Nunavik Inuit Knowledge and Observations of Polar Bears

Southern Hudson Bay subpopulation

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Cover photo: Allison Slater

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1.0 Executive Summary

1.1 Introduction to the report

In January 2012 Canada's then Minister of Environment, the Honourable Peter Kent, requested that the Nunavik Marine Region Wildlife Board (NMRWB or Board) work towards the development of a formal management regime for the harvest of polar bears in the Nunavik Marine Region (NMR). Specifically, the NMRWB was directed to establish levels of Total Allowable Take (TAT) for all three polar bear sub-populations that occur within the NMR. The Board recognized that while Nunavik Inuit possess a wealth of knowledge about polar bears very little of it has been documented and thus it remained largely inaccessible in the context of Board decision-making processes. As the NMRWB gives full consideration to the knowledge, traditions and hunting practices of Nunavik Inuit in its decisions and actions, the Board initiated a project to conduct interviews with hunters and elders to gather Inuit Knowledge (IK) and observations from all Nunavik communities. The NMRWB contracted Trent University to conduct this work with them and prepare reports on this knowledge.

This report details the observations and knowledge documented and shared by Inuit elders, hunters and other residents in the communities of Kuujjuaraapik, Umiujaq and Inukjuak. Given the context of public hearings related to establishment of a TAT for all sub-populations, particular attention was given to topics that could best inform management decisions.

1.2 Scope of the project

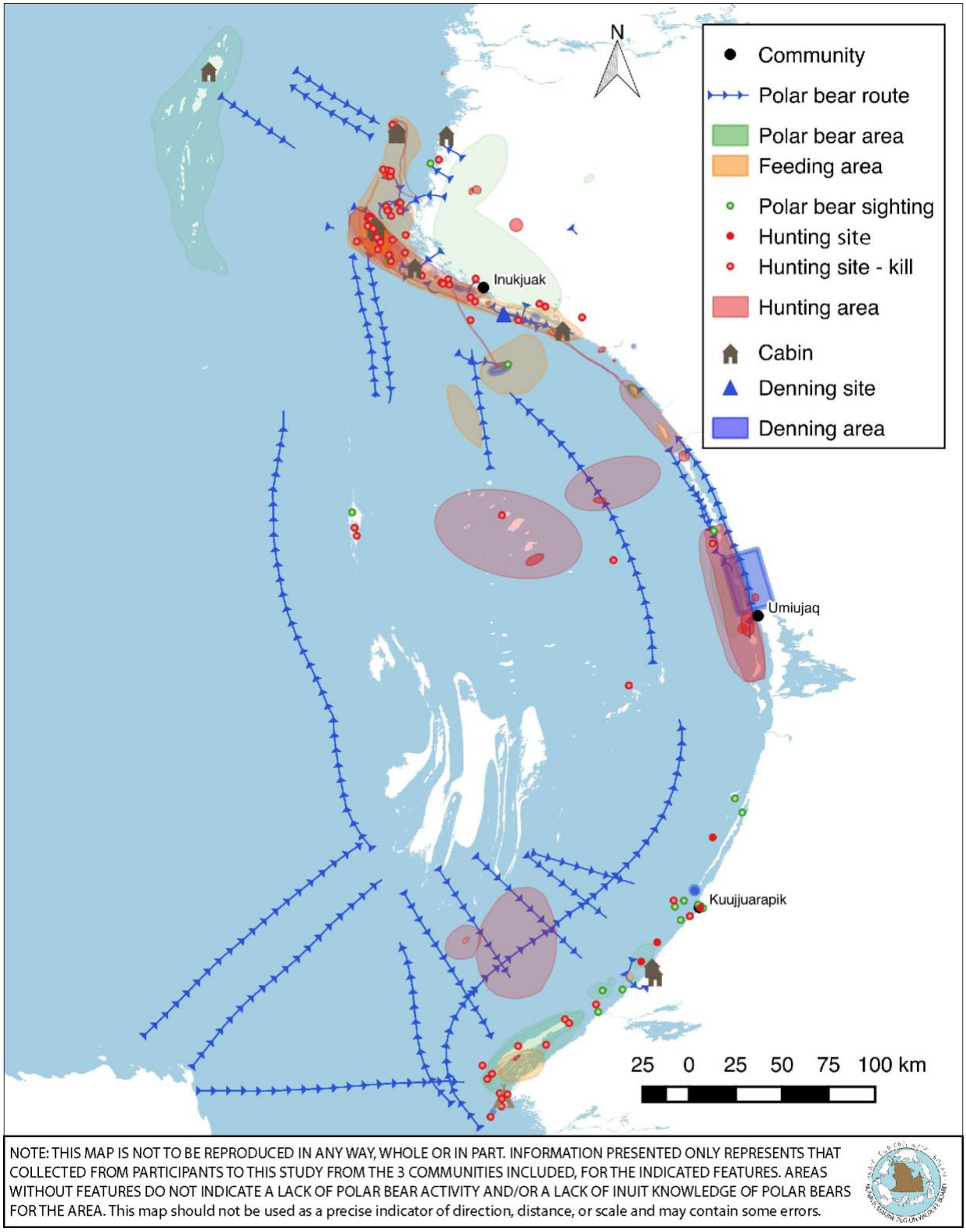
A vast depth and breadth of Inuit Knowledge and values were documented for this project. Local hunter/trapper organizations (*Local Nunavimmi Umajulirijiit Katujjiqatigiinninga*, or LNUKs) in each community helped identify local polar bear experts for interviews and mapping sessions. Participants spanned a range of ages and years of experience. When applicable, participants were asked to specify the seasons and time periods within which the information they shared was relevant. Participants shared

information on the biology and ecology of polar bears, including details about abundance, distribution, habitat, feeding, health, mating, and denning. Participants also spoke about the importance of polar bears, both to themselves and to Nunavimmiut in general, as well as about hunting practices, management, and the stewardship of polar bears.

1.3 Key findings

Biological

One of the most common pieces of ecological data reported by participants was the increase in abundance of polar bears over the last half century. In almost every interview participants reported noticeable increases in polar bears since the 1970s and before the 2000s. Polar bears also seem to have widened their distribution, with some participants reporting seeing bears in areas that they did not occupy in the past, such as around Umiujaq. Interviewees also reported the use of inland areas, including bears being found and hunted several kilometers inland of Inukjuak. Participants from Kuujjuaraapik sighted tracks of a mother and cubs emerging from a den several kilometers deep in the forest. Most respondents that had experience seeing polar bear dens indicated they were on the coast, or on islands, though some mentioned the possibility of bears denning inland. Participants indicated that bears prefer to eat ringed seals, but alternative food sources were common, with bird eggs and beluga being especially frequent alternatives in the polar bear diet. Overall, interviewees reported that bears seemed very healthy with normal inter-annual variation, fatter in the winter and skinnier in the summer, but rarely skinny enough for them to be concerned about bear health.



Features showing the extent of documented polar bear distribution and movement for the Southern Hudson Bay sub-population in the Nunavik Marine Region, as indicated by participants from Inukjuak, Umiujaq, and Kuujjuaraapik.

Importance of polar bears to Nunavimmiut

Polar bears were reported to be important to Inuit in regards to culture and mental health, safety, sustenance, and economy. Participants described a sense of emotional wellbeing and excitement when seeing polar bears in their environment. They are seen as a symbol of the fortitude and strength of the people who live alongside them. As a tertiary consumer and apex predator, polar bears are often considered more similar to humans than any other animal, and regarded as one of the most intelligent species. Participants also expressed safety concerns resulting from the increased abundance and frequency of interactions with polar bears. Hunting a polar bear remains an important rite of passage into manhood for young Inuit, and participants reported a sense of pride associated with every successful hunt. Hunting provides two of the most tangible benefits of polar bears: food and resources. Polar bear meat is eaten in each community, especially by elders, and usually shared amongst community members. However, when hunters have discovered that a kill was previously tranquilized and tattooed for research, the meat is deemed unsafe for consumption and left behind. The sale of polar bear hides is an important source of income for hunters and enables the purchase of materials such as ammunition, gasoline, rifles and snowmobiles, required to continue a subsistence hunting lifestyle. The importance of polar bear hunting has changed over time, as economic opportunities have changed, though the economic benefits have existed for many decades. Polar bear hides were traditionally used to make mattresses, snow pants, and mitts, or as important gifts (e.g. a first hide is often gifted to the hunter's *sanijik*, god parent) which still occurs today.

Management and stewardship

A very common sentiment among participants was that traditional stewardship practices were sufficient for conservation and that the introduction of a quota to limit polar bear hunting was unnecessary and possibly dangerous or counterproductive. Participants shared several stewardship practices that were common across the region. Without exception, hunting was based on need. While many participants expressed great

enjoyment associated with being out on the land, their hunting activities were based on sustenance, not sport. Even when a hunter's own needs were met (and sometimes even before), hunting supplemented the needs of family, or the greater community. Some hunters mentioned prioritizing elders who could no longer hunt when sharing polar bear meat. More specifically, participants spoke about limiting their hunting to the take of fully grown polar bears without small cubs. Participants also generally limited their hunting to winter, as well as late fall and early spring when the coat and meat are best. In some cases, especially in the past, a small amount of hunting outside of this season was done to sustain people on long expeditions (be it on the land, or on boat trips). Otherwise, virtually all kills during the warmer ice-free seasons were due to safety concerns. Participants cautioned that the implementation of quotas can create a sense of competition between hunters or communities, and that this may actually increase the number of bears hunted, as hunters would rush to get their bears before the quota is filled. The competition created from a quota system could also inhibit traditional management practices, where hunters wait until prime hunting season to take bears and harvest based on need. Participants suggested several ways that the detrimental effects of a quota could be mitigated, including considering seasons, and having quotas that are locally managed.

