
- Do you see any changes in dens?
- Has the number of dens you see changed over time? Why?
- When do female bears go in and come out of the den? Has this changed since you were young?
- How many young cubs do female bears have? Is this different in different areas? Has this changed overtime?
- How many older cubs do you see with the mother? Is this different in different areas? Has this changed over time?
- Do bears come around the community? Has this changed since you were young?
- Are people or are people not having problems with polar bears? Are there more, less or the same amount of problems as when you were young?
- How do the Inuvialuit monitor change in the polar bear population?
- Have you noticed any differences in what the bears eat now versus from when you were young?
- How have the seals changed (body condition, numbers)? How have the whales changed? Have the numbers changed? Are there more, less or the same number of seal or whale carcasses washing up on shore?
- Have you ever seen bears eating other bears? Do you see it more or less now than when you were young?
- Apart from hunting bears, how do polar bears die? Do you know if this has changed since you were young? Any change from what your elders told you?

Questions asked during the interviews included:³⁶

- From the '70s to 2000, did you see any change in the number of bears?
- You have been hunting in this area from 1967 until today. Have you seen changes in the number of bears? Within this area, you've hunted from the tip of the Tuk Peninsula to Herschel, have you seen changes in the number of the bears you've seen in this area since you were younger?
- Since you've been doing most of your hunting in these two areas, B4 and B5, have you seen any changes in the number of bears in these areas since you were younger?
- The number of bears you are seeing, does it vary in different areas? Will you be seeing more bears in different areas at different times of the year?
- Have you seen a change in the number of bears around Ulukhaktok since you were younger?
- Since most of your experience has been in Baillie [Island], have you noticed changes in the number of bears around Baillie?
- Have you seen changes in the number of bears in Nelson Head; how many bears there are, has that changed?
- Generally, have you seen changes in the number of bears in the different areas that you go hunting?
- Have you seen changes in the number of bears in different areas over your life? We'll talk about the three areas you go to, but around [Cape] Kellett: have you seen changes in the number of bears since you were young?
- Have you seen changes in the number of bears in this area over your life? Have there been more or less bears you've noticed?
- Over your life, harvesting on Melville and Victoria [islands], have you seen a change in the number of bears at all in certain areas?
- Since this was the area you've mostly harvested in your life — just around Prince Albert Sound and over here — have you seen a change in the number of bears in this area over your life?
- Have you seen over your life changes in the number of bears in this area, around Cape Parry?
- Have you seen a change in the number of bears around here over your life, in terms of the number of seal kills and the size of tracks? Have you seen a change in those?

- Do you talk with other hunters in the community or in other communities about what they're seeing with polar bears; what they're seeing happening with polar bear numbers?
- Have you seen more bears inland recently at that time of the year or is it the same number of bears?
- Have you seen changes in the number of bears since you were young?
- Have you seen a change in the number of the bears in this area since you were young, like, how many bears you're seeing?
- Did they [elders] ever say that some years there were no polar bears and some years there were more? Would they ever talk about cycles in polar bears' numbers?
- Have you noticed a change in the condition of the bears you're seeing or getting?²³⁷
- While you were hunting between the '60s and the last couple of years, did the bears look better or worse or the same condition since you were young?
- Have the bears looked different over your lifetime, the condition of the bears? Do they look bigger or smaller or fatter or skinnier?
- Have you seen changes in how the bears look? Have you seen changes in their condition? Have they gotten smaller or bigger or fatter?
- Do you notice if bears are looking in better or worse condition than when you were younger?
- Did the bears look better or worse or the same condition since you were young?
- Since you started hunting did you see any change in the condition of the bears? Did the bears look better or worse?
- Have you seen a change in body condition of bears over your life? Do bears look better or worse or the same over your life?
- Do bears look different since when you were young? Do they look in better or worse condition, fatter or skinnier, since you were younger?
- Do the bears look better or worse or the same since you were young — like, the condition of bears and the size of bears?
- Do bears look better or worse since you were hunting on Banks [Island]? Did you notice that there were some years that bears looked healthier and some years that bears looked skinny?
- Has the number of dens you see changed over time?
- Has the number of dens you've seen over time changed or do you see the same number of dens each year?
- Have you noticed any changes in the bear dens? Have you noticed changes in the amount of snow?
- Have you seen any changes in the dens, such as the number of dens each year or where they're located?
- Has the number of dens you've seen changed over time? Like, do you remember seeing more or less dens?
- Have you seen any changes in the dens, such as the number or when bears were going into or coming out of dens?
- Have you seen any changes in the dens, such as where the dens are located or the timing that the bears are going into or coming out of dens?
- When you see mothers with cubs now, is it mostly two or mostly one? Has that changed over your life? Have you seen the number of cubs they're having change?
- Has the number of cubs with mothers changed over time? When you were younger, did you see more singles or more twins than you did later in life?
- Has this changed over time? The number of cubs you're seeing or even just tracks? Like the mother and cub tracks?
- Has the number of cubs you see changed over time?
- Has it changed over time, the number of cubs you see with the mother?
- Have you noticed any changes in the time of year that they are going into and coming out of dens?
- Compared to when you were younger, are people having more, less or the same number of problems with bears?
- Has there been a change in the number of bears coming into camps and communities?
- How do the Inuvialuit monitor changes in the polar bear population, like the whole number of polar bears?
- How do people monitor changes? How would they measure if there are changes in the whole population of polar bears?
- What are the types of things that you look for to know if the whole polar bear population is doing well? Are there any indicators if the whole population is healthy and in good numbers?
- Have the seals changed at all over your lifetime, the number and the health of the seals?
- How about bearded seals? Have you seen any changes in bearded seals such as their number, their condition or where you're finding them?

- Have the seals changed in their number or body condition?
- Have you noticed changes in seals at all over your lifetime in terms of health or numbers or locations?
- What about when you're butchering them? Are you noticing that seals are getting in better condition or worse condition or about the same?
- Have you noticed changes in the number of seals that are washing up on shore in this area over your life?
- Has the number of whales getting beached changed?
- Have the whales changed in terms of their numbers or body condition?
- Are there more or less whale carcasses washing ashore these days than when you were younger?
- Are you seeing more or less or the same number of dead whales washing ashore?
- In terms of the number of seal or whale carcasses washing ashore, has that changed?
- Have people noticed a change in the whales, such as the number of whales or the condition of the whales that they get?
- Have the beluga whales changed at all in their numbers or body condition?
- Has the number of whales washing ashore changed? Are you noticing it more frequently?
- Have you ever seen bears eating other bears, like cannibalism?²³⁸
Have you ever seen bears or seen signs of bears eating other bears, like cannibalism?
- Besides you guys hunting them, how do polar bears die? Are there any causes for mortality that you know of?²³⁹
- Apart from Inuvialuit harvesting bears, how do polar bears die? Have you ever come across just a dead bear?

The TKHs were also invited to think about whether polar bears have “adapted” to changing weather and sea ice conditions. These were the questionnaire questions related to adaptation:

- If the weather has changed, how have bears been affected? Have they adapted successfully or not?
- If the ice has changed, how have the bears been affected? Have they adapted successfully or not?

During the interviews, however, the following questions were asked:

- Have bears adapted to the changes in the sea ice?
- Have you seen them adapting in any other ways to changes in the sea ice?
- How have the bears been affected by the changes in the ice you are talking about? Have you seen them adapting in any ways?
- Have bears started to adapt to changes in the ice and weather? Have you noticed anything?
- How are bears adapting to changes in the ice and weather?
- Are you seeing bears adapt in any other ways? From what you are seeing when you are out there, are you noticing them making any other adaptations to changes?
- Are you seeing bears adapt to changes in the weather?
- How do you think polar bears are going to learn to adapt to the changes in the ice?

Appendix 4. English and Inuvialuktun vocabulary

Table A10. English and Inuvialuktun vocabulary related to polar bears

English	Uummarmiutun	Kangiryuarmiutun	Sigitun
Polar bear (generic)	nanuq	nanuq	nanuq
Pregnant female	arnahuk hingaiyaulik	arnalluk najitaktuq	najitaalik
Newborn cubs in the den	nurraiyaat	mirrayiaq apittirmmi	nanuaqqat anilramiit
Cubs when they come out of the den	nurait niqhamiat aipitchiamin		nanuaqqat aniiqtut
Cub with its mother	nurrait aakngalu	arnnaluit mirayialgit	nanuaq amaamanilu
Female when she is with cubs (all out of the den)	arnnahaluq nurraniilu aniirut apitchirvingmingnin	arnaluit aniyut apittirmin mirayianggitlu	arnaluq qitunranilu silami
One year old cub	atauhimik ukiulik nurraq	nanuaq aipangganirnittaq	nanuq atautchimik ukiulik
Older cub, still smaller than the mother	atauhimik ukiulik nurraq	nanuaq mamangminin mikitqiyak	angayukliq nanuaq, qimmitun angitigiyuq
Cub about the same size as its mother	nurrait mikitlaaqtut huli aakmingnin	nanuaq aktikiliktut maa- mangminin	naamiariik
Group of bears including the mother and her twin cubs that are the same size as her	inuugiaktuat nanut maligingnilu aktilaangit atirut	pinggayuqqat aktigiliqtut	pingayuqqat
Young male		nukauq nanuq	angusalluq
Full grown male	anguhaluq	anggutiryuaq	angusalluq inirniq
Adult female without cubs	arnahaluq narranilu	mirayanggituq arnaluuq	qitunrailaq
Weasel bear		taliakuk, gayanaluk, tigliaqpak	tiriarnaq
Ticklish polar bear		quinaktuyuuq nanuq	quinaktuyut
Jumpy polar bear		qugluktaatuq nanuq	nuyuaqtuyuuq
Polar bear maternity den	apitchiaq**	apittiq	apitchiq*
Denning area (where more than one den is located)		apittiqarviit	apitchirvik
Breathing hole in a maternity den	aniqhaarvik apitchiivingmi	kinggak apirtirmmi	qingaq
Process whereby female bears claw away at the ceiling of their dens making the ceiling thinner	arnahaluq aglaminik qumigtungningit	haglihaiyuk apittirmik arnaluq nivakhunni	arnaluq nannum sitimi qulaa saaglipkaqsimagaa
Polar bear rut, rutting, mating	nanuq nuliqhuq	nuliaqtut, nulialirtut	nannut nuliaqtut
Polar bear killing and eating another polar bear	nannut ingmingnun nir- ritiruat	nunat tuqtiryut nirgivilugitlu nanuit	nannuktaugaaluktualuk
Hunting polar bears in dens	nanurniarniq apitchiivini	apittirhiuqtut nannunik	apitchiliqiyut
Polar bear den	nannum apitchvia	nanuit apittiit	apitchirvik
Polar bear crushing or breaking through the snow over a seal breathing hole	nunuq navgutiruaq alluami aniqtipkaarvingmi	nanuq kirlahiyuk kinggakun	nanuq agluliqiyuq

English	Uummarmiutun	Kangiryuarmiutun	Sigitun
Polar bear waiting at the seal hole for the seal to come up	nanuq utaqhiruaq natchim aniqhaarviani	nanuq nikpaktuk nattium agluanni aputaiqhugu	nanuq mippiqtuaq natchium aglungani, aputaiyaqlugu
Female polar bear and cubs cooperating in hunting at the seal hole	atautchkun natchirniaqtuat aakagiit	nanuat illihaktut mamang-mingnin nattihiunirmik agluummi	nanuq qitunraillu ikayuqtigiiklutik natchiqsiuqtuat
Traditional method of sharing polar bear meat	aviktuarniq nannum niqinganik	payuktarniq nanut niqaanik	payuktarniq nannum niqaanik
Polar bear hindquarter	nannum muminga	nannum mimia	nannum mimra
Polar bear lower back	nannum qinguliik niungik	nannum qimiglua	nannum kuutchiik
Polar bear front and back paws	nannum hivurangikta aglangik	nannum hivuliit kingguliitlu itigait	nanum itigait
Polar bear hide (skin)	nannum aminga	nannum amia	nannum amra**
Polar bear jaw	nannum aglunga	nannum aglirua	nanum aglirua
Polar bear skull	nannum niaquanga	nannum niaqua	nannum niaquan saunikua
Polar bear hide used as a mattress	nannummik qatraaq	nannum ammia alliniq	nannum amranik qajaaq
Polar bear hide used as a sled	nannummik unialiat	nannum amia aaliak	nannum amra qamutigi-blugu
To skin a polar bear	nunnumik amiqhiniq	nanungmik amiyainiq	nanuq aaktaksaq
To flesh a polar bear hide	nanuumik kiliurniq	ammiiqqinik nannum amianik	nannum amra uqsuiyaq-tuksaq
Polar bear track	nannum tumingi	nanuit tumait	nannum tumait

* Ronald Lowe (2001); ** Ronald Lowe (1984)

Table A11. English and Inuvialuktun vocabulary related to seals and other animals