1.0 ᖃᓪᓗᓂᕆᓚᐅᑦ ᑐᓴᖅᑎᕆᔨᑎᑐᓂᑦ

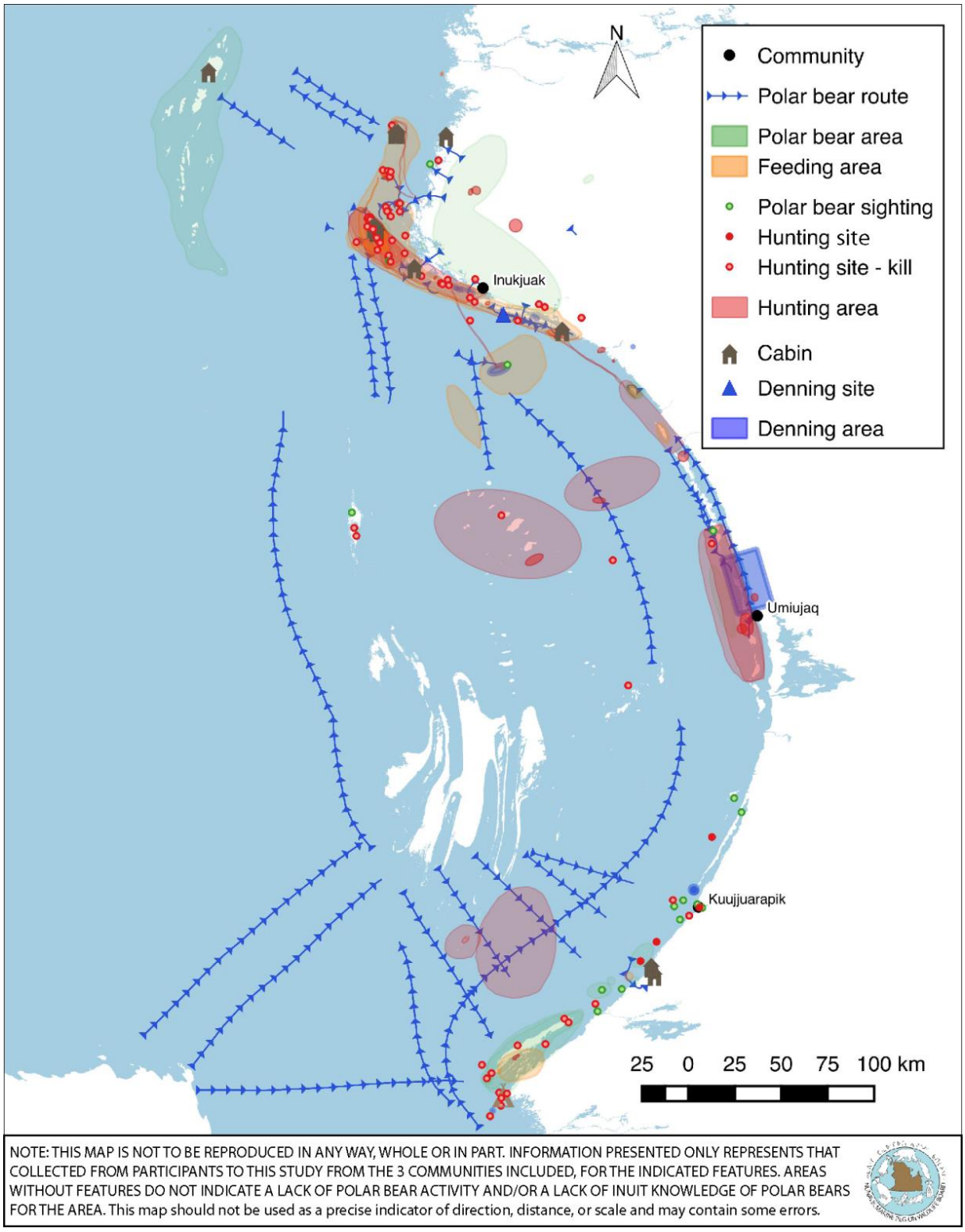
1.1 ᑐᑭᓯᑎᕆᔨᑎᖏᖅᓯᖏᖅ ᑐᓴᖅᑎᕆᔨᑎᑐᓂᒃ

ᓴᓇᐊᓗ 2012-ᖓᑎᓪᓗᒍ ᑌᑦᓯᒪᓂ ᑲᓇᑕᐅᐸᑦ ᑲᓀᒪᖏᑕ ᑐᖅᑕᑦᕃᖅᑎᓯᑎᑎᓕᐅᔪᖏᖓ ᐊᐸᑎᓕᓚᓂᖅᓗᓂᒃ ᐃᑕ ᑭᐊᓐ, ᐊᑕᓐᓂᐅᕐᑎᖏᓕᐅᖅᓯᓯᒪᔭᖏᑦ ᓄᓇᕗᒻᒥ ᑕᓚᐅᖅᑎᐅᑕᓕᓚᐅᕐᓂᑦ ᑲᑎᒪᔨᐅᑎᓂᖅᓯᒪᓂᒃ ᐃᓕᓴᕐᓂᖅᓯᒪᓂᒃ ᑲᒪᔨᑭᖅᑐᐅᓂᖅᓗᓂᒃ ᒪᓕᒐᖏᓕᖅᓯᒪᓂᒃ ᐃᓕᓐᓂᒪᓂᖅᓯᒪᓂᒃ ᐊᓐᓂᑐᐊᖏᖅᑎᑦ ᓇᓂᕐᓂᒃ ᓄᓇᕗᒻᒥᓐᓂᑦ. ᐱᓗᐊᖅᑐᒥ ᓄᓇᕗᒻᒥ ᑕᓚᐅᖅᑎᐅᑕᓕᓚᐅᕐᓂᑦ ᑲᑎᒪᔨᖏᑦᑐᓂᑦ ᑎᓕᓴᐅᒍᑎᖏᓚᐅᕐᕕᒃᓴᑦ ᐃᓐᓇᐸᓐᓂᖅᓴᐅᑎᓯᒪᔭᒃᓴᑦ ᐊᓐᓂᑐᐊᖏᖅᑎᑦ ᐃᓗᓐᓇᖏᑦᑐᓂᑦ ᐱᓕᕐᓂᑦ ᓇᓄᐃᑦ ᐊᓐᓂᑐᐊᖏᖅᑎᑦ ᐃᓕᖅᐸᓐᓂᖅᓗᓂᒃ ᓄᓇᕗᒻᒥᓐᓂᑦ. ᐊᓪᓚᐊᖅᑐᒥ ᓄᓇᕗᒻᒥ ᑕᓚᐅᖅᑎᐅᑕᓕᓚᐅᕐᓂᑦ ᑲᑎᒪᔨᖏᑦᑐᓂᑦ ᑎᓕᓴᐅᒍᑎᖏᓚᐅᕐᕕᒃᓴᑦ ᐃᓕᓴᐅᒍᑎᖏᓚᐅᕐᕕᒃᓴᑦ ᐃᓐᓇᐸᓐᓂᖅᓴᐅᑎᓯᒪᔭᒃᓴᑦ ᐃᓐᓇᐸᓐᓂᑐᐊᖏᖅᑎᑦ ᓇᓂᕐᓂᒃ ᓄᓇᕗᒻᒥᓐᓂᑦ ᐃᓐᓇᐸᓐᓂᑦ ᐱᓕᕐᓂᑦ ᓇᓄᐃᑦ ᓇᓂᕐᓂᒃ ᓄᓇᕗᒻᒥᓐᓂᑦ ᐃᓐᓇᐸᓐᓂᑦ ᐃᓕᓐᓂᒪᓂᖅᓯᒪᓂᒃ ᓄᓇᕗᒻᒥ ᐃᓕᓐᓂᒪᓂᖅᓯᒪᓂᒃ

1.2 ᐱᓇᓱᑦᑕᐅᔾᔨᑦ ᖃᓄᐃᓕᓵᔪᐊᑎᒋᓂᖅᑐᑦ

ᐃᓄᑐᐃᓐᓇᑦ ᖃᐅᔨᒪᔭᖅᑐᑕ ᐊᖏᕐᕕᒪᓇᐅᔪᓂᖅᑐᑦ ᐃᓕᖃᖅᓯᒪᖅ ᐃᓕᓴᓇᖅᑐᑎᒋᔭᖅᓂᖅ ᐊᓕᓴᕐᓯᒪᔾᔪᖅᓱᐃᔪᑎᐅᓯᒪᔪᖅᑕ ᑕᐅᔨᓄᖅ ᐱᓇᓱᑦᑕᐅᔾᔨᓄᑦ ᐃᓕᓐᓂᒪᓂᒪᔾᔪᓂᖅ. ᓄᓇᓕᓂᓂ ᐊᖏᕐᓇᓱᑦᑎᑦ/ᒥᑭᑦᐊᖏᓂᐊᑎᓕᓪᓚ ᐱᓇᓱᒪᖃᖅᓴᖅᑎᒋᖅᑐᑦ (*ᓄᓇᓕᓂᓂ ᓄᓇᓴᐸᒃ ᐅᒪᔨᓕᓱᓵᑦ ᑲᑐᔾᔨᖃᑎᖅᑐᓂᒃᑯᑦ,* ᐅᖃᓪᓚᑦᓂᓂ ᐊᖏᕐᓄᐃᒪᐃᓕᐅᒋᑦ) ᐊᑐᓂᑦ ᓄᓇᓕᓂᑦᑕᑐᑦ ᐃᑲᔪᖅᓱᓂᖃᖅᓯᒪᔾᔪᑎᑦ ᓇᓗᓴᖅᓯᓱᑎᑦ ᓄᓇᓕᒫᒥᓂ ᓇᓄᖅᓂᑦ ᐱᔪᓂᓇᐅᑎᖃᖅᓯᑐᓂᖅ ᑕᐅᑦᑑᓂᓂ ᐊᑐᓂᑦᑕᐅᔾᔨᓄᑦ ᓇᓗᓴᖅᓯᒪᓂᓚ ᐊᐱᖅᓯᓱᒪᔾᔪᑎᑦ ᐃᓕᓴᕐᓯᒪᔾᔪᑎᑦ ᐅᑭᐅᖅᑕᕐᓂᖅᓯᓕᖅᑐᑦ ᓇᓗᓴᖅᓯᓱᒪᔾᔪᑎᑦ ᐊᐱᖅᓯᓱᒪᔾᔪᑎᑦ ᐃᓕᓴᕐᓯᒪᔾᔪᑎᑦ ᓇᓗᓴᖅᓯᓱᒪᔾᔪᑎᑦ ᓇᓗᓴᖅᓯᓱᒪᔾᔪᑎᑦ ᓇᓗᓴᖅᓯᓱᒪᔾᔪᑎᑦ ᓇᓗᓴᖅᓯᓱᒪᔾᔪᑎᑦ ᐊᐱ

ᓄᓇᕗᑦᑐᐃᓂᖅᓯᒪᔪᑦ, ᐃᓕᑐᐃᓐᓇᓕᒃ ᓇᓄᐃᑦ ᑕᑯᐅᑉᖃᕐᓕᓕᒫᑦᑐᒃ ᓇᓄᕐᓂᐊᑕᐅᖃᑦᑕᕐᓕᓕᒫᓂᖅᓱᓇᓂᖅᓯᒪᓂᕐᓂᕐᒥᔅ ᐃᓄᑦᓯᐊᓂᖅ. ᐊᐱᕐᓂᑕᐅᖃᑕᐅᔪᑦ ᑲᑦᔪᐊᑦᐱᐅᒃᑐᐅᑦ ᑕᑯᓕᐅᕐᓂᒪᓂᕆᓕᐅᔪᑦ ᑐᒥᓂᑦ ᐊᕐᓇᓗᑦ ᓇᓄᐊᕆᕐᑕᓗ ᑐᒥᖏᓐᓂᒃ ᓂᑎᒥᓂᑦ ᐊᓂᔪᕕᓂᐅᔭᕐᓂᒃ ᓇᐸᕐᑐᐃᑦ ᐃᒪᒧᐊᓗᐊᖏᓂᑦ. ᐊᐱᓚόᐅᔪᓂᑦ ᑭᐅᔪᑦ ᐊᒥᓱᓂᕐᓂᑦ ᐅᖃᖃᑕᓕᐅᔪᑦ ᓇᓄᐃᑦ ᓂᑎᖏᓐᓂᒃ ᑕᑯᓂᒪᓂᕆᕐᓂᖅᓱᓇᓂᖅ ᐅᖃᖃᑕᓕᐅᔪᕐᒪᑦ ᑕᒪᐃᓂᐊᕐ ᓂᑎᐅᕐᓂᑦ ᑕᓚᐅᕐᓘᑦ ᖃᓄᖅᓄᑦᑕᐅᖃᑕᓕᐅᔪᕐᒥᑦᑕᒃᑐᑦ ᕿᑭᕐᑕᓂᓵᓕᖅᓯᒪᓕᕐᓂᒃᓄᓂᑦ ᐃᓕᖏᑦ ᐅᖃᖃᑕᓕᐅᓚᓗᐊᕐᑎᑐᓐᓂᑦ ᓇᓄᐃᑦ ᓄᓇᓵᕐᓕᐅᓂᖅᓱᓇᓂᖅᓯᒪᓂᕆᓕᐅᔪᑦ ᑕᑯᐃᓂᐊᕐ ᓂᑎᐅᕐᓂᑦ ᑕᓚᐅᕐᓘᑦ ᖃᓄᖅᓄᑦᑕᐅᖃᑕᓕᐅᔪᕐᒥᑦᑕᒃᑐᑦ ᕿᑭᕐᑕᓂᓵᓕᖅᓯᒪᓕᕐᓂᒃᓄᓂᑦ ᐃᓕᖏᑦ ᐅᖃᖃᑕᓕᐅᓚᓗᐊᕐᑎᑐᓐᓂᑦ ᓇᓄᐃᑦ ᓄᓇᓵᕐᓕᐅᓂᖅᓱᓇᓂᖅᓯᒪᓂᕆᓕᐅᔪᑦ ᐃᓕᖏᑦ ᐅᖃᖃᑕᓕᐅᔪᕐᒥᑦᑕᒃᑐᑦ ᓇᓄᐃᑦ ᓄᓇᓵᕐᓕᐅᓂᖅᓱᓇᓂᖅᓯᒪᓂᕆᓕᐅᔪᑦ ᐊᐱᕐᓂᑕᐅᖃᑕᓕᐅᔪ



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ᓇᓂᐃᑦ ᐱᓪᓚᕆᐅᓂᖏᑦ ᐃᓕᓐᓄᑦᔪᑎᑦ ᓂᓀᐹᒻᒥᐅᓂᓄᑦ

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2.0 Context and Rationale

The polar bear is the largest terrestrial carnivore on the planet and a critical top-level predator species of Arctic ecosystems. It also holds an important place in many Arctic people's culture and society to this day. It has a circumpolar distribution, being found in United States (Alaska), Canada, Greenland, Norway and Russia (Wiig et al. 2015). Sea ice is an important aspect of the bears' critical habitat, and annual decreases in Arctic sea ice extent and availability have been an ongoing concern (Stroeve et al. 2012; IPCC 2014). Primary threats to the world's polar bear populations include climate change and the loss of sea ice, environmental contaminants in the Arctic, resource development, Arctic shipping, and human-bear conflicts (McKinney et al. 2009; Letcher et al. 2010; Obbard et al. 2010; Stirling and Derocher 2012; Wiig et al. 2015). Given the increasing nature of many of these threats in the circumpolar North, the issue of polar bear conservation, management and protection has received considerable attention in recent years (Wiig et al. 2015). International attention surrounding polar bears and the threats they face in a changing Arctic has resulted in an increased level of scrutiny towards management regimes that are implemented at the national and international levels (e.g. Laidre et al. 2015; Polar Bear Range States 2015).

The polar bear is currently listed in Appendix II of the Convention on International Trade in Endangered Species (CITES), and international trade is therefore regulated. The Agreement on Conservation of Polar Bears (signed in 1973) provides a framework for coordinated management actions at the international level. In Canada, management responsibilities are shared by the Federal Government, as well as by the Provincial and Territorial Governments of Manitoba, Ontario, Québec, Newfoundland & Labrador, Yukon, Northwest Territories and Nunavut along with the wildlife co-management boards in each of the land claim settlement areas. The Canadian sub-populations account for nearly 60% of the world's polar bears and are organized into 13 management units (Figure 1).