English	Uummarmiutun	Kangiryuarmiutun	Sigitun
Ringed seal	natchiq	nattiq	natchiq*
Full grown female without pups	anguhaluq piatchatlu	arnaluq natianggittuq	natchiq iblaungittuq
Pregnant female		arnalluk najitaaqtuk	natchiq ilumiutalik
Female with pups	natchiq piatchnilu	arnaluk natialik	natchiq iblaulik
Female whose pups did not survive	arnahaluq irniyaalik	arnalum nattiangga tuquyuq	natchium iblaungit tuquvak-tut
Newborn pup with white hair	qakutaq natchiayaaq	nattiaq mitqikhimaituq	iblauq
Pup after it has shed its white hair		nattiaq qaliiqtuq	natchiaq
Adult seal of either sex	natchiq	nattiq	natchivik
Old stinky male	anuhaluq	tigak	ayulaq
Breathing hole	allu**	agluu	aglu
Seal lair		nunaryak	iglu

English	Uummarmiutun	Kangiryuarmiutun	Sigitun
Bearded seal	ugruk	ugyuk	ugyuk*
Adult female	anguhaluq	arnalluq aktuaktak	inirniq arnaluq
Pregnant female		arnalluq najitaktuk	natchiq najitaalik
Newborn pup	natchiayaaq	anilihaaq ugyuaq	iblauq
Pup in its first summer		ugyugaq	natchiaq sivullirmik auyiyuq
Yearling		aipaaganirnitaaq	atautchimik ukiulik
After the first shed		mitkirihaaq	inirninguqtuq
Young adult		iniqtilihaaq	inirninguqtuq
Adult male		aktuaktaq	ayulaq
Breathing hole	allu**	aglu	aglu
Beluga whale	qilalugaq**	qilalugaq	qilalugaq*
Beluga whale carcass (beached)		qilalugak tivyaq	
Bowhead whale	arviq**	arvik	arviq*
Bowhead whale carcass (beached)	tipiraq	arvik tivyaq	silu (arviq)
Arctic char	qalukpik**	iqalukpik	iqalukpik
Shrimp		kingguk	quinguk
Fox (white, arctic)	tiriganniaq**	tiriiganniaq	tiriganniaq
Wolf	amaruq**	amaruq	amaruq
Wolverine	qavvik**	kalvik	qavvik
Muskox	umingmak**	umingmak	umingmak
Eider duck	qingalik	qinggalgit	qaugak
Gull	nauyaq**	nauyaq	nauyaq*
Caribou	tuttu**	tuktu	tuktu
Grizzly bear	aklaq**	akhaq	aklaq
Dog	qipmiq**	qinmiq	qimmiq
Dog team	uniarauat	qinmiqtuqtuq	qimmit qimuktit
To hunt a polar bear with a dog team	uniaraqhuni naurniarniq	nanuqhiungniq qinmiqtuqhutik	qimminik nanniqiniq

* Ronald Lowe (2001); ** Ronald Lowe (1984)

Table A12. English and Inuvialuktun vocabulary related to ice and related sea states

English	Uummarmiutun	Kangiryuarmiutun	Sigitun
black vapour cloud over open water	taktukluk	qihuk	qisuk*
candle ice	nuigaurat**	illauyaq	illauyiniq*
crack (very thin)	quoaq	quumnik	quppaq
crack in ice that does not close in winter	qupaq quulailaq ukiumi	aulagun	aayuraq* hiuak
current	harvaq**	harvaq	sarvaq*
glare ice	qivliqtuaq hiku	quaha	quasaq*
iceberg	hikuqpait**	piqaluyak	piqaluyaq
icepan, broken ice	hiqumingniq	ahiruyaqhimayuk hiku	siqumnip*
landfast ice		tuvvaq	tuvaq*
lead that freezes over and opens again, with thin ice		aayuraq	
main ice	hikupiaq	hikulluak	hikulluaq
multi-year ice	hiku nuulailaq	qangangnittaq hiku	piqaluyaq
new ice	hikuliaq**	hikulihaaq	sikuliaq
old ice	hikualuk	utuqaq hiku	utuqqaq
open water	uiniq**	uiniq	uiniq*
piled-up ice	ivunrit**	qaliriik hiku	ivunrit*
polynya/open water		hikuyuittuq	uiniq
pressure ridge	ivunrit**	aulagun	quglugniq* kuglunik
rough ice	qairilaq hiku	manilaq	ivvuit*
rubble ice	murarat	hikut ahiqqut	ivvuq
sea ice (generic)	hiku**	hiku	siku
solid ice	hiku manngailaqhi	ukiungnitaq	tuvaq
swell (ocean)	ingiulik**	ingiulik	ingiulik
thin ice		hiku hattuq	sikuaq*
young ice	hikuliaq**	hikuliaq	sikuliaq*

Source: *Ronald Lowe 2001; ** Ronald Lowe 1984

Appendix 5. Polar bear “management”

The manner in which humans “manage” their relations with polar bears was not the central focus of the PBTk study given the many other topics that required attention during the 2010 interviews. However, Inuvialuit perspectives on “management” before and after government intervention following World War II emerged from a number of interrelated questions:⁴⁰

- Can you tell me the important things that you would tell your children if they were to go polar bear hunting? What are the things that you do when you harvest a bear? How do you show respect? Are there rules that you follow?
- What are the things your elders taught you so that you can hunt a bear? Are there traditional values about harvesting bears? Do any apply today?
- Are there traditional ways to make sure people don't kill too many bears? Are these still being used since quotas came in?
- Did your elders hunt bears with young ones? Were there different values when you saw a bear with young ones?

No TKH was asked to explain in detail an Inuvialuit worldview or perspectives on human-animal relations that would help non-Inuvialuit understand their polar bear harvesting practices, hunting ethics and decisions with respect to management and biological science and research. As a result, no systematically coherent oral tradition concerning such matters emerged from the interview transcripts. Therefore, in order to contextualize TKH narratives concerning “management,” this appendix provides an interpretation of the Inuvialuit worldview with respect to polar bears and the history of government and co-management of their relations with the animals. This interpretation is based both on TKH narratives and published literature. In addition, perspectives from several TKHs are provided that relate to scientific research concerning polar bears and decisions made with regard to Inuvialuit harvesting of them.

Humans do not “manage” polar bears

Polar bear hunting by Inuvialuit and their sport hunting clients is managed in a cooperative manner with the Governments of the Northwest Territories and Yukon through joint committees known as co-management bodies established by the Inuvialuit Final Agreement (IFA). Prior to government regulation and the IFA, Inuvialuit harvested polar bears as they needed them for food and clothing. In the post-World War II period, polar bears became an increasingly important source of income through the sale of their pelts and meat to DEW Line personnel, traders such as the Hudson's Bay Company, and through commercial sport hunting. An Ulukhaktok TKH explained the importance of polar bears as food to older generations of Inuvialuit and how this changed once they no longer needed dog teams.

What they see long ago, they used to go for it, 'cause they had to feed their dogs, and they had to feed their families and that. So, it's pretty well what they see is what they tried to catch. But us nowadays, we don't have much dogs anymore, so we try to get what we want. If we like it, we take it. If the size is good, we'll take it. But for me, I'm not a fussy guy. I like to try to catch what I see, but I would prefer males.

PIN 117, ULUKHAKTOK

As described in the main body of the report, Inuvialuit hunters relied on their knowledge of the polar bear's world, such as sea ice and seals, to focus their harvesting efforts in places where they had the greatest probability of success (e.g., headlands, pressure ridges and open leads). However, polar bears were also harvested opportunistically while Inuvialuit were travelling or camping. Some hunters harvested many bears, as explained by this Paulatuk TKH.

They'd hunt them the summer time. If they were boating, if they were camping along the coast, one would come along. They didn't have rules or regulations to follow at that time, so to them it was just open [hunting].... If it was a chance encounter, if they would be traveling with the boat and see one swimming, they would harvest it for food and the use of the hide.... I met a person who said he got over 200 [polar bears] in his lifetime. My grandfather was the same. In them days, it was mainly for food and for clothing.... I am just about 45 now, and I harvested about 40, and that old guy told me I am doing pretty good.... Them years, they didn't have a quota, so they could get as much as they needed.... With their big families you got to have food or you run into starvation, and so that animal was real helpful to the people in them days because of the food.

PIN 158 PAULATUK

Inuvialuit harvested female polar bears and their cubs in and near maternity dens in the past, as noted by these hunters from Ulukhaktok and Sachs Harbour.

Long ago, before they even have quota, I used to see them come home with cubs. They used to say they were good eating, young cubs, because they're soft and tender and soft bones, eh?... We used to say the best parts are the polar bear feet.

PIN 117, ULUKHAKTOK

In them years, once in a while, we used to hunt them for subsistence use. Dig them out of the den, that sort of thing. Now, it's illegal to hunt a bear in the den. But in them days, polar bear [hunting] was wide open. You could get as many as you want. You could get thirty or forty a year if you want, but now we're on the quota system, so we don't bother them anymore [in their dens].

PIN 132, SACHS HARBOUR

Harvesting females and cubs had been banned by the Government of the Northwest Territories by the mid-1960s.⁴¹

In the post-WW II period, it appears that the number of bears harvested each year increased significantly due to commercial incentives. Several TKHs interviewed for the PBTk study suggested that hunters were “taking a lot of” polar bears during this period.⁴² For example, a Paulatuk hunter said that when his elders were younger, they hunted in the same locations where Paulatuk people hunt today.

But back in the day, the old-timers, it was a small cash item, so you had to kill a lot of them, and back then there was no quotas. This was way before my time, probably my father's time.... Selling them for the hide.... And they were getting a hundred bucks a bear back then.... They were taking a lot of them.... Back in the olden days, you could get as many as you like.... for selling to the traders.

PIN 163, PAULATUK

Large seasonal harvests of polar bears did not result in a decline in polar bear abundance, according to this Tuktoyaktuk TKH.

I remember they used to have a store here. They called it Utqaluk. It's at Baillie Island, right at the sandspit here. They used to have a store and people used to be living there before us. When the store washed away in 1935... and they moved to the Stanton area or wherever, that's when the Hudson's Bay [Company] took over, because there was no more store there.... There were a lot of people there.... [PIN 100] was one of them from Baillie Island. He said that during the year they been killing 35 bears in one day. Just one day alone, they'd been killing 35 bears a day on the island right there.... There was so much bears there. But that didn't decline the bears. They were still there when I went there. Bears all around.

PIN 23, TUKTOYAKTUK⁴³

Whether it was focused on areas well known for seasonal abundance or was opportunistic, Inuvialuit polar bear harvesting was and continues to be embedded in a distinctive worldview that both explains and guides their relations with polar bears. One must be extremely cautious about applying the term “management” to the Inuvialuit constellation of beliefs and practices related to polar bears because of the heavy ethnocentric or cultural freight loaded on it by science-based resource managers. They assume that humans can “manage” highly mobile or migratory wild animals such as polar bears, caribou, seals, fish and waterfowl. In reality, however, humans “manage” only a tiny fraction of the Earth's animals in cases where they control their distribution, reproduction and genetic makeup (Feit 1988: 75). Thus, humans do not “manage” polar bears. They manage their relations with one another with respect to harvesting polar bears and through the management of resource extraction and other human activities that have an effect on their abundance, distribution and condition.⁴⁴

In a sense, traditionally-minded Inuvialuit and other aboriginal peoples “manage” their relations with animals when the latter are “spirited” such that they have souls or master beings that must be respected in order for the hunted animal not to be offended and to offer him or herself to human hunters.⁴⁵ In such cases, humans “manage” their social relations with animals, and participate with numerous animal beings in a shared social-ecological universe, a point that has been well documented for many aboriginal peoples across North America (e.g., Armitage 1992; Bird-David 1992; Brightman 2002; Cruickshank 2005; Feit 1988, 2000, 2004; Fienup-Riordan 2007; Hallowell 1960; Laugrand and Oosten 2007b; Nelson 1983; Scott 1996; Tanner 1979; Wenzel 1991).

A key feature of the Inuvialuit worldview — which is shared with their Inuit, Inupiat and Yup'ik neighbours elsewhere in the Arctic — is that animals are ensouled and have the same status as human beings.⁴⁶ Moreover, our corporal appearances as humans and animals are only the outward forms of similar, soul-like entities (see Laugrand and Oosten 2007b: xxxvii). This sharing of personhood allows animals to understand human speech, and for them and humans to communicate with one another. Dreaming appears to be one such means of communication, as explained by this Paulatuk TKH.

If I am out there, and I dream there are two polar bears I shot in my dream, it happens the next day. I don't know how I have those dreams, but in my dream I see a polar bear, I get it, skin it up. Travel some more I get another one, skin it up, I come home with two bears even before I get up. And when I get up, I go out, it's what happens. I don't know how, though. I know another person would be kind of puzzled, but me, when I am out there sometimes, I have dreams that come true.

PIN 158, PAULATUK

In the past, special powers were afforded to Inuvialuit shamans who could transform themselves into any number of animals, the polar bear being one of the most powerful (Alunik, Kolausok and Morrison 2003: 24).

There's stories passed on from generation to generation about the shamans being changed into different animals.... He uses his powers to change into an animal, say a loon, a crow, to fly around with the animal. The polar bear was a powerful animal at that time and [the shamans] would transform into polar bears.... Nothing is going to bother you if you are a polar bear unless a bigger one comes and chases you away.... They are walking around smelling just like that animal does, and they could smell the seals. When he is in his trance, his body is there but his being, his spirit, is elsewhere.... He is walking around out there and there are seals, so the hunters would know where to go to be successful, to bring the seals back. They [Inuvialuit] made their deals that time with the shamans. [The shaman goes] out, he finds where to hunt, and when the hunters come back successful, he would get his share for his lead. And these guys were positioned high in communities. Say a camp here, a camp there, all along [the coast], guiding the people to where the food is. He can be below the sea, on the sea, or above the sea, 'cause it is all one. You're not just walking.... They would cover on top and also below. There are different animals that they used [to transform into]: a walrus or a bearded seal for below. But if you changed into a fox, then you're more vulnerable to being chased or bitten while you're in that thing. So a polar bear wouldn't [be vulnerable]; no animal bothers you except a bigger one.... I think that's the main use of the polar bear by the Inuit. At that time it was their connection and their senses, and nothing bothered them.... it's just locating the food source.

PIN 158, PAULATUK

Humans and other animals have relations of reciprocity. In return for being shown respect, animals offer themselves to human hunters. However, if they are not respected, they will go elsewhere, not present themselves to hunters, with great hardship or even starvation the result for their human neighbours (Alunik, Kolausok and Morrison 2003: 24–25). Respect takes various forms, including not speaking badly about the animal, not chewing or consuming certain body parts, not playing with the animal, and taking its life when it presents itself to the hunter rather than refusing the gift of its life. A Tuktoyaktuk hunter who has guided many sport hunters over the years explained that polar bears can hear humans talking about them, and why it is important not to curse or make fun of them or otherwise show them disrespect. He makes an effort to explain such matters to his sport-hunting clients.

But there's that's one thing that our elders have always told us. Any kind of animal that you are going after, you never, ever make fun of those animals. You never talk about them, and I have always said that to anybody that travels with me. But big-game hunters are a whole breed altogether. Some are understanding, some of them are not. And some of them will do anything or say anything for them to get a bear. And you know some of these people will curse a bear. They will say bad things about them, and I always tell them, "don't talk like that. Those bears know".... I had this sports hunter. Third day of the hunt he asked me what time he is going to get his bear, and I said, "Look, there are lot of bear signs in here, there are bears out there. I am not going to say that we are going to get a bear, but hopefully we will." It was the fourth or fifth night. Finally he was getting really, really pushy. So I told him, "John, I already told you that you don't talk about bears like that. You can't say anything bad about them. If a bear is ready to give himself to you that bear is going to come." Three o'clock that night, a bear came into camp. I could have put out my arm like this [gestures] and touched his nose through the door of the tent. And that bear just kind of looked, then he turned around, and he walked a little ways, and that is when I told my hunter to shoot. That bear came right into camp and he gave himself to the hunter.

PIN 44, TUKTOYAKTUK

Polar bears will avoid hunters if the latter speak inappropriately about them.

I don't talk about what I am going to get. If I am going out, especially with animals, polar bears, they can hear you talking about them, if you are bragging, or loud-mouthing, talking about how you're a good hunter, you're gonna kill [them]. You don't say that kind of thing, especially when you go out on the ice to hunt polar bears, because they can hear you. They can avoid you if you talk in that manner. No matter how good a hunter you are, you talk like that, they're leaving your area.... So one of the taboos, I guess, is not be cocky, don't talk about the animals.... I don't talk about the animals I hunt.

PIN 158, PAULATUK

Bragging, making fun of polar bears or otherwise speaking disrespectfully about them can have serious consequences, including death, as explained by this Sachs Harbour TKH.

They really respect bears all the time, long ago. You shouldn't say the bears taste good.... Some people get scared when a guy start talking like that. They say sometimes the bear could eat that guy, the one who talk.... Dangerous: polar bears. That's why you must really respect polar bears. Don't say polar bear is really good to eat.... You shouldn't make fun of them or talk against them even a little bit. They gonna kill you.

PIN 128, SACHS HARBOUR

An Ulukhaktok TKH makes the same points:

She remembers her grandfather telling someone, as they were eating. There was another person saying, "Mmmm, this tastes good!" And her grandfather told that person, "You are not supposed to say they are tasty!" It is because polar bears would know that person said, "You are tasty".... And they might go after them or do something.... So that is their belief. That is the way it was back then, that she has been told, and she knows that.... Even nowadays, we are not supposed to say that.

PIN 101, ULUKHAKTOK, translation

Traditional Inuvialuit proscriptions concerning human behaviour towards polar bears include the requirement to use a knife when consuming certain parts of the bear.

When I was growing up, when I was small, we always eat polar bear meat. My mom said you can't say it tastes good or polar bear going to see it.... Can't say mamaqtuq to polar bear.... Around the ribs, that soft bone, what you call qaqulaaq; my mom won't let us chew that too, 'cause polar bear going to chew you up like that.... She said, "Ah, polar bear going to eat us like that." So we got to use a knife when we were eating polar bear.... said polar bears know everything.... So got to be real aware of the bear, even at home.

PIN 136, SACHS HARBOUR

Proper treatment of the carcass and distribution of meat to elders is important. An Inuvik hunter was once admonished by his mother for failing to retrieve a harvested polar bear's feet for distribution to community elders.

A good example is my first bear. I skinned it, I took the hind legs and I took the ribs, but I cut off the feet. Did I ever get shit for cutting off the feet! That's a delicacy, eh? I never, ever left a foot again. My mom drilled it into me!.... You always bring it in. There are elders here in town who are from Sachs Harbour or Tuk, and you bring them that meat. Man! That just brightens up their day. That's why I say if you can show a kid that, they probably see that when they give an elder a piece of caribou meat, they'll get that same feeling.

PIN 3, INUVIK

According to Inuvialuit hunting ethics, it is quite appropriate to give polar bear meat to other animals, including dogs, foxes and wolves. Furthermore, in former times there was nothing inappropriate about killing female polar bears and their cubs. Neither of these practices constitute disrespect or "waste" as defined by Euro-Canadian hunting aesthetics, and are consistent with the views of other aboriginal people who have "no conception of 'waste' attached to the material bodies of animals" (Brightman 2002: 283; see also Campbell 2004: 163–164). A distinctive Inuvialuit hunting ethic and aesthetic is evident in the words of this Paulatuk TKH.

We just wouldn't kill the bear and garbage it [the meat]. We take some choice cuts and we'd use some of it for dog food, obviously. Another thing we always used to talk about is that the animals need food too; the foxes and the wolves, especially the foxes, they need food too. So we'd always leave some for the foxes. Not the choice cuts.... because everything goes into a cycle. You kill one animal, it feeds everything else. Other than that, the only other thing we've always been told by elders is not to disrespect animals, not to laugh at animals, not to kill an animal if you're not gonna use it for the hide or for the meat. Basic things like that.

PIN 159, PAULATUK⁴⁷

In former times, women had to suspend their work on land-based animals whenever a polar bear was brought into camp because mixing the processing of land and marine animals was proscribed according to the rules of respect for all such animals.⁴⁸ They recognized the personhood of the polar bear in so doing, according to this Paulatuk hunter.

I was taught never to eat the liver. I don't know if they would use any other parts, maybe the tooth. Some of them made carvings out of it. Not like ivory from a narwhal or walrus, but they would make little amulets out of them. I don't [know] about any other body parts which they would use internally, or organs. I haven't heard anything about the skull.... An animal from the sea is not to be mixed with any land animal. If I brought a polar bear hide where I am staying, they are not supposed to work on caribou, wolf, any other fur that's not related to the ocean.... So they just put that aside. They deal with the polar bear and drop everything else until the polar bear is done, all the work is done with it. It's brought outside then, and after that, a women can start sewing and whatnot.... 'cause that's how much they respect the polar bear. Just as soon as it arrived, everything else was put aside and the polar bear was worked on, 'cause they don't want it to spoil. And the women know it is a person inside of there.

PIN 158, PAULATUK

An equal distribution of the polar bear hide and meat was also important. In general, traditionally minded aboriginal peoples believe that such sharing is a form of respect because animals like generous humans.⁴⁹ While the importance of sharing is described in the following account, no direct connection is made to pleasing the polar bear.

A long time ago, when they get a polar bear they don't skin the polar bear, they just cut the parts, like arm, leg, divide it with piece of skin of the bear, the hide, 'cause they wanted to divide the polar bear among all the people, the other hunters. So they just cut like

that. But when they go hunting again, they do the same thing. They want the hide, but they have to divide it with other hunters. When they go back home, the ladies, I guess, sew... the hides, the pieces together. That's how they make their polar bear mattress, I guess.... It was important to give everything. When they never get polar bear or 'cause the hide get dry already, if they get another one, even if they're not the same height, they make winter pants and mitts.

PIN 129, SACHS HARBOUR

Rules of distribution changed somewhat once polar bear hides had commercial value in trade with the Hudson's Bay Company and other traders, at which point the hide was kept by the hunter and his immediate family. However, the egalitarian rules surrounding sharing polar bear meat continued.

Despite the assimilative effects of residential schooling, global mass culture, and exposure to the techno-rational atheism of scientists who have conducted research in their territory, Inuvialuit hunters continue to think along these lines, and their ethics with respect to animals, hunting and scientific research are embedded in such thinking. This explains why Inuvialuit hunters continue to express grave concern about biological survey methods that require excessive handling of polar bears and other animals, such as placing satellite collars on them or the use of mark-recapture methods. Such methods are regarded as “playing” with the animal, an inherently disrespectful and hence unethical act, as explained by an Inuvik hunter:

I don't know how effective the tagging process is. Do they have to tag? I don't know.... The way I was growing up, you don't harass animals; you don't. You're there to kill it to eat.... You just don't play with animals, no matter if you're hunting muskrats or you're hunting polar bear. You don't harass animals. You don't harass birds, anything. That's just how we were grown up.

PIN 3, INUVIK

An example of horrendous disrespect towards animals was referenced by a Paulatuk TKH who was extremely unhappy with the way in which seal research had been conducted in Browns Harbour in the 1960s. The research was etched permanently in his memory and informs his current thinking about wildlife research in general.

My father used to work in Cape Parry DEW Line.... He took a trip to Browns Harbour with his boat and kicker.... Holy smokes! He couldn't believe what he was seeing there.... Seals about that high and about that long, about 400 seals.... Dead, the fisheries. 400 seals. Why didn't they come to us here and tell us, "Look, there's twenty dollars a pelt?" Them buggers never come and tell us.... He just looked to see 400 of them there, drowned seals. They drowned them. So they left them there and after a few years, no more seals. Nothing! There is nothing, zero now. So that was the starting point. Start off from the fisheries research.... That was.... 1965.... They make the iron red-hot. I wasn't there, but my father was there and he was watching them. Boy, he didn't like what he was seeing! He said this one man, his face was mad, this one man grabbed a seal, red hot iron, he give it to it, have to burn it.... We never seen one branded seal, all them years, not one. Soon as they're out a little while, the salt get into their skin, their fat, their meat and they get poisoned. Then from there on, there is absolutely no more seals.... I couldn't get over [how] they put a red-hot iron into [the seals]. They make the iron red hot and they poke the seal with it. You want to try it, try a red-hot iron, see how sore it is. That's what this guy from the fisheries was doing.... Then once they get into salt, they get the blood poison.... These guys, they could have come and tell us, tell one of us here. [We] would have cleaned them seals up instead of wasting [them]. Twenty dollars them days is a lot of money for a seal.

PIN 164, PAULATUK

Statements such as these shed light on the ethical foundation of Inuvialuit decisions with respect to polar bear “management.” An example is the Inuvialuit-Inupiat Polar Bear Agreement Joint Commissioners' recommendation from their August 2011 meeting that “polar bear population work be done further offshore and use methods that are less labour intensive and do not require handling animals (e.g., [alternatively, the use of] aerial surveys).”⁵⁰

Contemporary management of human relations with polar bears

The history of Canadian government management of human relations with polar bears is complex. It has evolved over time and is deeply entangled with the politics of Canadian sovereignty. This history involves a multitude of players, including government and university wildlife biologists, foreign biologists — through international bodies such as the International Union for the Conservation of Nature and Natural Resources (IUCN) — territorial, provincial and federal wildlife managers and legislators, foreign governments through international agreements such as the Agreement on the Conservation of Polar Bears and the Convention on International Trade in Endangered Species (CITES), and the Inuvialuit themselves, primarily through the Inuvialuit Game Council and Hunters and Trappers Committees established as a result of the Inuvialuit Final Agreement (IFA). A brief chronology of the history of state management and the contemporary co-management regime is provided in Appendix 6.

As noted previously, the Inuvialuit had traditional approaches to managing their relations with polar bears that were fundamentally different than those of the Euro-Canadians and Americans who arrived in the western Arctic with whaling activities in the late 19th century and in increasing numbers after World War II. Government management of polar bears commenced in 1949 with the introduction of a closed hunting season between June 1 and September 30 (Government of Canada 1950 Schedule D, p.97; see also Fikkan, Osherenko and Arikainen 1993: 99). During the next decade, harvesting with set-guns, traps and killing cubs less than one year old or females with cubs under that age were prohibited.⁵¹ Increasingly, the Canadian government imposed a science-based management system on Inuvialuit harvesting in response to a perceived crisis with respect to polar bear abundance. The crisis was international in scope, premised on preliminary population estimates of between 5,000 and 20,000 animals, and what several biologists thought was an unsustainable worldwide harvest of polar bears by Norwegian trappers and tourists in the Svalbard Archipelago, trophy hunters along the coast of Alaska, and Inupiat, Inuvialuit, Inuit and Greenlandic peoples, for whom polar bear hides were of increasing commercial value (Government of the United States 1966: 11; Flyger 1967; Stirling 1986: 168). It seemed at the time that polar bears had “a precarious future” and that “immediate, concerted action [was] necessary to save them” (Harington 1967: 234).