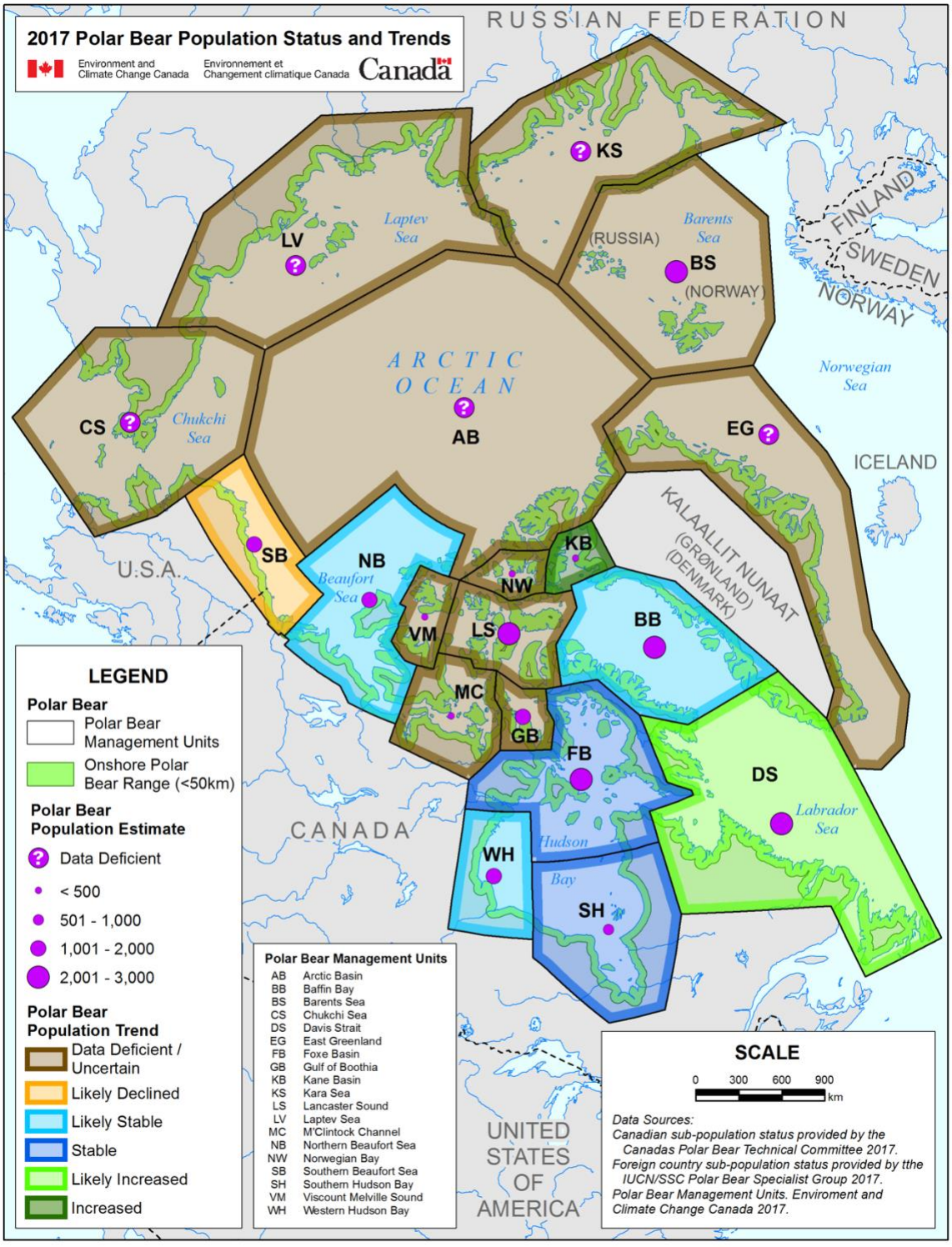


Figure 1. Circumpolar polar bear sub-population status and trends (ECCC 2017)

In January 2012 Canada's then Minister of Environment, the Honourable Peter Kent, requested that the Nunavik Marine Region Wildlife Board (NMRWB) establish a formal management system for polar bears in the Nunavik Marine Region (NMR) in collaboration with other management partners. As part of this management system, he directed the NMRWB to establish levels of Total Allowable Take (TAT) for all three polar bear sub-populations that occur within the NMR. As the main instrument of wildlife management for the NMR, pursuant to the Nunavik Inuit Land Claims Agreement (the "NILCA"), the NMRWB has exclusive authority over the establishment, modification or removal of levels of TAT and non-quota limitations (NILCA s. 5.2.3).

The objectives of the wildlife management system provided for by the NILCA are detailed in section 5.1.3 of the Agreement, and seek to establish a system that, among others:

(a) defines and protects Nunavik Inuit harvesting rights;
(b) is governed by and implements the principles of conservation;
(c) reflects levels, patterns and the character of Nunavik Inuit harvesting;
(f) recognizes the value of Nunavik Inuit approaches to wildlife management and Nunavik Inuit knowledge of wildlife and wildlife habitat and integrates those approaches with knowledge gained through scientific research;
(h) provides for public participation and promotes public confidence in wildlife management, particularly amongst Nunavik Inuit;

The decision-making process is further governed by section 5.5.3 of the NILCA which stipulates that decisions of the NMRWB, or a Minister, in relation to the establishment, modification or removal of a TAT shall restrict or limit Nunavik Inuit harvesting only to the extent necessary:

(a) To effect a conservation purpose in accordance with sections 5.1.4 and 5.1.5;
(b) To give effect to the allocation system outline in Article 5, to other provisions of Article 5 and to Articles 27, 28, and 29; or
(c) To provide for public health or public safety.

The Board recognized that while Nunavik Inuit possess a wealth of knowledge about polar bears very little of it had been documented and presented to the Board in a formal context. Because the NMRWB must give full consideration to the knowledge, traditions and hunting practices of Nunavik Inuit in its decisions and actions, a project to conduct interviews with hunters to gather Inuit Knowledge (IK) and observations from Nunavik communities harvesting from the three sub-populations of polar bears in the NMR was initiated.

This report is one of three sub-population specific reports for the NMR. It is the product of a collaboration between the NMRWB and Trent University, who assisted the Board in carrying out this work. The objective of the project was to thoroughly document the knowledge and observations of Nunavik Inuit relating to polar bears. Given the context of public hearings related to establishment of a TAT for all sub-populations, particular attention was given to topics that could best inform management decisions.

3.0 Introduction

3.1 The status of polar bears in Nunavik

In Canada, polar bears are managed by sub-populations, the boundaries of which are based largely on known movement patterns of polar bears within each of these regions (obtained from harvest reports of tagged bears and through telemetry studies; Figure 2) (Taylor and Lee 1995; Taylor et al. 2001).

In 2009, polar bears were listed as being 'Vulnerable' under Quebec's *Loi sur les espèces menacées ou vulnérables* and 'Threatened' under Ontario and Manitoba's *Endangered Species Acts*. Similarly, Canada listed polar bear as a 'Special Concern' under the *Species at Risk Act* in 2011. In all cases, these designations imply that polar bears are not

immediately threatened with extinction, but that certain conservation concerns must be addressed to ensure survival of the species.

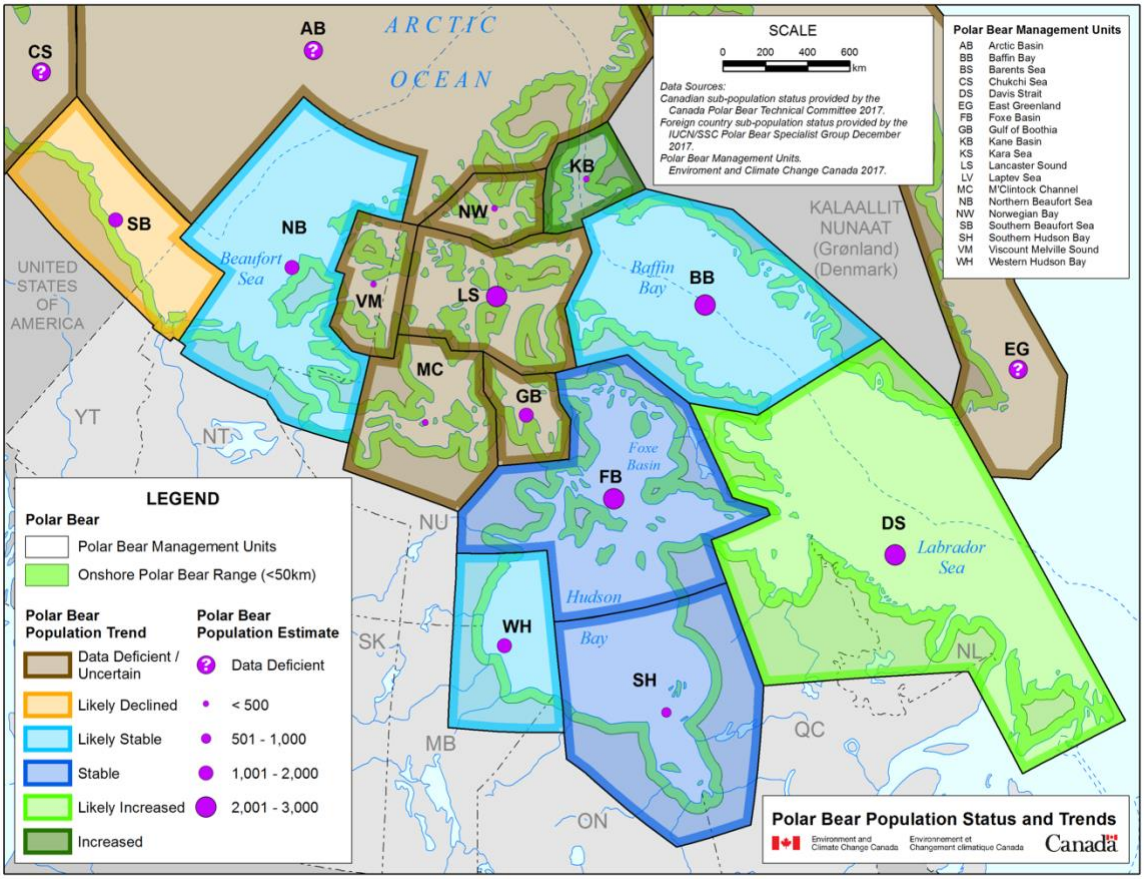


Figure 2. Polar bear sub-population status and trends in Canada (ECCC 2017)

The boundaries of three polar bear sub-populations extend into the NMR: the Davis Strait (DS), Foxe Basin (FB) and Southern Hudson Bay (SH) (Figure 2). A 2011/2012 aerial survey estimated the SHB sub-population to be 943, an abundance estimate that is considered stable since the late 80s (Obbard et al. 2013). In 2006, the Davis Strait sub-population was estimated to be 2251 bears (Peacock et al. 2013) (Figure 2 shows updated map and reported status as 'likely increasing'). The Foxe Basin sub-population was estimated to be between 2300 bears in 2008 (estimate based on Taylor et al. 2006 and updated based on Inuit observations) and it was unknown as to whether this sub-population was increasing,

decreasing or stable as of the that assessment report. A 2009-2010 aerial survey led to an estimated population of 2580 (Garshelis et al. 2012), and the sub-population was assessed as 'stable' (Figure 2).

The Southern Hudson Bay sub-population occupies two provinces (Quebec, Ontario), one territory (Nunavut), and four land claims areas, the Nunavik Inuit Settlement Area, James Bay Northern Quebec Agreement Territory, Nunavut Settlement Area, and the offshore Cree land claim area, the Eeyou Marine Region, each with their own management bodies and regulations. Bears from this sub-population have been important to Inuit and other Indigenous hunters for many generations and the knowledge of these animals, and the environment in which they exist, is extensive (Henri et al. 2010).

This report details the observations and knowledge documented and shared by Inuit elders, hunters and other residents in the communities of Kuujjuaraapik, Umiujaq and Inukjuak concerning polar bears in the region of the SHB sub-population.

4.0 Methods

4.1 Study area

Between April and June 2014 semi-directed interviews (Huntington 1998) were conducted in three Nunavik communities that occur within the boundaries of the SHB sub-population (i.e. Kuujjuaraapik, Umiujaq and Inukjuak). The study area includes the traditional and contemporary hunting grounds of the people of these three communities. This area encompasses the lands and coastal marine regions of central and eastern Hudson Bay and all of James Bay (Figure 2).

4.2 Interview guide and mapping

A primary focus of the interviews was to gather knowledge on the biology of polar bears from Inuit elders and hunters in participating communities. Topics related to biology included distribution and migration, feeding, body condition, mating and denning,

habitat, and abundance. The interview guide also included questions related to the importance of polar bears and traditional approaches to their stewardship by Nunavimmiut (Appendix 1). Questions about human interactions with polar bears were also included in the interviews, including frequency of encounters, and bears entering the community.

Interviews also included a participant mapping component (Tobias 2010), and questions were included in the interview guide to prompt participants to share knowledge by drawing features on the map. Participants identified areas relevant to different aspects of their experience associated with polar bears as well as aspects of bear biology such as denning areas and migration routes when drawing features on the maps.