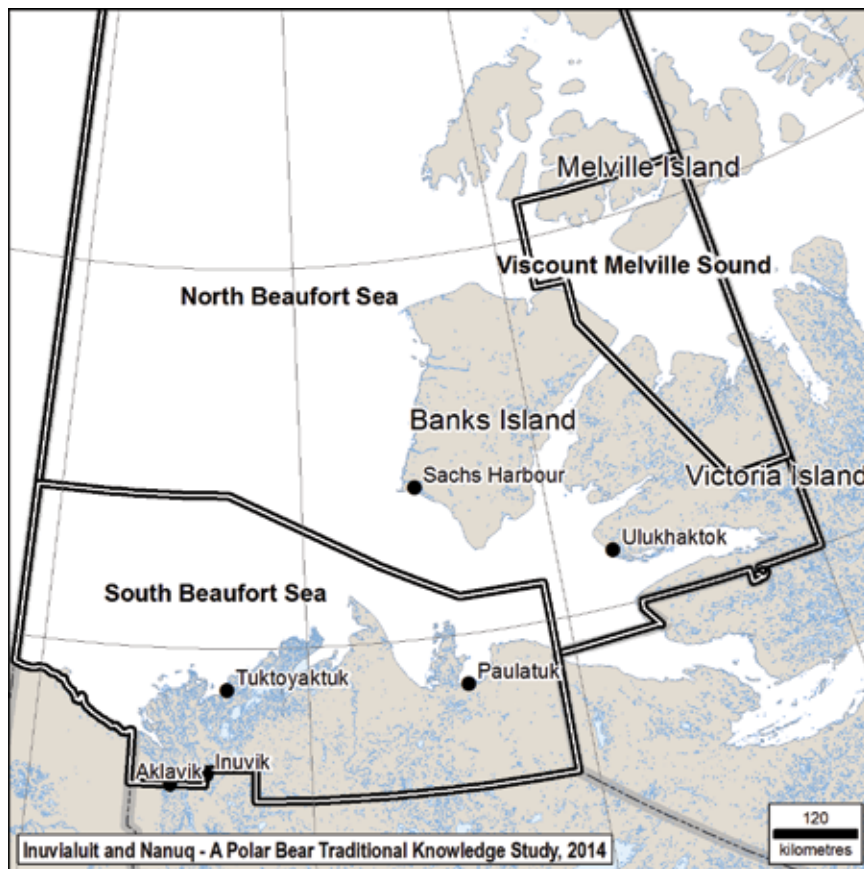
There is no evidence that Inuvialuit or Inuit shared the perspective that polar bears were in a state of crisis. Nonetheless, Canadian government biologists such as C.R. Harington set to work monitoring Inuvialuit and Inuit polar bear harvests by way of “Royal Canadian Mounted Police reports, and in some cases, Hudson’s Bay Company data” (Harington 1961: 22). Despite significant gaps in their knowledge of polar bear abundance and distribution, and population estimates that were hazy at best, the scientists recommended a number of management measures that would in one way or another control polar bear harvesting by the Inuvialuit and their neighbours.⁵² What this means is that early on, the nascent science and associated management of polar bears in the Canadian Arctic developed as an externally imposed set of discretionary judgments and restrictions, which were viewed by many Inuvialuit as a coercive stick entangled with government remote control over northern lives. Government policy may have been well intended, for the benefit of polar bears and northern peoples, but the perception of many Inuvialuit was radically different. Harington’s statement that “legislative policy in Canada concerning polar bears has stemmed from the desire to maintain the animals at a population level sufficient for optimum utilization by northern natives on a sustained yield basis” (ibid., 20) may have been well motivated, but the laws and policies it gave rise to were a source of friction and frustration for Inuvialuit.

With the introduction of polar bear harvest quotas in 1967–68, Inuvialuit and Inuit resorted to informal mechanisms to argue for changes to their quotas. Although the exact nature of such mechanisms is unknown, their existence is suggested by references to “pressure” in accounts such as the following:

Settlement quotas for the hunting of polar bears in Canada have gradually increased in the NWT from an initial total of 375 in 1967 to 604 in 1980, as a result of several factors: research results supported increases in Zones, A, H, E and F; political pressure from Inuit in areas where no research data were available led to special, retractable increases.... There is increasing political pressure to continue to increase polar bear quotas.... (Stirling et al. 1985: 90–91).

The establishment of quotas went hand-in-glove with the definition of “sub-populations” of polar bears, eight zones of which were created in Canada in the 1970s.⁵³ Inuvialuit harvested polar bears primarily in Zone “H,” which included all of Banks Island, western Victoria Island (including Wynniatt Bay), and the southern Beaufort Sea along the coast of the NWT and the Yukon North Slope (Stirling and Smith 1976: 64). In 1984, it was proposed to divide management zone “H” into “H-1” (South Beaufort) and “H-2” (North Beaufort) on the basis of mark-recapture and radio-tracking studies and the identification of a “single polar bear population along the mainland coast of the eastern (Canadian) and western (U.S.) Beaufort Sea” (Calvert et al. 1986: 8, 25). In the 1980s Inuvialuit and their sport-hunting clients started to harvest polar bears along the shores of Melville Island, which was located in Zone G. The management zones for polar bears in the ISR as of 2010 are depicted in Map A2.

Canadian government polar bear management efforts quickly evolved into an international co-management initiative involving the United States, Danish, Norwegian and Soviet governments, representing all of the circumpolar countries with polar bear populations (henceforth known as the Polar Bear Range States). International conservation initiatives started at the International Union for the Conservation of Nature, which by 1965 had listed the animal in its Red Data List out of concern for the future of the species (Government of United States 1966: 58). In September 1965, representatives of the range states met in Fairbanks, Alaska, to share scientific information concerning polar bear biology, abundance, distribution, and management in their parts of the Arctic, and to identify needs for future research and conservation policy development.⁵⁴ Participants and observers included numerous government wildlife biologists and wildlife managers, and a couple of representatives from big-game hunting NGOs, but no aboriginal people (ibid., 69–71).

Map A2. Polar bear management zones in the western Arctic when interviews were conducted in 2010

In the decade that followed the Fairbanks meeting, several initiatives were taken at the international level and/or by other countries with polar bear populations that further alienated the Inuvialuit and other Arctic peoples from decisions concerning human relations with polar bears. In 1968, following on a recommendation from C.R. Harington at the Fairbanks meeting, IUCN established the Polar Bear Specialist Group, “composed of scientists from each of the five ‘polar bear’ states” (Government of United States 1966: 58; Fikkan, Osherenko and Arikainen 1993: 100).⁵⁵ In 1972, the U.S. Congress passed the *Marine Mammal Protection Act*, prohibiting polar bear harvesting by everyone except “Alaska Natives” (ibid., 101). Non-aboriginal American hunters were thereby prohibited from importing their hides into the United States, which resulted in the elimination of the majority of Inuvialuit sport-hunting clients (Brower et al. 2002: 369).⁵⁶ The act was amended in 1994 to allow U.S. citizens to import sport-harvested polar bear trophies from Canada if they were “taken under quotas scientifically designed to ensure the maintenance of the affected population at a sustainable level” (Buck 2009: 87; see also Brower et al. 2002: 368, 369; Freeman and Foote 2009a: 245–246). However, the prohibition on importing polar bear products (hides, skulls, claws, etc.) was reinstated in 2008 when the U.S. government listed the bears as “threatened” under the *Endangered Species Act* (Lunn et al. 2010: 111).

Another important development at the international level was the 1973 Agreement on the Conservation of Polar Bears, signed by representatives of four of the five polar bear nations, and ratified by Canada late in 1974 (Fikkan, Osherenko and Arikainen 1993: 101). Harvesting polar bears was prohibited except “local people using traditional methods in the exercise of their traditional rights and in accordance with the laws of that Party; or ... wherever polar bears have or might have been subject to taking by traditional means by its nationals” (Stirling 2011: 321). Polar bears were to be managed in “accordance with sound conservation practices based on the best available scientific data” (ibid.). Once again, Inuvialuit and their neighbours had no direct participation in the deliberations that led to the signing of the agreement by Canada, and there is no evidence that any thought was given to using PBTK in devising conservation practices. However, in its fiduciary role, the government sought to protect aboriginal interests through the exception rule regarding “local people using traditional methods.” This enabled the Inuvialuit to continue hunting polar bears and to guide sport hunters, the latter with the mandatory use of “traditional” dog teams.

The lack of Inuvialuit involvement in decisions related to polar bears continued for another decade. It was not until the federal *Western Arctic (Inuvialuit) Claims Settlement Act* was enacted in 1984, following the signing of the IFA, that the non-aboriginal monopoly on decision-making changed. The Inuvialuit Game Council, Hunters and Trappers Committees, and the Wildlife Management Advisory Councils were created, establishing a formal co-management arrangement including Inuvialuit and the Canadian and territorial governments (see Staples 2012). Inuvialuit participation in decision-making with respect to polar bears increased exponentially. Inuvialuit are now an important part of all decisions related to polar bear quotas and management-related research, and participate actively in various processes. These include their co-management committees, meetings of the Federal-Provincial Administrative Committee for polar bear management, and the related Federal-Provincial Technical Committee for Polar Bear Research (Macpherson and Jonkel 1970: 14; Fikkan, Osherenko and Arikainen 1993: 100; Staples 2012). Inuvialuit have also participated in the Polar Bear Specialist Group of IUCN and the periodic deliberations of the signatories to CITES.

In 1988, the Inuvialuit Game Council and the North Slope Borough (NSB, Alaska Inupiat) signed the Polar Bear Management Agreement for the Southern Beaufort Sea; this created a Joint Commission with a Technical Advisory Committee (Brower et al. 2002: 364; Calvert et al. 1991: 3). The commission, which remains in place today, established its own harvest level guidelines for the shared Southern Beaufort polar bear population. They initially allocated 38 bears annually for the Inuvialuit and 38 bears annually for the Inupiat (Calvert et al. 1995: 69–70). Although the guidelines are recommendations to governments, they show the Inuvialuit and Inupiat to be proactive interveners in decisions that were formerly the sole prerogative of scientists and their governments. They also demonstrate the willingness of the Inuvialuit and Inupiat to combine scientific research findings with their own PBTK.⁵⁷

As noted previously, management of human relations with polar bears was only one of many topics discussed during the 2010 PBTK study interviews; this is why the transcripts are thinly populated with narratives related to it. Nonetheless, several TKHs spoke of management matters either directly or in relation to other topics. Government and co-management practices have been in place for so long now that Inuvialuit hunters have habituated to them, despite various irritants, and such practices are well integrated with harvesting and other activities that produce knowledge related to polar bears. This is evident in an Aklavik hunter's account of what he tells younger hunters to look for when they harvest a polar bear, and what he does with his tag kit when he harvests a bear himself.

I'll tell them to watch for... ear tags.... also lip tags. Right when you open its mouth there are tattoos ... a number there. That's when the scientific group ... get that down, jot that down. And when you harvest a polar bear or a grizzly bear — and generally it comes from the Hunters and Trappers Committee [the tag kit] — there's a little package there that you open up. You look at the package, and they want certain parts of the polar bear and the grizzly bear, like a chunk of fat. Is it a male? I take the penis bone for samples [and I note] how big the bear was, how big the paws were, that sort of thing.

PIN 19, AKLAVIK

The tag kit information and samples are provided to the GNWT for analysis and use in co-management decision-making processes.

The importance of the contemporary co-manage system to the Inuvialuit and the role they now play in setting quotas was touched on by a Tuktoyaktuk TKH.

Well, right now we are on a quota system, and we work very closely with the co-management board and the scientific people that come and do studies on the bear. We rely on that, and that is how we end up with the quota system we have now. So if anything, we were the first ones to tell proper authorities that bear numbers are going down, [that we have] got to cut back on the quota.

PIN 44, TUKTOYAKTUK

The same TKH clearly resents outsiders, whether they are members of NGOs or governments, who live in distant places without direct experience of the North, and who make decisions that affect Inuvialuit relationships with polar bears. Their interventions in trying to curtail sport-hunting and the international trade in polar bear parts are especially irksome given the fact that the Inuvialuit are actively engaged in a prudent co-management regime with their government, Inuit and Inupiat partners.

People are saying that the numbers [of polar bears] are drastically going to go down in the next ten years or so. But they are not the people going out there and seeing them bears. I think it is generally starting to be known that what we're telling scientists and the co-management board is basically what they should be doing. Not coming up with somebody from Ottawa saying we got to cut off the tags, [or that] we need to cut five polar bear tags because of global warming. People are saying there is going to be no more ice out there so we have to do something, and they are already trying to do that. But we're already feeling the effects of another country

*dictating what we can and cannot do with our [bear] populations — Americans. In my view, that should have never been done. We should still be able to take Americans out hunting because we are on the quota system. And we’re managing the [polar bear] populations.*⁵⁸

PIN 44, TUKTOYAKTUK

The 2008 U.S. prohibition on importing polar bear products hurt many Inuvialuit families financially and made it more difficult to sustain a range of harvesting and land-use activities given the increasing costs of fuel, snowmobiles and other equipment.⁵⁹ Furthermore, sport hunting helped to keep the Inuvialuit dog team tradition alive in a technological world where snowmobiles are an efficient and less troublesome form of transportation (see “Dogs and snowmobiles” in Section 2.3). This Paulatuk hunter mentioned how the requirement to use dog teams in the hunt enhances the experience for their sport-hunting clients.

[In] 1976, I think, I started using snowmachines. And then in '85, when we started sports hunting, we got back with the dog team because it was the policy. So we got back into the dog team.... Everybody should have an adventure. Being out there on a snowmachine, that's no adventure hunting a polar bear. Somebody wants to make the newspaper ... to hunt it traditionally, like we're doing with the dog team. That's the right way to go about it. These guys pay twenty to thirty thousand dollars; they're not just there to get the animal, they want to have an adventure.

PIN 163, PAULATUK

Another Paulatuk TKH described briefly the debut of sport hunting (Photo A1) in his community and its socio-economic significance in terms of financing the acquisition of harvesting equipment. The income from a single sport hunt is extremely important given the scarcity of well-paying employment in small communities.

Back in the '70s, when they first started the polar bear hunts, they found out they could make money off of it.... But it used to be only 1,500 dollars for a hunt. I remember the first one they got here was Japanese hunters, three of them.... When the bears started [there] was quota, we had 17. It's always been 17. They split that in half [between] sport hunting and subsistence. The first time they had the big hunt, holy smokes! 33,000 dollars and 27,000 dollars for a hunt. You were a millionaire.... [This was in the] '80s, '90s. You could buy out of one hunt ten years into the future.... a snowmachine, all the equipment you needed for hunting.... If you were a guide, you were one of the guys that made the money.... If you were a good guide like [one person I know], your name was out there, globally, for this area. They'd [sport hunters] know who to come to.

PIN 160, PAULATUK



Photo A1: Two Paulatuk hunters and their sport-hunting client.

Tony Green

Under the terms of the IFA and enabling legislation by the GNWT, the Hunters and Trappers Committees decide how to allocate the community polar bear tags. This explains the reference to splitting the 17-bear quota equally between sport and domestic hunting.⁶⁰

Inuvialuit perspectives on scientific research

Various discussions in the interview transcripts that relate to polar bear management issues and scientific research suggest that in recent times the Inuvialuit, their government co-management partners and members of the scientific community have had a productive but not problem-free relationship. Inuvialuit have gained a greater say in important decisions that affect their harvesting of polar bears and have acquired additional knowledge from the biologists and wildlife management agencies whose research informs co-management decisions. Moreover, Inuvialuit participate in many monitoring, contaminants, and population studies involving fish, seals, beluga whales, polar bears and other natural entities.

There are irritants in their relationships, however, and certainly some “baggage” left over from the pre-IFA days when scientists and wildlife managers enjoyed a monopoly over decision-making related to polar bears. One problem has to do with certain methods of scientific research that entail disturbing polar bears; for example, tranquilizing, tagging and collaring them; the Inuvialuit consider these practices unethical and disrespectful towards polar bears, as mentioned previously. Another issue relates to the failure of polar bear biologists to incorporate Inuvialuit PBTk in their research, and to acknowledge its contribution to our collective knowledge of polar bears. Furthermore, many TKHs exercise rational skepticism with respect to a number of biological research methods and findings related to changes in the abundance and condition of polar bears; if not with the findings, with the way they are presented in the mainstream media by various advocacy groups.

An Ulukhaktok TKH described how he interacts with biologists who pass through his community when doing polar bear surveys, and why their surveying strategy produces inaccurate results.

Last year [2012], I think, they were doing polar bear tagging, radio collaring. They were helicoptering. He [the biologist] was looking for polar bears for radio collaring and tagging. He was mostly going by the shorelines for denning areas, and he said there weren't very much bears. But when we go polar bear hunting out in the ice where he never flied before, there's lots of bears out there. We were taking all our bears from out on the ice, and he was telling us there's no polar bears [inaudible]. They were following the shorelines looking for dens [inaudible]. The ice was good. There was lots of pressure ridges for seal holes and that. We had a good year last year. Every time that helicopter comes in [inaudible], I go find out, ask them questions, see how the polar bear condition was. I asked them where they're flying. The place where they don't fly by, we go out hunting [inaudible] and catch our bears. We catch our bears, but there's no ear tags on them. They haven't been spotted before.... You can't find all the bears when you're flying. Because they're flying where they're looking for polar bear dens. Sometimes out on the ocean, it's hard to spot a polar bear. [inaudible] They miss a lot of polar bears; we know that. Even my father knows. I travel with him since I was just a little boy. I've been hunting all my life.

PIN 117, ULUKHAKTOK⁶¹

A Tuktoyaktuk TKH was critical of scientists, especially their students, who do not spend enough time in the Beaufort Sea region doing research. As a result the data they used to support propositions related to critical changes in abundance are inadequate.

We have scientist doing studies. But we have our Inuvialuit Game Council and we have our wildlife management boards. And that's the ones that look into stuff like that [re: monitoring changes in the populations]. And then we have scientists. I don't know how it really works, but they get scientists and they get studies. And [if] we think something is endangered, going down population, or something is happening, then they get scientists. But my thing is, they keep getting the university students. Those the ones that are just doing their practicum ... and getting their 12 or 20 hours in the field, and going back and writing up these reports. And then they're telling down south that there's no more polar bears up here. They were up here for one month out of 12 months. Something is wrong there. They're not getting the whole information. If you did a study like this and you live up here year-round, and you went out maybe once a week or twice a week, you'll see the differences, and then you'll have a report.... Nowadays they come out here and it gets too cold — “Oh, we'll come in March, when it's a little bit warmer.” Stuff like that.

PIN 42, TUKTOYAKTUK

This Sachs Harbour TKH explained that the Inuvialuit obtain polar bear population data from scientists. They compare this information with what they themselves observe while hunting and travelling on the ice.

[We] get the scientist to do the studies. But we haven't seen any sign of them [polar bears] dying off or whatever. You could probably see when you're out there [on the ice], if you see good sign of females with cubs, things like that.... But a lot of it is mainly from what

the scientists are telling us.... If you go out there to young ice, and if you go out there for quite a while and you're not seeing any bear sign, I'm sure you would be saying, "Okay, there's something going on here." That's when we call in our friends the biologists. I know where most of their radio collars are, so I know where they [the polar bears] should be.

PIN 135, SACHS HARBOUR

The same TKH noted that biological science is limited in its ability to thoroughly survey polar bears due to the restricted range of survey helicopters. However, other survey methods could be adopted, and the TKH thinks that biologists should listen more carefully to what the Inuvialuit propose. In the past, biologists refused to accept Inuvialuit PBTk concerning the presence of polar bears in pack ice. They changed their minds, however, when radio collar data supported the Inuvialuit position.

They should listen to the communities a bit more, the biologists, on where and how they are doing their studies. They're doing their studies right now, their population estimates, based on how they've always done them in the past. They're not really going to areas where any of our communities are telling them where they should go. They're saying that they can only fly out so far with a chopper for safety reasons. But there's other ways to do the studies. I think Viscount Melville [management zone] is one we're still looking at because Nunavut says they don't want darting.... because it's a shared population. We're going to have to look at if that's the only way.... But if there, we can get stuff from [PIN 114] and other guys from Cambridge [Bay], if they're able to do a really good count from the Skidoos, that might be something to look at.... They did one, I think, on South Hampton Island; CWS did a pilot project, I think, on South Hampton Island. They were using a fixed-wing survey.... That was a pilot project to see if it would work before they go into the other areas. So, I think doing some of their studies, they have to start listening to us, 'cause we've told them our parents have told us about bears being in pack ice, and for years they kept saying there are no bears in pack ice. Well, now the radio collars that they've done are showing the bears are all out in the pack ice. They kept saying the bears are all dying off and whatnot, there's no bears. Well, bears aren't dumb, they're going to follow the ice. They're not going to say, "Oh jeez, no more ice. I better jump in the water and drown."

PIN 135, SACHS HARBOUR

Another Sachs Harbour TKH spoke of the survey work he had done with one of the polar bear biologists and why he would like to see more of this kind of research in the future.

Last time I seen Dennis [Andriashek], he was up here, he was stuck in bad weather for ten days. So I worked for Dennis personally. I flew with him and tagged bears a few times. I am quite familiar with the operation.... Nobody's doing research on the bear too much anymore. We should do more. Like more collaring and stuff.⁶² I know they got some collars on the bears in the south but not too much in the north.... It would be interesting to see the migration routes.

PIN 134, SACHS HARBOUR

A Paulatuk TKH argued that biologists do not have adequate data on which to base their conclusions concerning trends in polar bear numbers and condition.

[What] I don't like about biologists is they don't have enough knowledge to determine if there is a decline in the polar bears. And there is not a decline in their health from what we have seen. I have a question for ENR [Environment and Natural Resources]. When they used to come here and talk about reducing the quota, for sport and subsistence [hunting]; they were going to reduce the quota. [But] I don't think you have enough study [research] to determine if we have a decline in our population. According to people that harvest the bear, the bears are healthy and have they done their studies like all four seasons to follow through, to see where they might migrate and how their health is... all four seasons, 'cause the only time they do their studies is when? The females are starting to [go into] heat and the ice is going to be pushing so the bears are going to be going more north towards Sachs Harbour and those areas. So it's very hard for them to do an estimate of the population. Because they travel such wide ranges. Like he [her spouse] said, his uncle had taken a bear that was tagged way west, so they travel lots. They won't just stay in that one area. I don't think even the caribou population counts there are accurate; they are estimated. And it puts a quota on us that's good for preservation, but at the same time, we feel like we are being pushed to one corner with all our wildlife. And if they can start to get accurate with the numbers and working with the traditional knowledge, taking that traditional knowledge and putting it in with the scientific research that they are doing, and then base a quota on the traditional knowledge.

PIN 150, PAULATUK

An Inuvik hunter described an occasion when he harvested a polar bear that had been badly bruised by a tranquilizer dart. The dart must have hurt the bear a great deal given the size of the bruise, which explains why the bear was stressed.

That bear that I got that was darted; I couldn't take none of the meat. Well, by right, you're not supposed to anyway, or it's supposed to have it so many months before everything [the drug] is out of it.... But I wanted to let you know that that had to have hurt to

bruise that big. I know it had to put the bear through lots of stress, too. I know you guys look at it when they're down and out, but I'm looking at the bear when it's dead. It's totally different when you look at it and you skin it.... It got hit right about back here in the middle of the back.... Right back here, and it was right from his rump to right up to just below its neck, red.... I was surprised. I should have took pictures of it. I was surprised how big. Wow! This bear, when I got it, it was pissed off. Usually you can turn the bear around if you want, drive up to it and turn it around; but he acted like a grizzly bear. You can't come near as close to a grizzly bear as a polar bear.... He'd only run so far and he was pissed off and he'd come after me; so, different.

PIN 3, INUVIK

Chasing polar bears with helicopters so that they can be tagged makes them “jumpy” according to another Inuvik-based TKH. Jumpy bears cannot hunt seals properly at their breathing holes.

When Stirling⁶³ was tagging polar bears, the elders was really against it, you know, because they say you chase it with a helicopter, it gets nervous; and after that, he can't hunt seals anymore. Like, when the seal is coming up from his hole, before he gets to the top, he just blows, and it's just like a whistle, eh. And the polar bear stands at the top edge, waiting for it; and when it blows, it jumps and scares the seal away. They get jumpy. Yeah, and that's what they were against, you know. But it didn't stop Stirling. He had to do his job.

PIN 100, INUVIK

A Tuktoyaktuk TKH said that tranquilizing polar bears with darts also makes them “get jumpy.” Jumpy bears get skinny and are forced to scavenge from other bears because they can no longer hunt seals properly.

When white man tranquilize that way, they're not there; they get jumpy. They don't hunt as good as they used to.... That's when they get skinny. They look for different kills when they can't hunt good anymore.... scavenging from other bears. They say a lot of them skinny ones, they been tranquilized and tagged.... I quit hunting before they start tagging so much, so I can't tell you. I used to kill a few, like a couple of collared ones; they were pretty skinny that time and their collars were rubbing. This must have been kinda a small bear when they collar it. They never caught it for so long, it get tight maybe, tagged or caught already.

PIN 33, TUKTOYAKTUK

Another hunter from the same community is obviously interested in what the biologists have to say with respect to polar bear numbers; however, he is concerned that collaring and tagging the bears may drive them away from the Tuktoyaktuk area. “The last few years I been kinda against that because I think that when they collar or tag the bears, they kinda move them away from the reach of the community” (PIN 161, Tuktoyaktuk).

A third Tuktoyaktuk hunter said they cannot eat the meat from polar bears that have been tranquilized.

If you judged a bear by its health, there is something wrong there, 'cause in all of the years that I have hunted bears, I have never, ever, once got a bear that was in such bad shape. What is doing the damage now are when they go and they tag a bear. If a guy gets that bear that has been tagged, he cannot consume the meat. You can make use of the hide, you can sell it, but you cannot consume the meat until about a year, year and a half after the drug has worn out. That's not done naturally; it is man-made.

PIN 44, TUKTOYAKTUK

An Aklavik TKH is concerned that using helicopters to conduct research during the warmer months of the year may be “hard on the bear.” Furthermore, collars may end up being too tight on the bear's neck and may chafe the animal's fur.