4.3 Interviews

4.3.1 Participant selection

LNUKs in each community were informed in advance about the project's intent and their support was sought prior to and during the research team's visit to their community. LNUKs assisted with identification of participants, organization of interpretation services, and provision of interview space. Trips to communities began with a meeting between the researcher and the LNUK to discuss the project and to establish a list of potential participants, composed of individuals with expertise and knowledge of polar bears. The project aimed to include approximately 10 participants per community, but varied depending on the level of polar bear activity and polar bear hunting in each community. Participants were purposively selected based on their experience and knowledge of polar bears (Davis and Wagner 2003). Participant lists were cross referenced with any available hunting records to ensure active polar bear hunters were invited to participate. Participation was open to both males and females over 18 years of age, though polar bear harvesting is primarily done by men. Participants were then contacted by the community interpreter/translator and invited to participate in the study.

4.3.2 Conducting interviews

Individual and small group interviews of five or fewer participants were conducted between November 2014 and March 2015 in each community. Participants were given the opportunity to choose the interview format with which they felt most comfortable. If a participant preferred to be interviewed in a group, they were encouraged to form groups with peers that were identified during the meetings with the LNUK (i.e. often individuals having hunted or travelled on the land and sea together).

Interpretation was offered for all interviews, and, depending on participants' preference, interviews were conducted in a public location in the community (e.g. Municipal and/or Landholding buildings) or at the interviewee's home. Interviews started with an informed consent process; and consent was gathered in writing or by recorded verbal agreement.

4.4 Qualitative analysis

Audio recordings were transcribed and all transcripts were then reviewed and verified by the research team against the original recording. A hierarchical map of themes and topics included in the interview guide was created to guide the qualitative analysis. Transcripts were imported into QSR International's NVivo 10 qualitative data analysis software (2014), and codes were applied to identify text fitting the hierarchical map (Kitchin and Tate 2000). If important information was found during the coding process, which called for a new theme or topic to be added to the coding hierarchy, a new code was created, and all previously-coded transcripts were re-analyzed.

When all transcripts had been coded, descriptive and thematic content analyses (Saldana 2013) were performed on the dataset. Interview data was explored to: a) describe common responses to questions, and b) look for patterns and trends in the data across many participants.

4.5 Validation

In March 2015 validation meetings were held with participants in each participating community. All participants were invited to workshops where preliminary results were presented, and participants could review, modify and add to the results. Having received a copy of their interview transcript (if they did not attend the workshop, this was done via their LNUK) participants were provided the opportunity to review, omit, or add material to their transcript to ensure accuracy of data collected and approval of the knowledge shared (Huntington 1998; Creswell 2009). Feedback received during validation meetings was considered, and adaptations to findings were made based on discussion among participants and group consensus. Preliminary maps were created for workshops, and participants had the opportunity to add, remove, or modify features they had shared. Validation workshops also confirmed that 1990 was an appropriate date to be considered as a division between 'historic' and 'current' time periods used in the analysis and reporting of results. The year 1990 was chosen for validation as it was the earliest decade that participants from all communities said that polar bears were more abundant than in the past and reflected current abundance and distribution patterns. For clarity, some participants noted increases in abundance as early as the 1960s, and some areas had reached polar bear abundance at current levels before the 1990s (see Abundance section for details).

5.0 Results

5.1 Participant attributes

A total of 13 interviews were conducted with 25 elders, hunters, and knowledge holders. Six of the interviews were individual interviews while group interviews ranged in size from 2-5 participants with an average of 3 people. All participants interviewed were male, and over 20 years old, with men aged 40-79 years making up 76% of the 25 interviewees. Table 1 shows a breakdown of participants, stratified by age range, and community.

Table 1. Number of participants from the South Hudson Bay region listed by community and age range.

	Number of participants			
Age range	**Kuujjuaraapik**	**Umiujaq**	**Inukjuak**	**Total**
20-39	2	0	3	5
40-59	3	1	4	8
60-79	1	4	6	11
80+	1	0	0	1
Total	7	5	13	25
Average Age	55	68	54	57
Age Range	30-81	44-77	24-78	24-81

During the interview process, over 24 hours of audio information was recorded and transcribed, and participants drew a total of 240 features on maps. The final hierarchy of topics discussed and shared through interviews is presented in Figure 3 and shows the scope of themes addressed.

Figure 3. Hierarchical coding structure used to code interview transcripts. Numbers represent the level of hierarchy for a given code.

5.2 Polar bears and Nunavimmiut

The residents of Inukjuak, Umiujaq, and Kuujjuaraapik have a long and intimate history with polar bears. Over time the role of polar bears in the lives of Nunavimmiut has changed and shifted in many ways. This shift includes the role of polar bears in Inuit culture and sustenance. However, their place in the Nunavimmiut world-view appears to have remained constant over time. Participants spoke of polar bears with respect and reverence, in a way that is not quantifiable, and likely unrelated to the frequency of polar bear encounters, or of their status as a resource. The respect offered to polar bears goes beyond that which is given to most other animals, with some participants referring to them more as people than animals.

> *"Yes, our fellow seal hunters. They wait on a seal hole just like Inuit." – Resident of Inukjuak*

To this day, a boy's first successful polar bear hunt remains an important milestone.

> *"Every young hunter, is dreaming of his first one, always. They never stop thinking of getting that." – Resident of Kuujjuaraapik*

5.2.1 Hunting practices and traditions

Over time, and across geographical areas, the role of polar bear hunting in the lives of Nunavik Inuit has varied, along with the intensity and frequency of harvesting efforts. Most interviewees reported that the region has seen an increase in polar bears since the 1990s (see section 5.3) and that hunting has increased proportionally, as has the importance of polar bears as a resource for Nunavimmiut (see section 5.2.2).

Harvesting opportunities in the SHB range differ between the three communities, and coincide with the abundance of bears in each respective area. Harvest records maintained by the Quebec Government are incomplete, and have only been collected systematically in recent years. Even still, many hunters mentioned only reporting bears when they were interested in selling the hide and therefore bears which were used for other purposes

(e.g. meat and clothing) are largely uncaptured by the reporting system. Therefore, previously published data regarding harvest by Nunavik communities should be considered the minimum harvest. When asked to provide an estimate of their harvest, all communities reported an increase in harvest in recent years. The community of Inukjuak reported the highest harvest at approximately 20-30 bears/year. The communities of Kuujjuaraapik and Umiujaq both reported annual harvests of less than 10 bears (6-7 and 2-8 respectively). While respondents from Inukjuak report a strong history of polar bear hunting, there was indication that periods of time existed when fewer bears were taken on an annual basis (prior to 1960). Some participants from Kuujjuaraapik and Umiujaq similarly reported periods of time when very few bears were hunted. In Umiujaq and Inukjuak, changes in hunting frequency were directly attributed to changes in polar bear abundance and distribution.

Inukjuak reported the highest harvesting effort and rate of harvesting of the three communities, with participants in 4 out of 5 interviews stating that they sometimes specifically hunt for polar bears (Table 2). However, as this is a purposeful sample of those hunters with experience hunting polar bears, the proportion of total hunters in boundaries of the SHB sub-population specifically hunting polar bears is likely much lower. One participant from Umiujaq spoke about the rarity of going out to specifically hunt polar bears. He stressed that in his community polar bear hunting is almost exclusively opportunistic.

Table 2. Number of participants in interviews where the approach to polar bear hunting was described.

	Actively hunt polar bear	**Opportunistic**	**Did not comment**
Inukjuak	4	4	5
Umiujaq	1	2	2
Kuujjuaraapik	0	7	0

Communities differ in the time of year and where hunting takes place. In Kuujjuaraapik most polar bear harvest has occurred in late autumn, most commonly in November. In Umiujaq most hunting occurs in winter and spring, although some elders reported having hunted polar bears in summer and fall. In Inukjuak hunting occurs predominantly from January to the end of March, with some harvesting during the shoulder months of December and April depending on environmental conditions. Geographically, polar bear hunting has occurred predominantly within areas that can be reached from the community by dog sled or snow machine (Figure 4), and often within an individual or family's traditional hunting ground. In accordance with the largely opportunistic nature of polar bear hunting, most participants explained the areas where they go to hunt polar bears are often the areas where they go hunting in general. These areas tend to be focused on islands and points of land due to their naturally high occurrence of wildlife. Inukjuak participants reported that most hunting occurs around Elsie island and the innalik series of islands located near and northward of the community. In Umiujaq, a focus of hunting activity was reported past the offshore islands in the Bay. While most polar bear hunting occurs on the sea ice, it was noted that it is not uncommon to see or track bears inland. Most participants do not actively hunt polar bears inland, due to a lack of appropriate gear on hand or the challenges associated with hunting on the rough inland terrain. Some participants from Kuujjuaraapik spoke of coming across very fresh tracks well inland (approximately 10-15 km) while on a hunting excursion and not pursuing the bear, as they were less comfortable and confident of the hunt in that environment.

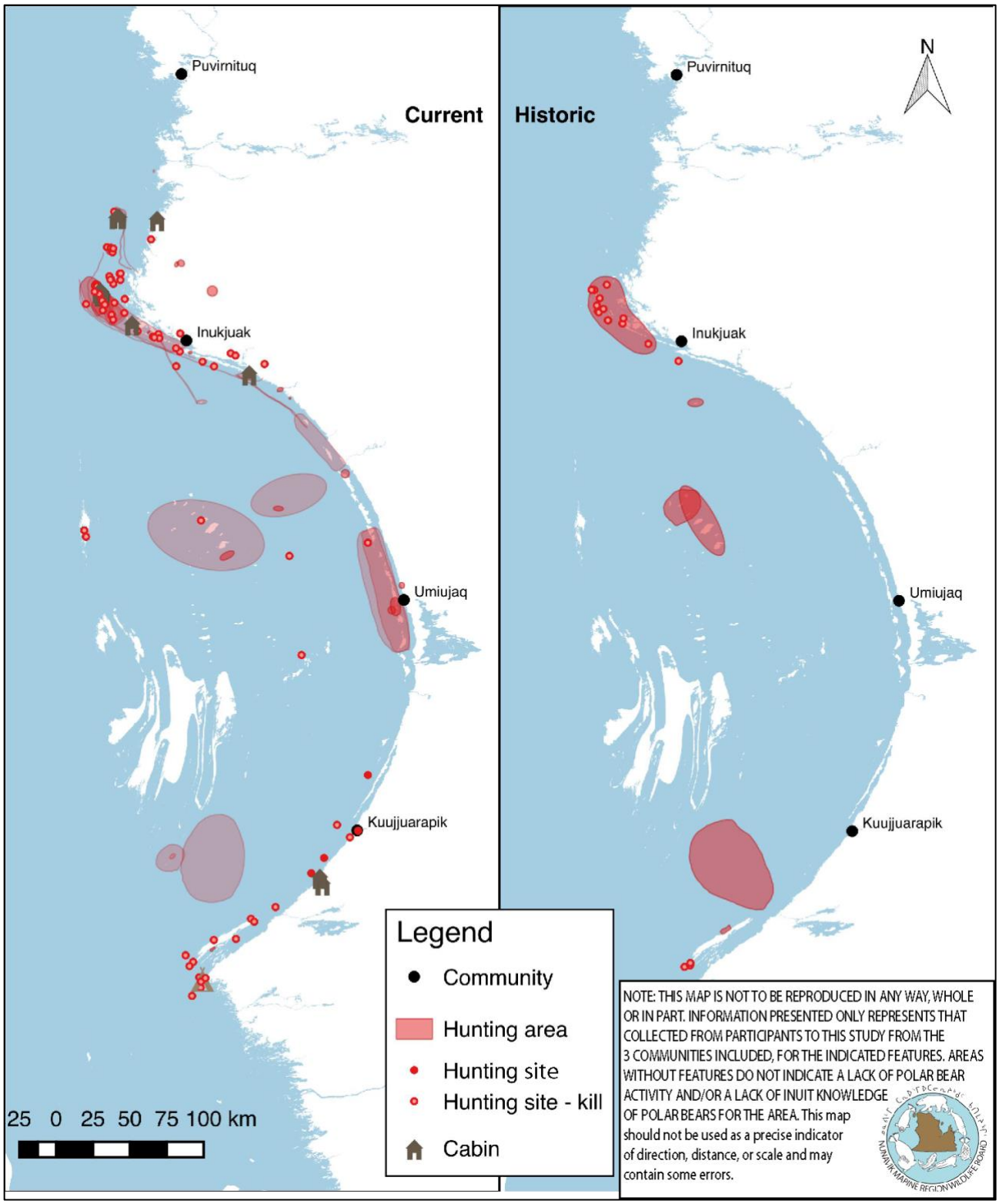


Figure 4. Map of human footprint associated with polar bears, in the study area from 1990 to present (current) and before 1990 (historic).

Polar bear hunting is commonly done with a high-powered rifle. Finding a bear is either opportunistic, or involves tracking the animal; traditional approaches to tracking are still practiced today.