I really don't like how they use a helicopter when they do try and check for animals, eh. I think that's pretty hard on them. I've seen it with the grizzly bear. I used to work with a biologist doing grizzly bears and using chopper, and I don't think that's a good way because it's so hot there. Usually it's in the summer time or the late spring, and it's hard on the bear. They'll just keep running.... The collaring, too. I remember one time one of my uncles (I used to stay with him here quite a bit many years ago), I remember him getting a polar bear with a collar on it. I think it was a female.... And that collar was on really tight. I was glad he got that polar bear because... he didn't know it was a collared bear.... It was really tight. You couldn't even put your hand inside through the collar.... It wasn't in the greatest shape either.... That would be in the '80s.... And the fur was kind of rubbed, too, where the collar was. So, he didn't really get that great of a price for it. The fur was rubbed.

PIN 12, AKLAVIK

A Paulatuk TKH made a number of connections between net gunning⁶⁴ and/or tranquilizing caribou, polar bears and grizzly bears, and possible declines in their numbers, while at the same time arguing that any periodic declines in numbers are more likely due to natural cycles. Whatever the cause of such declines, darting and netting the animals stresses them. He is firmly opposed to such practices.

The thing that really irks me is the amount of studies that they're doing on these animals. You sit there and tell me that this doesn't put stress among the female caribou, the female polar bear. Maybe part of that is the big reason why the caribou aren't calving each year. It just irks me that year after year, they're darting polar bears there, darting caribou, doing studies on them, making them stressed, and then they come back and tell us the numbers are dwindling. I [share the opinion of our elders here]; leave the damn animals alone! Leave them alone. Our elders have for years seen dwindling numbers in caribou. This was years back; they seen numbers dwindling of caribou, but they've always recovered on their own. Same with the polar bears. There were times, given ice conditions and stuff, that polar bear numbers were small, and you hardly see any, but they knew it wasn't a reason to panic, because the generation before them told them that these are just natural cycles.... And a lot of people in this community, not only my community, but the surrounding communities, Holman [Ulukhaktok], Sachs, are really getting fed up with these government surveys. Not these surveys, but the darting of the grizzlies, the darting of the polar bears, the darting of the caribou, chasing them, throwing nets on them, catching them. We believe that's a big part of their numbers hurting.... Granted, with no sea ice and climate change, a polar bear is gonna have less area to hunt and find seals, I'm sure. But then again, don't dart them, and drug them up, and put them in a net every year to see how much fat they have, to see how much they've grown. It irks me; it bothers me to my core as an Inuvialuit. My opinion, and a lot of other people's opinion is, leave the damn animals alone. Let's see what nature does. History has proven that human intervention only causes more problems.... What was it they reintroduced, wolf in Wood Buffalo National Park, [or] was it one of the [other] parks? There was no buffalo and no more elk left.... Leave nature alone, because we've heard after generation and generation that this is a cycle.... My uncle went through, and my dad went through that cycle, where there was no animals, nothing. You could hardly see a seal in this bay... and there was a time where you couldn't get a caribou, you couldn't get a seal, fish was hard to come by, but they realized from their elders that this cycle happens.

PIN 159, PAULATUK

The positive side of the Inuvialuit relationship with biological science is the welcome return of information from science to the communities. However, the frequency of reporting by government, private sector and academic research scientists is inconsistent.

An Inuvik TKH learned that female bears may den on the ice from a biologist during one of his HTC meetings. *The last year I was with the hunters and trappers, we had a meeting about polar bear dens and things like this. That's the first time I ever heard of polar bears having a den out on the ice. I'd never heard that before.... The guy that was holding the meeting,⁶⁵ he said he travelled between Herschel and Garry Island, and he was pointing out where they seen bear dens.*

PIN 100, INUVIK

One Tuktoyaktuk hunter learned the age of a polar bear he harvested on the basis of scientific analysis of a tooth sample. *The oldest bear I got was 22 years old.... I used to have papers that the wildlife people used to send me [that said] how old they were, when they start to sample the tooth. We used to have to bring the tooth and then know how old it is.*

PIN 33, TUKTOYAKTUK

Another Tuktoyaktuk TKH was concerned that collaring or tagging polar bears may drive them from his area. However, his comments suggest that some Inuvialuit value scientific perspectives on polar bear abundance and health because they are useful for critical reflection.

I'm curious to know what the numbers are. They say the Southern Beaufort is declining; they say the Northern Beaufort is steady.... I know Nunavut side, they have quite a population. I'm curious to know what the numbers are in our area and if they have to collar them every year or tag them every year.

PIN 161, TUKTOYAKTUK

An Ulukhaktok TKH learned about the incredible distances that ringed seals can travel based on information from satellite collars that he and his colleagues had attached to them. In his words, “We used to put radio collars on them [seals]; and I've seen some seals travel, and they give us reports on a satellite. The seals just from here, they go all the way up towards Melville [Island]” (PIN 117, Ulukhaktok). The same TKH learned by way of a radio collar that a polar bear that he and his son harvested had travelled to the Victoria Island area from Alaska.

In '98 or '99 — not too long ago — me and my boy got two bears, a female and a cub. And it was radio-collared in Alaska, the one we got. After a month or so, it was dead, they said the transmitter was still on. He was in the deep freezer. He called back and asked me how come the transmitter is still good, and the polar bear is not moving, you know. You know, it must have been going off for a while, eh, the transmitter. So, it was still beeping.

PIN 117, ULUKHAKTOK

Another Ulukhaktok TKH spoke of sharing knowledge with a biologist and of the mutual support required while doing research, which can be extremely dangerous at times. His story about a close call with a charging male polar bear shows that constant vigilance while on the ice can be a matter of life or death for all members of the research team.

We seen some polar bears that had a bite from a male there. They're really yellow. But I showed [a biologist] how to cut it open a little bit to see if it's a bite, if it's from fighting. Because I seen bears with a big lump there. We couldn't figure out how that happened in our survey. But I tell you one thing, when you're doing a polar bear study, you better look around good, because one time we just about got caught from a big male. We were working on the female bear right beside the chopper. I forgot to look around. We put that polar bear to sleep, inside the rough ice, all around...about 10, 15 feet high, rough ice. And we're inside that place, and we're working on that female polar bear, and I looked — "Hey, there's a bear running towards us over there." Because the wind was coming from the west. We were on this side and that bear was running to us. That chopper pilot was sitting on the chopper. Luckily, he started it, but he didn't have the chance to warm it up to take off. But we got it up. We just left everything on the ice; all our instruments for checking bears, blood samples, needles, and everything. We just kind of took off really slowly because the chopper's still cold.... He started up and that bear was still coming. We were just about to lift off. He just missed the skis on the thing there... He just about touched it. If he ever grabbed that, we could have been gone.... Big male. Holy smoke, I was scared! I couldn't stop shaking for a long time.... One thing I want to remind whoever is going to do a polar bear study, make sure you look around every minute. If you don't look, boy, that bear could kill you. You wouldn't even have time to start the chopper.

PIN 125, ULUKHAKTOK

In this narrative, it is clear that the experiences of a pioneering scientist have entered the Inuvialuit oral tradition and inform their PBTk.

In 1953, [biologist] Tom Manning went [to Banks Island]. They flew him into De Salis Bay in '53. He went right around Banks Land. It took him two years. One year it took him from De Salis to Mercy Bay. He said he camped there, and when he woke up, there wasn't even enough water to put his boat in. The ice had come in. So, he walked lengthwise to Sachs. And Fred Carpenter, right away, he asked him if he seen any sign of animals around here. He said nothing but wolves, caribous and rabbits; that's all he seen. No signs of muskox.... No sign [of polar bears either]. But he said when he got past Gore Islands, around there, he had to go close to shore. He had to have his ears and eyes open all the time, there was so much polar bears. He was scared that they might jump from the icebergs and get him. He said one time there was a big iceberg with a few polar bear above them. After that, they said they don't get too close to the iceberg. If they've got room, they stay away from them. But he said sometimes they've got not much room; they have to go close to the iceberg. I wonder if he wrote the book about Banks Land, because it would have been really interesting, because he went all the way around Banks Land with a five-horse kicker and a 22-foot canoe, and that's not travelling very fast.

PIN 100, INUVIK

A Sachs Harbour hunter knew of scientific theories related to the evolutionary separation of grizzly bears and polar bears. However, he was not entirely convinced of the historical relationship. He was asked how polar bears are going to learn to adapt to the changes in the ice:

Some will learn to adapt, to live on the land. There are going to be a great many that perish, too. There will probably be a lot more that perish than the ones that learn to adapt. The scientists say that the polar bear evolved from a grizzly bear. I am not sure how true that is, but if that is the case, then it can reverse back itself. Sometimes these scientists, some of them anyway, can be a little bit nutty. Some of the theories really don't make sense.

PIN 138, SACHS HARBOUR

A Paulatuk TKH situated this study and Inuvialuit PBTk in general in relation to the knowledge generated by biologists. In his view, Inuvialuit knowledge and experience have not supported the findings of the biologists with respect to polar bear abundance in the Southern Beaufort area. Moreover, there is a great urgency to documenting PBTk, given the passing of their elder generation and the lack of studies other than the PBTk study:

[We] don't have any other research project going on for polar bears, other than, I think it was in 2005 that Ian Stirling did the last bear count.... He tagged 45 bears. And that was a big number at that time; 45 bears was a big number. But now they say we're losing bears, not noticeable, but we're losing bears, so they're cutting our quota down from the Southern Beaufort quota...coming down to 70.... We're saying that it's not noticeable, because we're out there every year, and we see the amount of bears that are still out there. We know there are bears out there. The scientists say we're losing bears, but we don't notice it. Such as in the east, the communities say they don't notice. They actually notice an increase in bears. But the scientists say different. I guess that's why this [PBTk study] came about, this traditional knowledge on polar bears came about. I'm sitting on the Game Council for the last year and a half, and before that on PCC [Paulatuk Community Corporation] and other committees. And I've seen a push on traditional knowledge, greater than in the past. Even the science community, they're relying more on traditional knowledge now than they did

in the past. This is what I like about traditional knowledge. Before we lose any of the significant parts of our community, like our elders, 'cause we're down to very few of our elders that actually know traditional knowledge of this area.... We're making a push to traditional knowledge because once they're gone, this is what we're going to have left.

PIN 160, PAULATUK

While implicitly recognizing the value of scientific understandings of polar bears, this Tuktoyaktuk TKH said that Inuvialuit PBTk has been marginalized in high-level decision-making processes. He thinks that a meeting of the minds is required at all levels that includes both Inuvialuit TK and scientific knowledge.

Inuvialuit have been trying to bridge the gap for a long time. The co-management boards have the spirit of it, bringing in the scientific [and the] traditional knowledge, and sitting on the boards and going over the management of the habitat and the management of wildlife.... But there's still that gap between what's going to decision-makers all of the time. At the top level, the scientific knowledge is more recognized.... There should be two documents going to decision-makers; one is the scientific knowledge and one is the traditional knowledge. Both should be treated equally as information to any decision-maker. Not just the scientific document that has only a little over a hundred years of documentation.... There should be a real evaluation done on putting our minds together.

PIN 43, TUKTOYAKTOK

Appendix 6. Brief chronology of polar bear management in the ISR

This a brief chronology of the evolution of state polar bear management as it affects the Inuvialuit.⁶⁶

- 1949 Northwest Territories Council prohibits polar bear hunting by holders of a General Hunting Licence (including aboriginal people) between June 1 and September 30 (Government of Canada 1950, Schedule D, p.97; see also Fikkan, Osherenko and Arikainen 1993: 99).
- 1965 The Canadian delegation (Canadian Wildlife Service) reports to the First International Scientific Meeting on the Polar Bear at Fairbanks, Alaska that “Northwest Territories legislation prohibits killing of cubs under 1 year of age, or females accompanied by cubs under 1 year of age” (Government of the United States 1966: 9).
- 1967–68 GNWT sets the first quotas on the number of bears that could be killed by each community in the NWT (Kwaterowsky 1967; Schweinsburg 1981; see also Brower et al. 2002: 363; and Fikkan, Osherenko and Arikainen 1993: 104). Quotas for Inuvialuit communities were Cape Parry (5), Holman Island (12), Sachs Harbour (18) and Tuktoyaktuk (12) (Kwaterowsky 1967).
- 1968 IUCN establishes the Polar Bear Specialist Group “composed of scientists from each of the five ‘polar bear’ states” (Fikkan, Osherenko and Arikainen 1993: 100).
- 1969 Canada establishes the Federal-Provincial Administrative Committee for polar bear management (Macpherson and Jonkel 1970: 14).
- 1970 Canada establishes the Federal-Provincial Technical Committee for Polar Bear Research (Macpherson and Jonkel 1970: 14; Fikkan, Osherenko and Arikainen 1993: 100). Henceforth, “The polar bear quotas by jurisdiction are based on recommendations by the Federal-Provincial [Technical and Administrative] Committees” (Stirling and Calvert 1985: 99).
- late 1960s–1970s Mark-recapture methods are employed by polar bear biologists to acquire data for management purposes, particularly for setting quotas (Jonkel 1970: 8).⁶⁷ The concept of “maximum sustainable yield” becomes the foundation of management philosophy (see Brower et al. 2002: 365). Other research/management tools are adopted over time, including aerial surveys, radio and satellite telemetry, genetic analysis, and mathematical/statistical modeling.
- 1970s Polar bear “populations” are defined and a management zone system is implemented. Eight zones are created in Canada (ten if the division of zone A into three sub-units is considered). The entire western Arctic area — including all of Banks Island and western Victoria Island, but not Melville Island — is delineated as Zone H (Stirling and Smith 1976: 64). Quotas are established for Melville Island and Hadley Bay.
- 1970 Native-guided polar bear sport hunt in Canada is authorized (Fikkan, Osherenko and Arikainen 1993: 100; Macpherson and Jonkel 1970: 14).
- 1970 GNWT introduces an ordinance permanently banning the use of set-guns to harvest polar bears. At this point, however, set-gun hunting had already been “discontinued for several years in Canada” (Macpherson and Jonkel 1970: 14).
- 1972 The U.S. Congress passes the *Marine Mammal Protection Act*, which prohibits polar bear harvesting by everyone except “Alaska Natives” (Fikkan, Osherenko and Arikainen 1993: 101). American hunters are thereby prohibited from importing polar bear hides into the United States. This eliminated the majority of the Inuvialuit’s sport-hunting clients (Brower et al. 2002: 369).
- ca. 1972 The Government of Yukon Territory adopts metal seals for marking polar bear hides. Native families resident on the Yukon coast, or with a tradition of hunting there, are permitted by the Government to take two polar bears per family per year (Stirling and Macpherson 1972: 54). Females and cubs are “protected,” hunting season is established for 1 October to 31 May, and bears in dens are protected.

- 1973 The Agreement on the Conservation of Polar Bears is signed by representatives of four of five polar bear nations. It is ratified by Canada on 16 December 1974 (Fikkan, Osherenko and Arikainen 1993: 101). Harvesting polar bears is prohibited except “local people using traditional methods in the exercise of their traditional rights and in accordance with the laws of that Party; or... wherever polar bears have or might have been subject to taking by traditional means by its nationals” (Stirling 2011: 321). Polar bears are to be managed in “accordance with sound conservation practices based on the best available scientific data” (ibid.).
- 1973 Canada signs the Convention on International Trade in Endangered Species.
- 1974 With the ratification of CITES by Canada, provincial and territorial export permits are required for the export from Canada of any polar bear part or product (Stirling and Smith 1976: 65; Freeman and Foote 2009a: 245–246).
- 1979 The red tag system is introduced by the government of the NWT: increases in existing quotas are permitted in management zones where biological data supported such increases. Red tag quotas could be withdrawn if polar bears “were being overharvested” (Stirling and Calvert 1985: 106–107). Jaw return from all harvested bears is mandatory “in order to monitor the kill and detect if bears were being overharvested” (ibid.).
- 1984 The federal *Western Arctic (Inuvialuit) Claims Settlement Act* is enacted following the signing of the Inuvialuit Final Agreement in 1984. The Inuvialuit Game Council, Hunters and Trappers Committees, and the Wildlife Management Advisory Councils are created, establishing a formal co-management arrangement that includes Inuvialuit and the Canadian and territorial governments.⁶⁸
- 1984 The Melville Island quota of 12 is permanently assigned to the Western Arctic and shared between Sachs Harbour and Holman [Ulukhaktok] (Calvert et al. 1986: 25).
- 1984 Beaufort Sea polar bear management Zone H is divided into H-1 (South Beaufort) and H-2 (North Beaufort) on the basis of mark-recapture and radio-tracking studies. A “single polar bear population along the mainland coast of the eastern (Canadian) and western (U.S.) Beaufort Sea” is identified (Calvert et al. 1986: 8, 25). Zone E-1 is Viscount Melville.
- 1984 The Government of Yukon has six quota tags, but loans five to the Government of NWT for distribution through the Aklavik Hunters and Trappers Association (Calvert et al. 1986: 28).
- 1985 All special red tags are converted to regular silver tags within the ISR at the request of the Inuvialuit Game Council “as they felt they did not need artificial incentives to provide complete hunter kill information on polar bears” (Calvert et al. 1991: 4).
- 1988 The Inuvialuit Game Council and the North Slope Borough (Alaska Inupiat) sign the Polar Bear Management Agreement for the Southern Beaufort Sea. The Inuvialuit-Inupiat Joint Commission is created, with a Technical Advisory Committee appointed by the commission (Brower et al. 2002: 364; Calvert et al. 1991: 3). Guideline harvest levels are established: 38 polar bears annually for the Inuvialuit and 38 bears annually for the Inupiat (Calvert et al. 1995: 69–70).
- 1991 The HTC of communities that hunt polar bears from each of the Southern Beaufort Sea (SB), Northern Beaufort Sea (NB) and Viscount-Melville Sound (VM) populations sign management agreements. “All human-caused mortalities must be included in the quota. As laid out in the IFA, these agreements were implemented through the creation of HTC polar bear bylaws that are enforceable under the Wildlife Ordinance of the Northwest Territories” (Brower et al. 2002: 365; 366).⁶⁹ Polar bear baculum must be submitted to GNWT as proof of sex. If proof of sex is not provided, a polar bear is considered female for quota purposes (Brower et al. 2002: 366).
- ca. 1992 Inuvialuit/Inuit and their Traditional Knowledge are increasingly involved in polar bear research and management (Calvert et al. 1995: 66).⁷⁰

- 1993 HTC of two communities (one within the ISR) that hunt polar bears from the Viscount-Melville Sound population sign an amended management agreement that includes a five-year harvest moratorium.⁷¹
- 1994 The U.S. *Marine Mammal Protection Act* is amended. U.S. citizens may obtain permits to import sport-harvested polar bears from Canada if they are taken under quotas scientifically designed to ensure the maintenance of the affected population at a sustainable level. Imports from seven Canadian polar bear populations are permitted (Brower et al. 2002: 368, 369; Buck 2009: 87; Freeman and Foote 2009a: 245–246).
- 1999 Nunavut Territory and Nunavut Government come into existence. This results in shared management jurisdiction for the Northern Beaufort and Viscount-Melville Sound sub-populations (www.itk.ca/historical-event/nunavut-land-claims-act-nunavut-act-passed-parliament-canada; accessed October 22, 2013).
- 2006 The Inuvialuit Game Council and Kitikmeot Hunters and Trappers' Association sign the Polar Bear Management Agreement for the North Beaufort Sea and Viscount-Melville Sound Polar Bear Populations (Lunn et al. 2010: 104).
- 2008 Polar bears are listed as “threatened” under the U.S. *Endangered Species Act*. Importation of polar bear trophies (hides, skulls, claws, etc.) is prohibited (Lunn et al. 2010: 111).
- 2011 The Inuvialuit-Inupiat Joint Commission established in 1988 recommends a decrease in the polar bear harvest quota to 70 polar bears annually, 35 each for the Inuvialuit and Inupiat communities (correspondence: Inuvialuit Game Council to Wildlife Management Advisory Councils, NWT and NS, September 1, 2010).
- 2011 Wildlife Management Advisory Councils, NWT and NS, recommend a boundary change for Southern Beaufort and Northern Beaufort Sea Polar Bear sub-populations (correspondence: Wildlife Management Advisory Councils, NWT and NS, to responsible federal and territorial ministers, July 7, 2011).

Endnotes to appendices

1. A graduate student at the University of Alberta (Department of Resource Economics and Environmental Sociology), Slavik conducted thesis-related PBTK research in Sachs Harbour in the period March–May 2009, and a community-based workshop concerning PBTK in Tuktoyaktuk in October 2009. “The workshop included two focus group discussions and a mapping exercise” with “elders and hunters from four of the six communities in the Inuvialuit Settlement Region” (Slavik 2010: 63).
2. See File — “Final_Polar Bear Instrument Feb 11_2010_option 2.doc”
3. The map biography component refers to a method of documenting spatial components of PBTK (e.g., maternity den locations). It is explained at greater length in Appendix 2.
4. The graphics were taken from a “Polar Bear Score Card: A Standardized Fatness Index” produced by World Wildlife Fund (“score card 10-8.pdf”).
5. D. Slavik told P. Armitage 9 December 2011 that he “didn’t need to use the photo prompts too much.”
6. It appears from the transcripts that this denning diagram was rarely used during the interviews.
7. This amounts to 25 maps. It appears from the transcripts that these were rarely used during the interviews.
8. Ronald Lowe. 1984. Siglit Inuvialuit Uqausiita Kipuktirutait - Basic Siglit Inuvialuit Eskimo Dictionary. Inuvik: Committee for Original Peoples Entitlement.
9. See www.docs.sony.com/release/ICDSX57.pdf (accessed 27 May 2013).
10. This was probably the Canon EOS 5D Mark II. Slavik had to monitor the camera continuously because it has only 12 minutes of recording time when set to 16, 9 HD (1920x1080). “Movie clips can be up to 4 GB in size, approximately 12 minutes of 16, 9 HD (1920x1080)” (http://en.wikipedia.org/wiki/Canon_EOS_5D_Mark_II, accessed 27 May 2013). There are small gaps in the interview recordings because of this; breaks between the 12-minute cut-off and when Slavik restarted the recording (Dan Slavik pers. comm. to Peter Armitage, 8 December 2011).
11. Translation was provided during interviews with those TKHs with asterisks beside their PIN numbers.
12. Translation was provided during the interview with the TKH with the asterisk beside the PIN number.
13. Version 9 of NVivo was used for this project. Produced by QSR International, NVivo was formerly known as NUD*IST.
14. See <http://en.wikipedia.org/wiki/NVivo> (accessed 27 May 2013). More detailed information about the software is available on QSR International’s website (www.qsrinternational.com/products_nvivo.aspx, accessed 27 May 2013).
15. The first version of these coding/node categories excluded changes in Inuvialuit behaviour or beliefs as a result of government management actions in relation to polar bears. However, the key issue is whether Inuvialuit can no longer harvest polar bears, whether due to climate change, decreased abundance, changes in distribution, reductions in harvest quotas or some other reason.
16. “Travel routes” that were initially coded separately were merged with “land use.” References to travel routes provide information regarding ice conditions, and how this may have changed over time. Informants also encounter and observe polar bears and other animals while travelling.
17. The coding (and questionnaire) category “hunt” is all-encompassing: it includes where Inuvialuit looked for polar bears, tracked them, scanned the horizon for using binoculars, etc., but not necessarily information related exclusively to a kill.
18. The term “management” as applied to Inuvialuit relations with animals such as polar bears may be anthropocentric and ethnocentric but it is an integral part of the interview questionnaire (questions 10-1 to 10-7) and is a term widely used today, denoting both common and distinct Inuvialuit and non-Inuvialuit approaches to how relationships between humans and wildlife are organized. For a brief critique of western/state wildlife management ideology and its language, see Spak (2005: 235). Note also that the concept of management as applied to non-industrial peoples is complex. The myriad human relations and beliefs among non-industrial peoples that shaped land tenure, harvesting animals, and access to resources cannot easily be compared to the management systems of industrialized peoples. See Spak 2005.

19. This includes matters related to the sentience and personhood of polar bears and the customs, practices and beliefs related to respect for polar bears, and other animals, etc.
20. This is a leading question that shows a western conservation bias. It may be that there is no traditional Inuvialuit concept of killing “too much,” especially if all polar bears are “given” to the hunter by the other-than-human being(s) responsible for the bear, and if it therefore would be disrespectful not to kill the bear.
21. Since assessments of polar bear “health” could well be conflated with “condition,” queries used both of these variables simultaneously.
22. Discourses related to changes to ice in the Mackenzie Delta were coded under this node as well.
23. Discourses related to changes to ice freeze-up and break-up in the Mackenzie Delta were coded under this node as well.
24. The code used in the initial coding list, “Climate change [CLIMATE],” was merged with “Weather” and then deleted. “Weather” and “climate” are probably not distinct categories in the Inuvialuit way of thinking. The reason “environment” was added to the definition is to capture changes to animals other than polar bears, changes to land forms because of erosion and other “natural” factors.
25. Poor weather prevented travel to Sachs Harbour in the period 8–10 October (three attempts), and Paulatuk meetings had to be postponed due to an elder’s death. These required adjustments to the meeting/workshop schedule and extension of the confirmation tour by five days.
26. Posters were sent to HTC staff in each ISR community.
27. Tobias recommends review of thematic maps by small groups of people related by kinship (2009: 319–320). “[P]ublic meetings in combination with verification feedback from individual sessions is (sic) still being used by regional-scale map surveys.... Large public meetings are not by themselves adequate for verification. Instead of holding one large meeting to review provisional thematic maps, it is better to hold a series of small group meetings if possible.”
28. Nadasy’s critique of the compartmentalization of TK (TEK) invites a reflection on the way that Inuvialuit PBTk has been documented and the uses to which it will be put. “The imperative of incorporating TEK into the state management system has caused researchers to focus on extracting from communities only that kind of information which can be expressed in a few very specific ways — that is, in forms that can be utilized within the institutional framework of scientific resource management, such as numbers and lines on maps contained in reports, books, and other written documents — and then to interpret it in a manner consistent with the assumptions of scientific wildlife management” (1999: 9). The Inuvialuit PBTk study explicitly acknowledges the purposes to which it is directed, the assumptions it makes, and the consequences of both in conveying and understanding Inuvialuit knowledge.
29. The term “population” was embedded in the following interview questions from the questionnaire: “How do the Inuvialuit monitor change in the polar bear population? What are the types of things that you look for to know that the population is doing well?” Note also its use in this supplementary question: “Do you keep in touch with other communities about how their polar bear populations are doing, what they’re seeing with polar bears?” A number of unilingual English-speaking interviewees used the term to refer to polar bears in the aggregate and to the “population” they hunt. These linguistic practices are frequently confounded by the interchangeable use of the terms “population” and “sub-population” by wildlife managers and researchers, even though their meanings are formally distinct.
30. There are other ways to obtain information when doing social science research; for example, through participant observation, where the researcher studies behaviour and cultural forms through observation and doing as well as by listening to conversation, not by systematically asking people questions.
31. Interviewer questions were replaced with three or four periods as in “.... “ which is the standard protocol for elision in formal English writing. Other protocols were also adopted in order to improve the readability and coherence of some narratives, e.g., use of square brackets [] to insert additional text.
32. These include two documents prepared by Stephen Kilburn - PBTkDEN2008 Digital Data Creation Methodology and PBTk2010 Digital Data Creation Methodology.
33. Otherwise known as a “geographical grid,” a graticule is a coarse network of lines superimposed on a map representing latitude (parallels) and longitude (meridians).