> *"So those that would follow bear tracks, you're not to step on the tracks. You will not catch up to it if you step on the tracks. The only way to catch or see the polar bear from the tracks is to walk beside the tracks, not on the tracks. If you walk on the tracks then you will not see the bear today. If you're on the side, then you will catch it. Even up to today. So we tell the youth when you find tracks, don't go on the tracks if you want to be able to catch it. These are the teaching methods that are used. If the tracks are stepped on, then you're pushing it further away…that is the teaching. Not just because we want the polar bear – not just because we want to catch the polar bear, we do catch it for the skin and also to be able to sell the skin. Our parents used to love the meat." – Resident of Inukjuak*

Before rifles, polar bears were hunted in a variety of ways, including the use of a type of rock trap, as described by participants from Kuujjuaraapik

> *Respondent 1: "Here is Cape Jones, a very historical site for camping … a few years ago I saw a polar bear trap made out of rocks piled up… A tunnel [made] out of big boulders… The inside is narrowed, and at that end put bait. He would smell it and go in and get stuck there. He cannot go backwards."*
>
> *Interviewer: "So then how do they actually kill the polar bear?"*
>
> *Respondent 1: "Harpoon."*
>
> *Interviewer: "Oh so the rocks are just to trap it?"*
>
> *Respondent 1: "The rocks will not fall apart, he will just stay there. He cannot go backwards."*

Respondent 2: "We found out that polar bears can't walk backwards; even foxes, they can't walk backward. You can make a bear trap and a fox trap, the same kind but smaller; I've seen many of them."

Interviewer: "So how long, like how old would that trap be?"

Respondent 3: "Very, very old… way before guns." – Residents of Kuujjuaraapik

While the method of hunting bears has changed over time, the role played by polar bear hunting in these three communities has not. Polar bears and polar bear hunting has remained important despite the changes and shifts that have occurred in Inuit culture over the years. Respondents overwhelmingly agree in a belief that no part of an animal should be wasted.

"We take everything. All the meat and the whole skin. Nothing is wasted." – Resident of Umiujaq

Respondents also reported abiding by traditional practices in terms of choosing which bear to hunt, and being selective about what individuals were acceptable to harvest. There was strong consistency in what participants deemed acceptable:

A. Do not take cubs, or mothers with cubs.
B. Avoid juveniles, unless the primary focus of the hunt is for meat.
C. Regardless of other points if you truly need it, you can take it.

"But if… say it's a small bear and if it's not bothering you or harming anything we just sometimes let it be, grow up to be bigger. But if I see a polar that's big enough, if it's a female or male I'm just going to go after it." – Resident of Kuujjuaraapik

Sustenance, education, and maintaining cultural practices were, and continue to be, important benefits of polar bear hunting. Some participants noted that through polar bear hunting Inuit children and youth learn invaluable life lessons and traditional skills.

"[Inuit youth] are very smart and when they follow, they learn. If they're maybe going hunting on their own, they may be in danger. So a young person, if he shoots a bear in any area, then this bear may get really angry and fight this person. So we used to be told to shoot the bear right in the center of the heart so that we would not be getting ourselves into danger. So when an animal is not killed, even if you are trying to kill it and if it's not killed or it didn't die, then it can become very dangerously scary with a wound if it's shot in a place where it should not have been shot. Our youth that are hunting bears are now safe, but the younger ones may have to learn about this as well because our children are capable now. For someone who never went polar bear hunting, it's dangerous. They may get too close before shooting or it may be too far because they're too scared. They might try to shoot it from way too far, then they would shoot it without killing it. When we hunt, we want an instant kill when we shoot it because bears are different than other animals. We have been told, even if we have not hunted bears, we have been taught before that we should not hit a polar bear without him knowing we're there. We have to let them know that we are there before we shoot them. When they're sleeping they cannot wake up – when they're really sleeping. They have to be waking up before you shoot them – by a noise, by a shot, but not by shooting it first." – Resident of Inukjuak

Almost every aspect of polar bear hunting has changed in some way over the last 50-100 years. Two main drivers of change were reported in interviews. The first of these was climate change, and the corresponding changes in sea ice conditions. Slower freeze up in autumn and earlier melt in spring have shortened hunting seasons and led to unpredictable ice conditions. In Kuujjuaraapik hunting is now done closer to shore than in the past. Some traditional hunting areas have become inaccessible, such as the Sleeper islands northwest of Inukjuak.

Additionally, changes in polar bear hunting have been influenced by the transition from a nomadic lifestyle to settled communities, the introduction of firearms, the snowmobile,

and many other social and technological changes in the North. Some respondents spoke of increased polar bear harvesting as a consequence of a rise in the value of hides. Although the monetary value of polar bears has existed for decades, the economic value associated with polar bear hunting increased more recently, and for some hunters has surpassed food as the primary reason to hunt bears. Some older hunters reported limiting their hunting in response to their concern over increased pressure on bears due to the influence of hide prices on harvest rates.

5.2.2 Importance of polar bears and polar bear hunting

The importance of polar bears to Nunavimmiut takes many forms. Much of the conversation regarding the importance of polar bears focused on hunting and the importance of these animals as a resource (physical, cultural, and economic) for Inuit. However, polar bears were also described as being more important than solely for their material worth. An effort was made to better understand participants' overall thoughts on the importance of polar bears, independently from aspects tied to hunting alone. Participants indicated that polar bears are important to them for cultural, ecological, and economic reasons (Table 3).

Table 3. Categorized interview responses to the question "Are polar bears important to you? How?"

	Total interviews	Cultural*	Ecological	Economic	Not Important	Other
Inukjuak	7	4	1	2	1	2
Kuujjuaraapik	2	1	0	0	1	0
Umiujaq	4	2	2	0	1	2
Total	**13**	**7**	**3**	**2**	**3**	**4**

* 'Cultural' included hunting, traditional activities and uses, symbolism, food.

In many interviews (77%, n=13), participants spoke in detail of the many ways in which polar bears are important to them, with some identifying importance in all three categories. In three interviews (23%, n = 13) participants stated that polar bears were not

particularly important to them personally as an individual, but then went on at some other point during the interview to speak to the ways in which polar bears were important to Nunavimmiut. Every one of the 25 participants (100%) agreed that polar bear hunting is important for Nunavimmiut (Figure 5).

> *Interviewer: And even though you guys are no longer interested in going out polar bear hunting is it important to you that other Nunavimmiut are able to go out polar bear hunting?*
>
> *Speaker: Yes. From what we've been hearing, it is still very important.*
>
> *Interviewer: And how come it's important? What are the reasons behind the importance of that, continuing that hunt for Nunavimmiut?*
>
> *Speaker: 'Cause our grandchildren are working really hard to keep the tradition going. It's still very, very important for them to continue that tradition.*

Many participants stating that polar bear hunting was not important to them personally were elders who were no longer able to take part in hunting, while others found the large polar bears too hard to work with once they had made the kill, and preferred hunting smaller animals such as seals or caribou as they were easier to manage. One participant spoke of his understanding of the importance of polar bears not only to Inuit, but also the rest of the world, and of the importance of conservation. He indicated that the international desire to conserve polar bears should be considered alongside the traditional and contemporary importance of polar bears to Nunavimmiut.

Figure 5. Number of interviews (n=13) in which participants spoke about the importance of hunting polar bears for themselves and for Nunavimmiut in general.

The benefits reported to be associated with hunting polar bears were diverse (Figure 6). Obtaining food was mentioned as a benefit of hunting bears in every interview, while economic value, lessons for youth, and the importance of hunting polar bears for personal intrinsic value (sense of identity, confidence, and wellbeing), were mentioned in a majority of interviews.

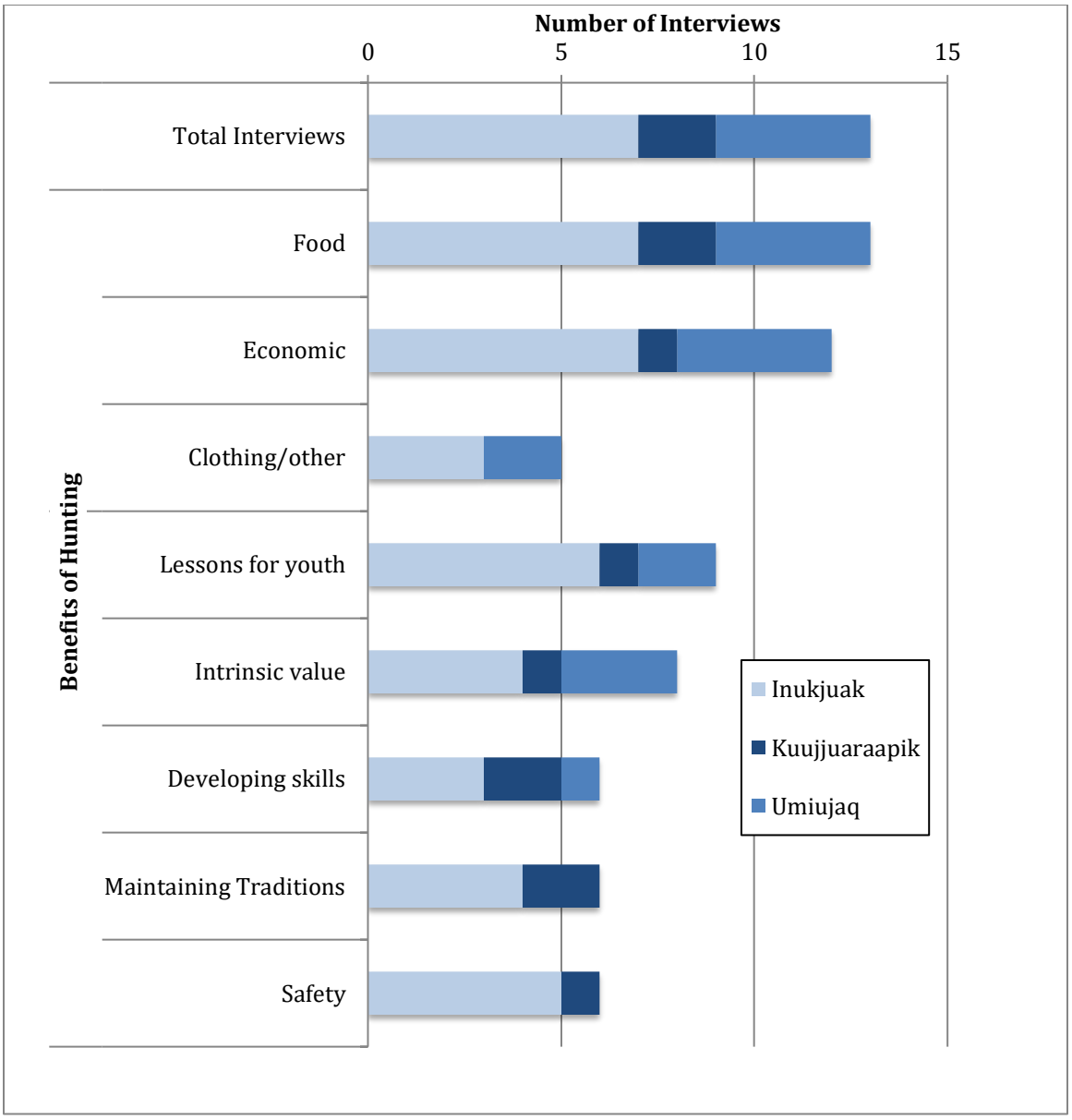


Figure 6. Number of interviews in which participants spoke about the various benefits of hunting polar bears.

Many respondents talked about the multi-faceted importance of polar bear hunting.

Speaker 1: "…it helps us when we go out hunting for polar bears, it sustains us, from the meat that we harvest and the skin that we sell to southerners. So it's

kind of a duel or double kind of… assistance in a way. It sustains us in two ways basically".

Speaker 2: "Economically it's really good for hunters that don't work, that have no way to make a living during the winter and also for the food, it sustains us both ways, so it's really important."

Speaker 1: "Plus it can get dangerous. If there's so many polar bears close by they can come into the community, if they're that hungry they can attack people." – Resident of Inukjuak

All interviews mentioned access to food as an important aspect of polar bear hunting for Nunavimmiut. Polar bear meat is consumed in all communities, though not by everyone, and is almost always eaten cooked. It is not a frequent or consistent part of the diet, and preference for it varies between individuals.

"Good meat too, it's like seal meat, almost similar… you see it like a caribou meat, but when you taste it. – Resident of Umiujaq

"So the meat is all taken for food." – Resident of Inukjuak

Some participants stated that elders in particular appreciated eating polar bear meat and one participant remarked that it appeared to give a sick elder strength.

"It's important. I think it's important because they are very good; even the meat. For us elders we want to eat the meat. It's good." – Resident of Inukjuak

Most participants stated that they will not eat polar bear meat if it is clear that the bear has been tranquilized. Any bears that have ear tags, lip tattoos, or a telemetry collar are generally not eaten. In Inukjuak, meat from hunted bears is almost always consumed as long as the bear has not been tranquilized. Due to the large quantity of meat obtained from a hunt, it is frequently brought back to the community to be shared. Announcements are often made over the FM radio to share with community members.