34. Rubbersheeting is a mathematical process through which digital images are adjusted (stretched and distorted) to make them conform to a geographic coordinate system (often a particular map projection and datum). In this study, this allowed information marked on the original paper maps (converted into digital images) to be placed in geographic space.
35. In semi-structured interviews, the “interviewer is prepared with a list of questions and topics to be discussed. However, the order of the questions and topics is undefined. It depends on the flow of the discussion” (<http://apps.who.int/medicinedocs/en/d/Js6169e/5.4.html>). In contrast, with semi-directive interviews, “the participant or participants are guided in the discussions by the interviewer, but the direction and scope of the interview are allowed to follow the associations identified by the participant. There is no fixed questionnaire, nor is there a preset limit on the time for discussions, although a list of topics may be a useful reference, helping the interviewer cover important areas while allowing the participants to add or skip topics depending on their interest and expertise” (Huntington 1998: 238).
36. This is not a comprehensive list of questions. They have been excerpted from a comprehensive list of such questions that were tracked using NVivo coding methods.
37. Note the use of the polar bear condition diagram during the interviews. Slavik explains, “I’m interested in knowing where you saw bears, if you can recall the number of bears that you saw at that time, and then, the condition of the bears; and one thing which they’re starting to implement in terms of bear harvesting is they’re starting to give these diagrams, so people can rate the condition of the bear when they see it. So, for example, this is put out by Polar Bear International [World Wildlife Fund], and it rates polar bears from one to five, based on their health and appearance. So, as you’ll see, one is a skinny bear.... Would you consider that a skinny bear? Would this be an average-looking bear?” (interview with PIN 3, Inuvik).
38. Very few TKHs reported having seen evidence of polar bears eating their own kind. The question as to whether there had been any changes in the frequency of this phenomenon was not asked during the interviews.
39. Very few TKHs had much to say about polar bear mortality not related to harvesting. The question as to whether there had been any changes in mortality was not asked during the interviews.
40. Some of these are leading questions and have a scientific management/conservation bias.
41. The precise date when this ban came into effect is unclear. However, in 1965 the Canadian delegation (Canadian Wildlife Service) reported to the First International Scientific Meeting on the Polar Bear at Fairbanks, Alaska that “Northwest Territories legislation prohibits killing of cubs under 1 year of age, or females accompanied by cubs under 1 year of age” (Government of the United States 1966: 9).
42. The PBTK study was not designed to obtain quantitative historical data on polar bear harvests, and any attempt to do so would be fraught with serious methodological difficulties that would likely produce highly inaccurate results. Furthermore, no one is in a position to say whether Inuvialuit harvests during the 1950s and 1960s constituted “over-harvests” or were unsustainable in the contemporary biological meaning of the term. One reason for this is that biologists had not yet defined “sub-populations” of polar bears or generated estimates of abundance for each sub-population. CWS biologist Alan Loughrey noted in 1956, for example, that “[n]o census has been made of the polar bear population and indeed the general movements of the animals within their range are poorly known. At present it is not possible to determine whether the population is being under or over harvested” (1956: 238; see also Stirling 1986: 168). Thus, “over-harvesting” can be determined in scientific terms only if one knows the total annual harvest in relation to estimated numbers for a given sub-population as well as the gender of the harvested animals. The PBTK study interview question dealing with this topic is a leading one because it presumes that the concept of “killing too many bears” was culturally relevant to the Inuvialuit. The original interview question reads, “Are there traditional ways to make sure people don’t kill too many bears?” During the interviews, it was reformulated as, “Were there ways to make sure that people didn’t harvest too many bears, in the old days?” and “Were there traditional ways to make sure people did not over-harvest bears?”
43. For more information about the trading post at Utqaluk see Hart 2011: 86–90. “The land on which the post stood eroded away over the years, and in 1939 the post was moved to Maitland Point” (ibid.).
44. Anthropologist Adrian Tanner has given some thought to the “management” issue: “Part of the problem as I see it is with this word ‘management,’ regardless of whether you bring an indigenous or a scientific biology perspective to the issue. The concept of the management of wildlife by humans is questionable. Some species under some conditions are better candidates for effective planning than are others, but in no case I can think

- of is it possible to fully ‘manage’ a wildlife population. I acknowledge that the scientific ‘managers’ use this language, but it can be shown from within their own parameters of understanding that ‘management’ is a fantasy, a collective delusion. Planning, however, and in some circumstances, the management of human interventions, is what both groups try to do. Unpacking the biologists’ concept of ‘management’ might go some way to opening the needed dialogue” (Adrian Tanner, pers. comm. to Peter Armitage, 17 October 2013; see also Freeman and Foote 2009b: 1). See also polar bear biologist Andrew Derocher’s statement that “[w]ildlife management is 90% human management, and many, if not most, of those humans are local people” (2012: 201).
45. As Campbell notes, “[t]he language of respect should not be misconstrued to be an affirmation of Western hunting ethics” (2004: 164).
 46. In aboriginal worldviews, “[a]nimals as persons are not soulless machines; animals are active agents. Animals are full of subjectivity, awareness and social relations, and they respond to and convey meaning through their actions” (Feit 2004: 104).
 47. With respect to leaving some of the polar bear meat for foxes and wolves, note Campbell’s point that, “what naturalists and biologists conceive of as waste may be understood as sharing, or something altogether different” (2004: 164).
 48. According to Alunik, Kolausok and Morrison (2003: 25), “[t]he strict division of land and sea observed by central Arctic Inuit had its reflection in rules which forbade the sewing of caribou skins when an unbutchered seal was in the house, and vice versa.”
 49. Fienup-Riordan notes that among the Yup’ik, “[m]any contemporary elders still view animals as active, ethical beings who respond to human thought and deed.... Animals view compassionate and restrained humans as desirable, even pitiable, and approach them.... The hypersensitivity of animals — their ability to see and hear what occurs in the human world — must always be taken into account” (2007: 249 and 251; see also Wenzel 1991: 134–141).
 50. See the Recommendations of the Meeting of the Inuvialuit-Inupiat Commissioners to the Inuvialuit-Inupiat Polar Bear Agreement in the Southern Beaufort Sea, Tuktoyaktuk, 2–3 August 2011.
 51. The exact date when these prohibitions came into effect could not be determined, but the ban on killing females and young cubs was in place by 1961. That is when CWS biologist C.R. Harington reported that “[e]xisting legislation also prohibits the killing of females accompanied by cubs under one year of age, and forbids the taking of cubs under one year of age in the District of Keewatin and the District of Franklin (excepting Banks and Victoria Islands).... Trapping, a non-selective method of catching animals, could result in destruction of cubs, and females with cubs in contravention of the Northwest Territories Game Ordinance” (1961: 13).
 52. See Harington’s suggestion in 1961 concerning a closed season for hunting. “The greatest part of the Canadian white bear kill occurs between February and June, there being a minor peak in late autumn or early winter. According to the best evidence available, perhaps 70 per cent of the total annual kill falls between March and May. A closed season during this period could be an effective means of protecting bears in the Northwest Territories” (1961: 18). Harington was one of two Canadian delegates to the First International Scientific Meeting on the Polar Bear at Fairbanks, Alaska (Government of the United States 1966: 69).
 53. Ten zones were created if the division of zone A into three subunits is included in the count. Management zones were established by the Federal-Provincial Polar Bear Technical Committee, which had no participation by Inuvialuit or Inuit peoples.
 54. U.S. Senators Stewart L. Udall and E.L. Bartlett called “an international conference of Arctic Nations to pool scientific knowledge on the polar bear and to develop recommendations for future courses of action to benefit this resource of the Arctic region” (Government of the United States 1966: 67).
 55. Harington switched his Canadian government CWS hat for an IUCN one during the meeting. He presented IUCN’s submission, which proposed that the organization “publish a yearly international polar bear data sheet. This data sheet could include basic information on total kill, sex and age composition of kill, size of bears harvested, kill chronology, changes in polar bear legislation, in addition to brief notes on general progress on critical problems in research and management” (Government of the United States 1966, 58). The IUCN website states that “[c]oncern for the future welfare of the polar bear brought together a small group of leading

- Arctic scientists at IUCN headquarters, Morges, Switzerland, during the last three days of January 1968” (http://pbsg.npolar.no/en/meetings/stories/01st_meeting.html, accessed 11 November 2013).
56. The Canadian government had authorized a “native-guided” polar bear sport hunt in 1970 (Fikkan, Osherenko and Arikainen 1993: 100; Macpherson and Jonkel 1970: 14).
 57. According to Brower et al. (2002: 369), “[t]he existence of a signed management agreement between parties that share a polar bear population was identified as important to demonstrate that the conditions specified by the [U.S. Marine Mammal Protection] Act were being met. Such agreements describe the allocation of the sustainable quota to each party and other conservation measures, such as harvest seasons, sex ratio of the harvest, and protection of females and cubs. Thus, in part, the existence of this Agreement helped to qualify the southern Beaufort Sea polar bear population for importation of hides taken by guided American hunters. The foresight of the IGC and the NSB to develop a formal agreement, as part of their joint initiative to ensure the southern Beaufort Sea polar bear population did not become overharvested, was rewarded when this population was approved for importation.”
 58. This TKH uses the language of scientific wildlife managers when he says “we’re managing the populations.”
 59. See Slavik (2009) for an analysis of sport hunter demographics and the economic importance of sport hunting to the Inuvialuit. Slavik notes that “without the ability to bring back polar bear trophies to their homes in the United States, hunters’ interest in participating fell sharply. These findings suggest that American hunters would be unwilling to return a second time to hunt for polar bears in the NWT if they were unable to import the trophy back into the United States. This is troubling news for the sports hunting economy, which, in 2007, generated an average revenue of \$37,670 per hunt...with a large proportion of this revenue remaining within the four Inuvialuit communities that staged the hunts” (Slavik 2009: 76).
 60. Starting in 1991, Hunters and Trappers Committees of communities that hunt polar bears from each of the Southern Beaufort Sea (SB), Northern Beaufort Sea (NB) and Viscount-Melville Sound (VM) populations signed management agreements. “All human caused mortalities were included in the quota. As laid out in the IFA, these agreements were implemented through the creation of HTC polar bear bylaws that are enforceable under the Wildlife Ordinance of the Northwest Territories” (Brower et al. 2002: 365, 366).
 61. This was recorded at the Polar Bear Environmental Change workshop, 29 January 2013.
 62. Other Inuvialuit say this practice is unethical and disrespectful towards polar bears.
 63. This is polar bear biologist, Ian Stirling.
 64. Netgunning refers to a method of capturing polar bears, caribou and other animals by firing a net from a special gun, usually operated by a biologist or technician in a helicopter. The net engulfs and immobilizes the animal, allowing researchers to tag, tattoo, measure, weigh and obtain other information concerning it.
 65. This was probably Evan Richardson, Environment Canada polar bear biologist.
 66. See also Freeman and Foote’s chronology of significant events in international polar bear governance (2009a: 245–246).
 67. See <http://pbsg.npolar.no/en/methods/markrecap.html>.
 68. See www.inuvialuitland.com/resources/Inuvialuit_Final_Agreement.pdf.
 69. See also www.justice.gov.nt.ca/Legislation/search2.asp?Parameter=Inuvialuit+settlement+region&btnSearch=Search&Option=All&DBTable=LegReg&Page=1.
 70. The manner in which PBTk is used in polar bear research and management is not clear.
 71. See the Management Agreement for Polar Bears in Population E-1: An Agreement Between the Hunters’ and Trappers’ Committee of Holman and the Hunters’ and Trappers’ Association of Cambridge Bay, 6 July 1993.

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The Polar Bear Traditional Knowledge documented in this report is that of the Inuvialuit (“the real people”) who occupy Canada’s western Arctic. The lands that comprise this vast territory fringe the Beaufort Sea and Arctic Ocean and meet Alaska in the west and Nunavut in the east.

Observing and harvesting animals creates an intimate knowledge of the land, sea and ice.

Without such knowledge and the associated skills required for travel and harvesting, the Inuvialuit way of life in the region would not be possible.