"I really want to eat polar bear. I just love it. … Yeah, [I] keep a little bit and share everything. When the polar bear meat is brought in town, they are finished right away." – Resident of Inukjuak

In evaluating the overall importance of polar bear hunting to Nunavimmiut, it is important to recall that responses have been categorized for the purposes of the analysis and reporting. While it is probable that certain broad patterns can be extracted from the data, the reality remains that the perceived importance of polar bears to Nunavimmiut is as varied and unique as individual respondents. All individuals were able to express their own unique value and relationship with polar bears and polar bear hunting.

5.2.2.1 Cultural importance

Polar bears are important to Inuit culture in many ways. Often, their importance to culture is linked to other forms of value they are reported to have, including food, skills development, economic importance, or in lifestyle adaptations associated with safety. When asked how polar bear hunting makes them feel, many indicated that they associated an important personal intrinsic value to hunting polar bears. Participants spoke of many unquantifiable things they gained from polar bear hunting, including respect from others, learning survival skills, life skills, a feeling of fulfillment (especially from sharing the meat), and a feeling of pride or accomplishment.

"Respect from others." - Resident of Kuujjuaraapik

"It gives us pride." - Resident of Kuujjuaraapik

One young hunter (under 30 years old) from Inukjuak spoke of the sense of fulfillment he gets from providing for the community through hunting polar bears.

Interviewer: "And even though you didn't eat the meat, is there a feeling associated with being able to give -- because it's a lot of meat, right, from a polar bear?"

Young Hunter: "Yeah it's -- I know that I actually helped other people with food so it's a fulfillment I like because I don't eat the meat and I wouldn't know what to do with it either."

Interviewer: "So would that be done like through the community freezer or would you just like informally go around and give it out to people?"

Young Hunter: "We used to go by radio. When we arrive back from hunting we'll put away our stuff and put the meat aside and go on the radio and tell people to come and pick up some meat."

Respondent 2: "Because not all the people here eat polar bear so they used to go on the radio so anyone who eats polar bear meat can go and get some." – Residents of Inukjuak

Most participants indicated that young Inuit learn many things from hunting polar bears. The danger of the animal itself and the skill required to hunt it out on the sea ice makes hunting polar bears an effective way to learn the ways of the land.

"Life skills and survival skills." - Resident of Kuujjuaraapik

"Not only they learn about polar bears, they also learn about where the hunting areas are, where the dangerous areas are, like thin ice or currents… It's not only the stuff they learn when they hunt polar bears… Yeah, like I said before, not only they learn about polar bear hunting, they also learn the danger areas of the hunting areas." – Resident of Inukjuak

"Yeah a lot of young people when they go out they learn a lot about the ice, how it moves, if the wind shifts from one direction to the other what happens to the

ice and stuff like that. So yeah it's important for young people to learn." –Resident of Inukjuak

In the past, hides were reported to have a variety of uses, including outerwear (especially pants and mitts), blankets or matts, and coverings for dogsleds. Some participants said they followed the tradition of giving their first polar bear hide to their *Sanijik* (a dresser, or godparent figure).

"Before the skidoos came [we] were always on the dog team, that's the only time [I] kept one… the other seven were sold. It was [used for] covering up the equipment… It was really handy for multiple things." – Resident of Umiujaq

"Yeah, good for clothing in winter time." - Resident of Umiujaq

Many participants indicated the use of hides has shifted more towards use for its economic value, although traditional uses, such as clothing and mitts, are still important. The economic value of a polar bear or its hide is still important in Nunavimmiut culture and society. While there has been a transition with colonization to living in settled communities, and an associated loss of aspects of traditional nomadic Inuit lifestyle, many traditional practices have been maintained. Individuals that perform these activities carry the means by which intergenerational knowledge can be passed forward, and culture maintained. However, even those living a more traditional lifestyle have economic needs. The economic value of polar bear hides has provided an important opportunity for individuals to meet their economic needs while carrying on traditions and cultural practices.

"Some of us don't work; that's our job to go out hunting and that's how we make our living." – Resident of Kuujjuaraapik

One of the strongest indications of importance of polar bears to Nunavimmiut can be seen in how participants talked about hunting their first polar bear. Many participants described their first polar bear as a coming of age experience, and a way of becoming a

respected hunter. The excitement of young hunters at the thought of successfully hunting their first polar bear is undeniable.

> *"I was happiest when I was told by my father that [he] will bring me polar bear hunting… that was the most fun time… and the most fun day, polar bear hunting. It was… my first polar bear catch." – Resident of Inukjuak*

5.2.2.3 Ecological importance

Participants talked about the importance of polar bears in maintaining a healthy ecosystem. Polar bears were credited in particular with controlling seal populations.

> *"And also they… help us to maintain the group balance of other species… Overpopulation of any species is disastrous to our wildlife… the polar bears help us to maintain a good balance. Like, for example, if we don't have polar bear[s] there would be too many seals. And where there are too many seals the population would collapse. And in order to maintain a good population of any species, they help us. And it's important for our environment. We should not have too many polar bears, we should not have too many seals in order to have a healthy environment. So they help us, even if we don't think they help us. Just because we don't see them we may feel that they're useless but they're very useful for us." – Resident Inukjuak*

Polar bears were also identified as important scavengers, cleaning up carcasses of whales that wash ashore.

5.2.2.4 Economic importance

> *"With no proper income from anywhere, knowing that the skins can be good money, then it's very interesting to try to get it." - Resident of Inukjuak*

The economic importance of polar bears primarily comes from selling the hide. While the economic value of polar bears can and does extend beyond that of income gained from

selling hides, most participants did not speak about this. Sport hunting and eco-tourism provide alternative economic opportunities related to polar bears in other regions, but this is not the case in Nunavik at present. Sport hunting of polar bears is not currently allowed in Nunavik though some participants expressed interest in developing an industry, and eco-tourism is a relatively new industry with minimal infrastructure related to polar bears. With the reality of a globalized economy reaching the North, it is difficult for individuals to maintain hunting as a form of livelihood while sustaining themselves economically. The economic value of a polar bear hide can help hunters financially and provide the income they need to continue hunting.

> *"Most of the polar bear hunters don't have jobs so in the winter time they mostly hunt polar bears for the [money]." – Resident of Inukjuak*

Non-Inuit buyers provide the demand that drives the economic importance of polar bear hides from Nunavik. Several of the older participants witnessed first-hand the emergence of an economy associated with polar bear hides.

> *"The skin was sold because when the white man sees it, he goes for it. He goes to pay for it. Sometimes they even fight for it. So he (the hunter) doesn't have time to keep it because the skin is wanted." – Resident of Umiujaq*

Many participants spoke about the range in prices for polar bear hides, ranging from approximately $100 to more than $10,000/hide. Some participants remember selling hides in the past and then later realizing they under-valued the hide.

> *Respondent 1 (through translator): "After hearing other communities selling their hide for more money, 'cause he sold his for $45.00, after hearing that he didn't want to go hunting anymore. …"*
>
> *Respondent 2 (through translator): "Well, [I sold mine for] 200 bucks. ..."*
>
> *Respondent 1: "Sold the second one for 45 and the third one for 800."*

Interviewer: "The one for 800, was that later, like, later years?"

Respondent 1: "Late 'Seventies or early Eighties." – Residents of Kuujjuaraapik

In Inukjuak, the involvement of the Hunter Support Program has helped to ensure that hunters are paid a fair price for the hide. However, in communities like Umiujaq and Kuujjuaraapik where the Hunter Support Program is not involved, many hunters still face the possibility of being significantly under-compensated for the value of their polar bear hides.

"Well we send it to Kuujjuaq and get paid for it or sell it. Sometimes some people keep it to make some clothes out of it like the pants." - Resident of Kuujjuaraapik

"… there's not a lot of us who have hunting equipment, and for sure there are people who can't afford equipment, and they have to go to take this opportunity (with the hide), if there's an opportunity." – Resident of Umiujaq

5.2.3 Human interactions and conflicts with polar bears

For Nunavimmiut polar bears are a part of everyday life. They can be aggressive carnivores and often will not hesitate to attack. While some Nunavimmiut (that do not go out on the land very often) may never see a bear, those that do spend time on the land hunting camping or gathering bird eggs/down, are constantly aware of possible bear encounters. Most interviews indicated that polar bear sightings and/or encounters have increased significantly during their lifetime.

"It's important to keep on hunting the polar bear because they are dangerous when they are around… When there were not too many polar bears in that area we were able to go out hunting overnight … and we were comfortable and safe at that time. But now, with the increased population of polar bears, we no longer want to spend an overnight inside an igloo, hearing that a polar bear may attack us. And it has happened before, polar bears have attacked our igloos before…

And I want to add that it's important to keep on hunting polar bears because if we leave them alone they can start attacking people, they can start destroying our property or our wildlife reserves. So it's really important to keep on hunting them." – Resident of Inukjuak

The destruction of property and cabins has become a frequent occurrence as reported by participants. Some participants said they have lost count of the number of times they have rebuilt their cabins as a result of polar bear damage. Camps and cabins are increasingly difficult to maintain, and many respondents said that the occurrence of property destruction has been in association with increased polar bear sightings and encounters.

Occasionally polar bears also enter communities. A participant from Umiujaq stated that they have seen bear tracks around the village garbage dump. This is a serious concern for many people who fear for the safety of children. Most did not report a noticeable increase in bears coming into the community. However, there is speculation that this could begin to happen, based on increased sightings outside the communities and reports from communities in Nunavut that frequently deal with bears in their community.

"Yes it's really important because they're going to grow a huge population and walk into our communities and go into our dumps and it's very dangerous for the community because of what we hear what's happening outside. In Nunavut there's so many bears in the community and they can't even shoot down one bear. So I think it's very important to continue our harvest of bears for food and to also have the market for hides, for better money to put in your pocket or use for clothing." – Resident of Inukjuak

As well, one resident from Umiujaq believed that bears are more aggressive than they used to be.

"… the polar bears have to be surveyed because they're becoming more aggressive to people. Every time we see them, they keep getting aggressive, more aggressive. That should be studied. How come they're becoming more aggressive?" – Resident of Umiujaq

Many participants believe that the only reason bear encounters have not caused more damage or personal injury is due to the diligence of hunters. Bears know that humans are dangerous and therefore, for the most part, avoid communities.

Interviewer: "And has the aggressiveness or the encounters with polar bears changed at all? It sounds like it's still pretty rare for polar bears to come into town or destroy cabins."

Respondent: "It looks rare but that's where we should thank our hunters for doing their job." – Resident of Inukjuak

5.3 Abundance

In all three communities, changes were reported in polar bear abundance. Some changes are unique to a community, although overall trends exist. Participants in all three communities generally felt that the number of bears is healthy, and among the highest numbers they have seen in their lifetime. Many participants were very concerned about perspectives from outside Nunavik (national or international perspectives) that polar bears are endangered everywhere. Most participants strongly disagreed with this perspective.

"There's no shortage of polar bears. They're not going extinct." – Resident of Kuujjuaraapik

"We hear a lot nowadays that polar bears are facing extinction but that's not true. Ever since 1961 we have been seeing a lot more polar bears" - Resident of Kuujjuaraapik

Contrary to the perception outside of Nunavik, all interviews conducted in the SHB communities shared the view that the population grew somewhat from the 1960s until the 1980s, and that a continued increase has then been very noticeable since that time. From the 1940s to the 1960s, and around the time of World War II, very few bears were observed.

"Then, before, all the animals were scarce… Also, they used to be so hard to catch then. Today, there are much more and they are closer – [that] is what we know now." - Resident of Inukjuak

Participants described the complexity of the ecosystem, and any changes in polar bear abundance being linked to more than just hunting by humans. Participants also noted that the increase in polar bears is supported by a large ringed seal population, but that these things change from year to year.

"Because there's different years. Some years there's more and some years there's less animals. It is like that for all kinds of animals. Each year is different." – Resident of Inukjuak

In Kuujjuaraapik an increase in bears was reported by participants for the 1970s and 1980s and participants also commented on a significant increase in the last 15-30 years as well. One participant also remarked that there were times with no bears at all.

"There was a period where there were no polar bears, in the 1940s and 1950s." – Resident of Kuujjuaraapik

Umiujaq participants reported that bears have only been seen with any consistency in the past 25 years.

"During my childhood days there used to be no polar bears. They started coming from the west side of Hudson Bay. From Churchill just like going this way. So it's just uh recently we started getting polar bears within the last 25 years, at least." – Resident of Umiujaq

Inukjuak has the highest reported abundance of polar bears of the three SHB communities. It also has the longest history of polar bear hunting. Participants spoke of previous generations hunting polar bears in the area. For some participants, though, the change over their lifetime has been from almost no bears, to seeing a large number now.

"There used to be none, absolutely nothing when we were children, and now today I know [there are] a lot." - Resident of Inukjuak

Participants from Inukjuak reported observing more bears since the 1960s, with an even greater increase in this trend since the 1980s. Some attributed this to changes in the environment that made sea ice less stable. The development of the hydro dam in the area was said to be responsible for changing the flow of the warm and cold water currents, and much of the conditions in ice.

Nunavimmiut stated that the number of polar bears observed fluctuates annually, largely in response to environmental conditions. For example, in years when there are large areas of open water near communities, more bears are observed. Inuit have stressed that these fluctuations are a natural aspect of polar bear demography and movement. Similarly, it was reported that environmental conditions (e.g. in years with large expanses of rough ice) can impact the ability of hunters to reach the floe edge where they would normally harvest bears.

"It's different every year. That's what the elders say, but it's true. I can feel it too... changing every year... Sometimes there's lots of animals, one year later not much, another year later, there's lots." - Resident of Inukjuak

5.4 Distribution

The distribution of polar bears (Figure 7, Table 4) is important to examine at different scales, in combination with abundance, to better understand populations. Changes in local abundance can simply be the result of a change in regional distribution. Many participants spoke of this, and as regional distributions change over long periods of time, these observations are often intergenerational. Many participants spoke of being taught about this by elders.

> *"We used to be told stories… The bears and the caribou and the big animals, they were still not around as I was growing up. Our elders used to say… would come back and then they would say they're far away right now. They would say they would come back some day. Now they are back today." - Resident of Inukjuak*

Locally, many participants spoke of increases being due to changes in the distribution of bears.

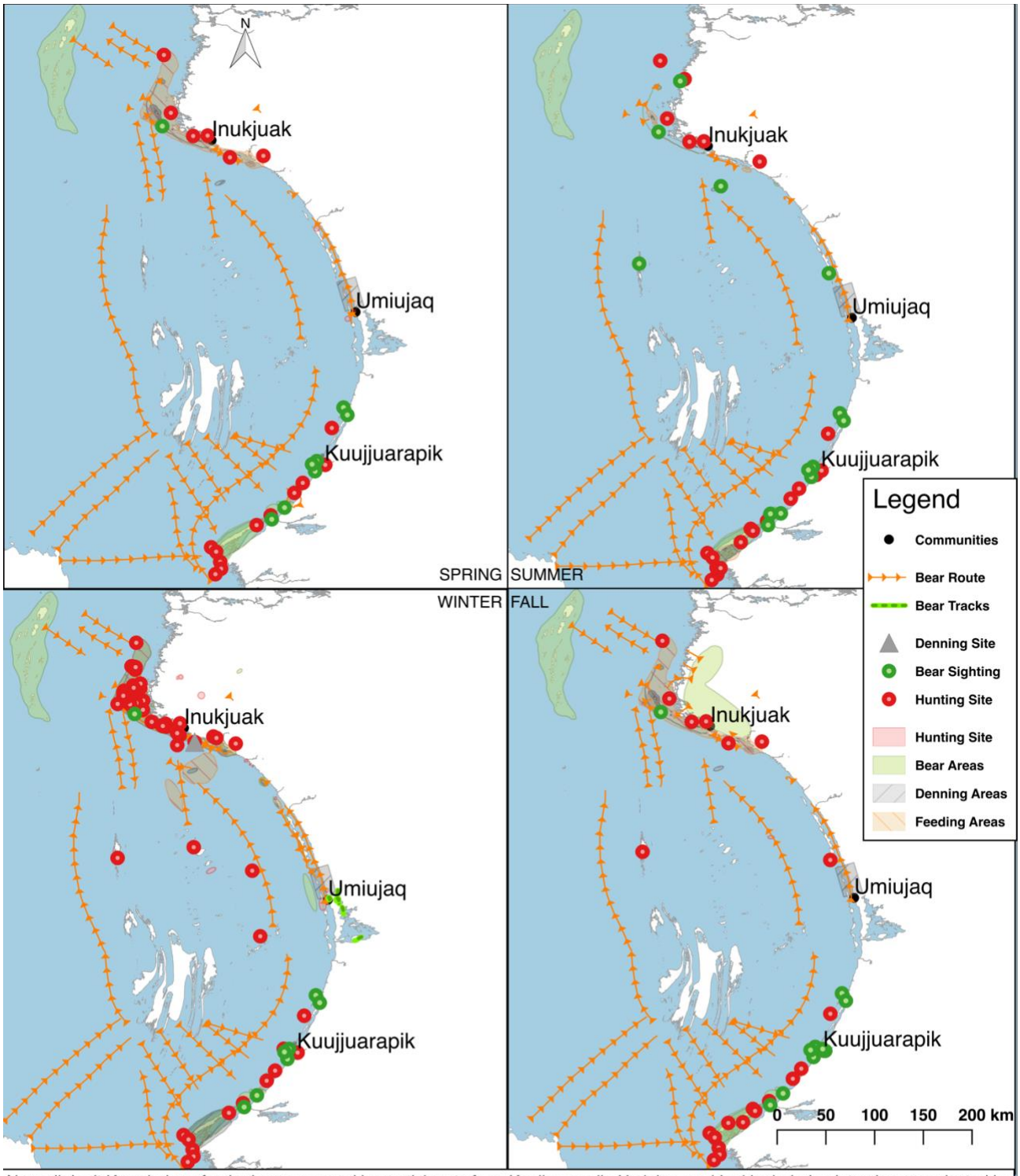
> *"During my childhood days there used to be no polar bears. They started coming from… west side of Hudson Bay. So it's just recently we started getting polar bears within 25 years, at least." - Resident of Umiujaq*

One participant described how important sea ice formation and break up is to bear distribution.

> *"I don't really know because the ice is really controlling. When the ice breaks, it leaves and comes back and sometimes they may go far away and then come back… I think they were just following the ice flow. So around this time there's less bears because all here-- all the ice from here leaves. So it just becomes all water and usually they just follow the ice. And [getting more or less] time and time again... [The timing of ice break up has] often changed here. There's still ice further north although there's no more ice behind the islands down there, there's still some ice there. So the leaving of the ice is often different." – Resident of Inukjuak*

In Inukjuak, changes in polar bear distribution were attributed to environmental conditions, which were said to have been affected by hydro dam development (Figures 8,9).

> *"They're all over. We go everywhere. They can be caught everywhere, anywhere… Yes, even Ottawa Islands… also places where they catch the polar bears in canoe… Winter time, it's very hard to go there in winter time because the ice there is always moving… I think that there's a lot of polar bears that come around there because the currents are always there ever since there was damming of the rivers… The current doesn't stop there… it's always moving now so the hydro really affected this area. We used to hunt polar bears around these areas when the ice was formed – when it was solid. Now it's not solid anymore."*
> *- Resident of Inukjuak*



Nunavik Inuit Knowledge of polar bears mapped by participants from Kuujjuaraapik, Umiujaq, and Inukjuak during interviews conducted in 2014-2015. Data without a specified season is included for all four seasons.

*NOTE: THIS MAP IS NOT TO BE REPRODUCED IN ANY WAY, WHOLE OR IN PART. INFORMATION PRESENTED ON THIS MAP ONLY REPRESENTS THAT COLLECTED FROM PARTICIPANTS TO THIS STUDY FROM THE 3 COMMUNITIES INCLUDED, FOR THE GIVEN FEATURES. IT DOES NOT REPRESENT ALL NUNAVIMMIUT KNOWLEDGE OF POLAR BEARS FOR THIS AREA.

Figure 7. Seasonal polar bear distribution and travel routes.

Table 4. Locations of frequent bear sightings by community and season (see Fig. 7).

Distribution and sightings	Kuujjuaraapik	Umiujaq	Inukjuak
Winter	Along coast and ice	West side of Nastapoka Islands Further offshore Richmond Gulf	Coasts and islands
Spring	-	-	-
Summer	Long Island and Cape Jones Further in bay Sightings inland	Long Island	Ottawa and Sleeper Islands Sightings inland
Fall	Most frequent observations than other seasons	-	-

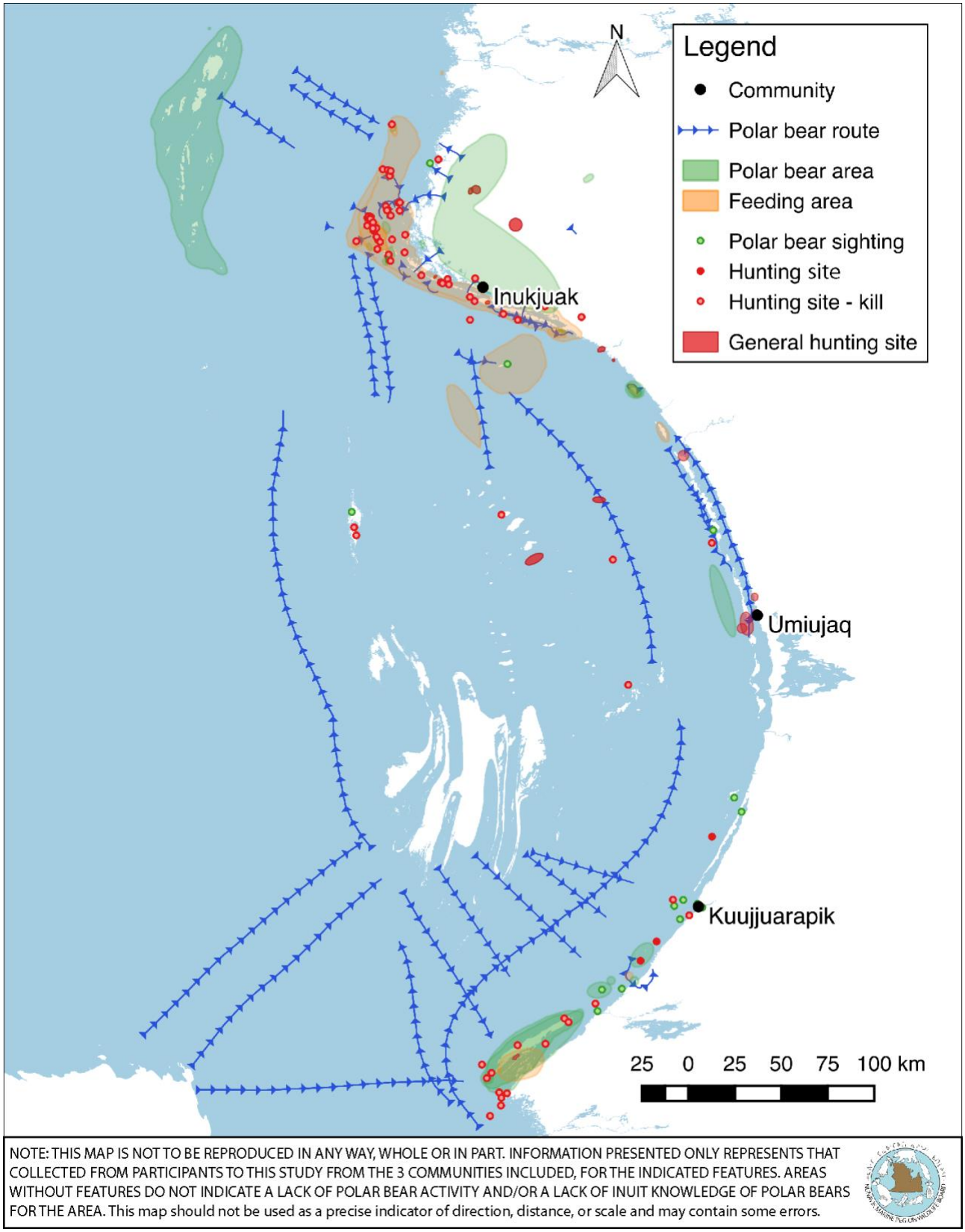


Figure 8. Current (1990s – present time) aggregate map of polar bear distribution.

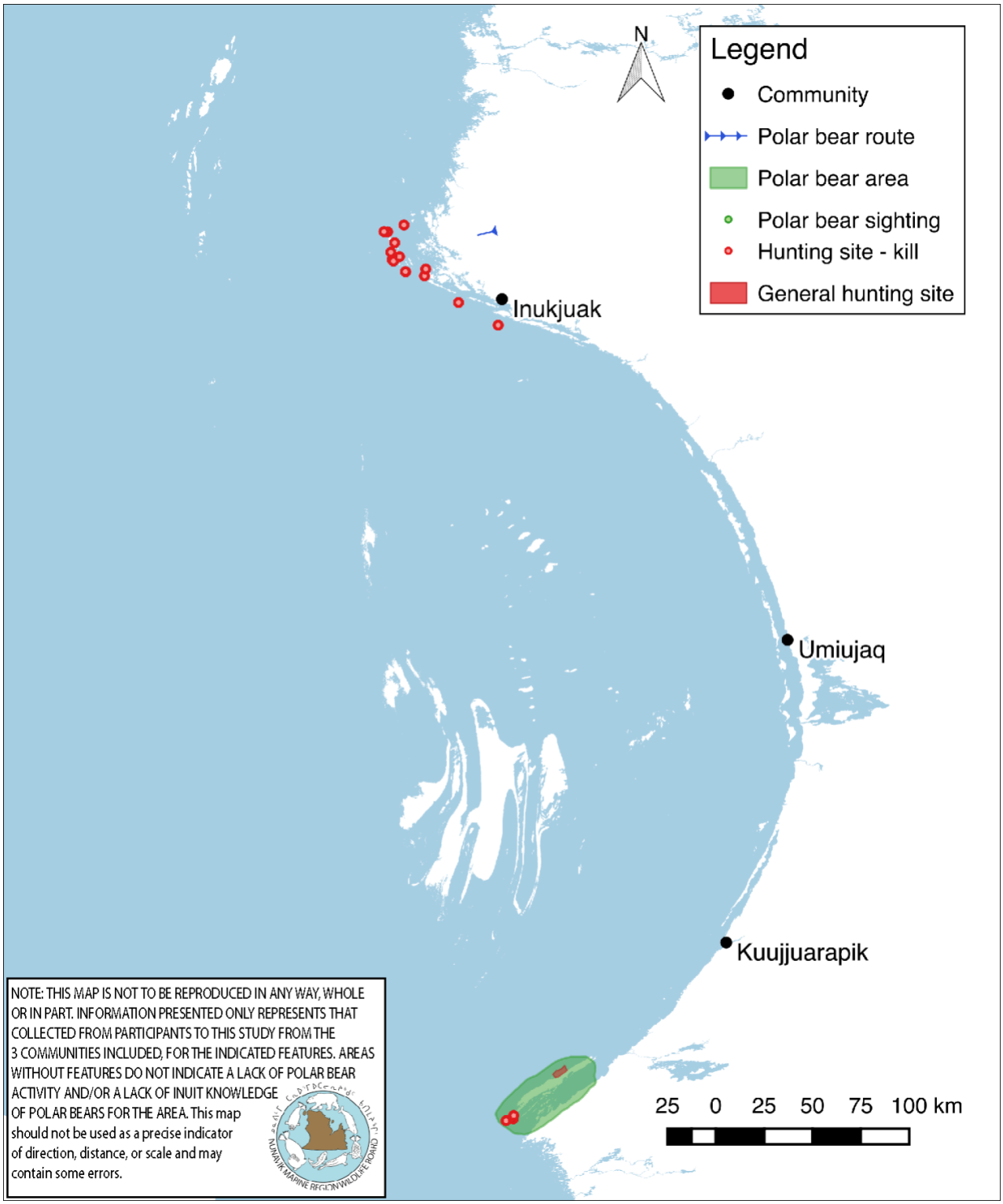


Figure 9. Map of historic (pre-1990s) distribution of polar bears.

5.5 Habitat

Many characteristics of polar bear habitat were identified during interviews. Figure 10 provides a visual representation of the most common characteristics mentioned.

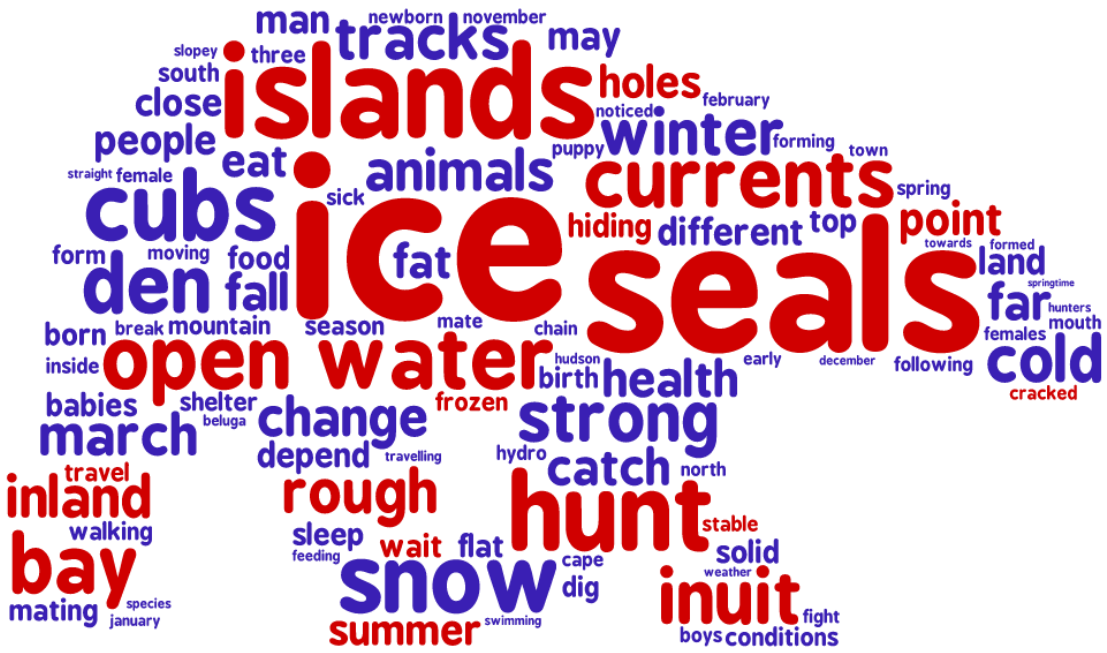


Figure 10. Word cloud indicating the 100 most common words mentioned by participants when speaking generally about polar bear habitat. Word size indicates relative frequency of word usage. Red highlights the top 20 words used when participants were asked specifically what polar bears need in their habitat to survive.

The characteristics of sea ice were identified by participants as very important aspects of polar bear habitat and influencing their access to seals. Participants spoke of bears needing the same things Inuit need when hunting seals: a stable ice platform from which to approach the floe edge and open water. Bears show a preference for areas where conditions match these characteristics, often around islands and points of land where current affects ice formation. Long island, near Kuujjuaraapik, is an example of such an area. Some participants noted that local dumps are becoming a type of habitat for bears, however most indicated less disturbed areas away from humans as prime polar bear habitat. Residents of Kuujjuaraapik indicated shallow areas on the sea ice where there tend to be seal dens.

"The least disturbed areas like if there were no people around, that's where they'll go. Where the islands are, that's where they're going to be. Every time I see polar bear, their tracks looks like they're heading to islands or shallow-what do you call it-shoal or something? Like, around there because I think there are seal dens around that kind of area so they'll go to places like that." – Resident of Kuujjuaraapik

Participants described how many of these habitat features are affected by the hydro dam and how these changes have affected polar bears. One participant spoke of these changes and their impacts on seals, particularly in relation to effect the changes in salinity have on hunting seal.

"What we're talking about when that river was dammed, we had gone to Sanikiluaq to have a feast and there was still… a lot of ice and we were not aware of something happening there. Then there was someone seeing floating seals when we were going on our way." - Resident of Inukjuak

The above quote is specifically pointing to the changes in salinity in the water column since the hydro dam has been operating. Increased freshwater released in Hudson Bay in the winter causes a phenomenon where seals sink below the surface freshwater and are suspended by the lower saltwater layer. Inuit have had this happen to seals they have hunted, making them inaccessible after a kill.

5.6 Polar bear biology

5.6.1 Feeding

The most important hunting seasons for polar bears are winter and spring when seals can be caught along the floe edge. Participants indicated that polar bears become very fat and look very healthy during this time. In all interviews seals were identified as the primary prey of polar bears. Ringed seals and the larger bearded seals were both said to be the preferred prey of polar bears. However, most participants stressed that polar bears

will eat anything that they can catch (Figure 11). Belugas and bird eggs were commonly identified as prey items. During validation in Kuujjuaraapik, one participant reported finding sculpins in a bear's stomach. Participants also reported how polar bears can and do hunt beluga whales, as opposed to just eating them as carrion. This is indicated by the scars on the backs of beluga from encounters with polar bears, which are very common.

> *"When there's a breathing hole of belugas and the open water and its freezing… there were like nine polar bears. They caught 19 belugas as they were coming up." - Resident of Kuujjuaraapik*

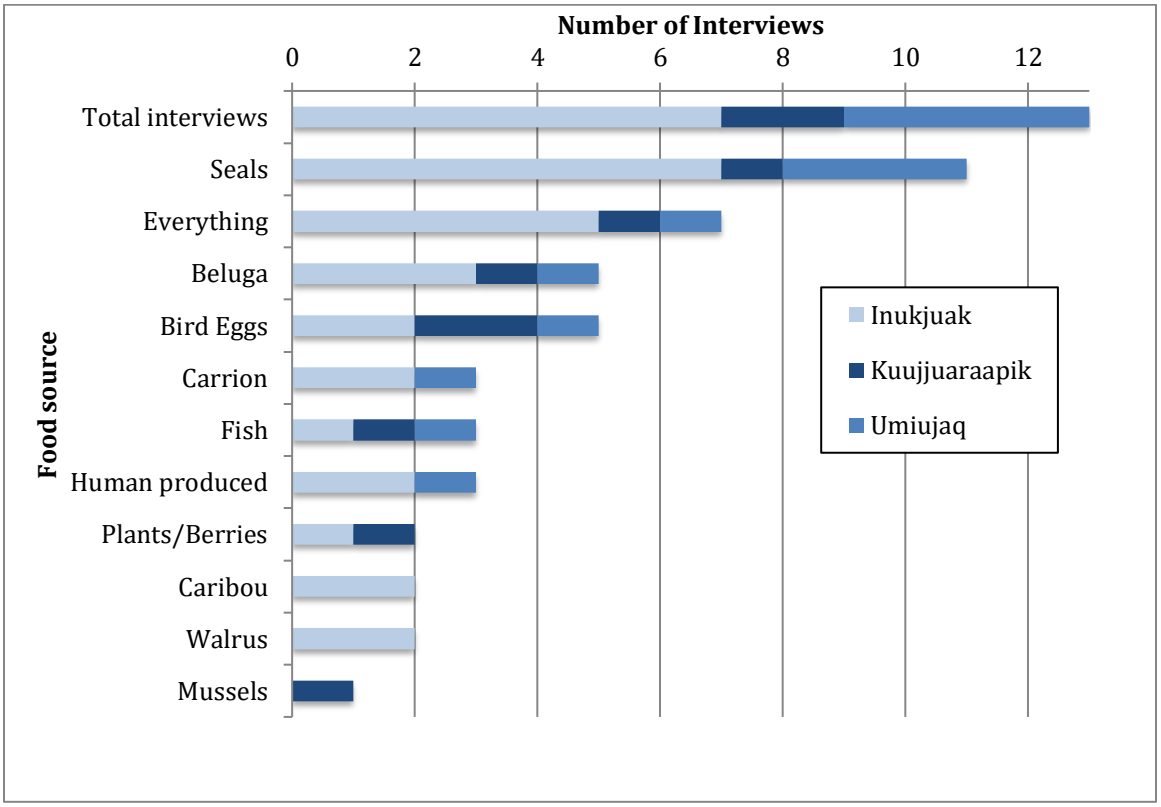


Figure 11. Food sources for polar bears ranked by the number of interviews in which they were mentioned.

Many participants indicated that when food is abundant, polar bears would only eat the fat from seals. This was supported by many observations of the stomach contents of hunted bears, which frequently contained only fat.

"Usually just fat, oil inside." - Resident of Inukjuak

"Not the meat, just the skin, blubber. Sometimes they go – I think they don't eat the whole thing. The way I see it, they just eat the blubber." - Resident of Inukjuak

"Because they eat mostly fat, then that oil is in the stomach." - Resident of Inukjuak

"Fat soup." - Resident of Inukjuak, Group 4

Some participants noted that polar bears would eat vegetation at times when they had eaten large amounts of fat. This was thought to be done to help with digestion.

"When they eat seal, when they eat the fat, seal's fat, then they eat grass and also some eat leaves, they even eat leaves." - Resident of Inukjuak

5.6.2 Health and body condition

The large majority of observations reported were of healthy bears with good condition. No participants indicated noticing parasites in bears that they had caught. However, some did indicate that parasites and infection were the reason that polar bear meat is most often eaten cooked.

"They're very healthy. Most of the bears we catch are very healthy because they have a very good hunting ground for seals because it all cracks up every day and there's floe-edge." - Resident of Inukjuak, Group 4

While most observations reported were of healthy bears, some reported occasionally seeing unhealthy individuals. Skinny bears were reported and said to be far more likely to be aggressive. Health status of bears was generally attributed to differences in their hunting skills, or occasionally to injuries obtained from fights with other bears and large animals such as walrus.

"No, I have not seen a sick bear… Although some that are not good in hunting, just like you [see with] people, they may not be as lucky then also others may be good as well." - Resident of Inukjuak

No overall trend in the number or frequency of observations of unhealthy bears over time was reported by participants. A normal annual fluctuation in body condition was reported though, with bears being skinnier in the summer and fatter in the winter and spring.

5.6.3 Mating and denning

Participants indicated knowledge of polar bear mating, as well as denning areas or specific sites (Table 5; Figure 12). Interview information on these subjects varied significantly between interviews; commonly reported and mapped information is presented in Table 5 and Figure 12, respectively.

Table 5. Mating and denning information in all three communities.

	Kuujjuaraapik	**Umiujaq**	**Inukjuak**
Denning	Dens in November to March, near coast, islands, and north of Umiujaq.	-	Den in March on coastal islands for shelter and for cubs.
Mating	Mate every 2-3 years	-	February – May
Cubs	2-3	Cubs rarely observed	2

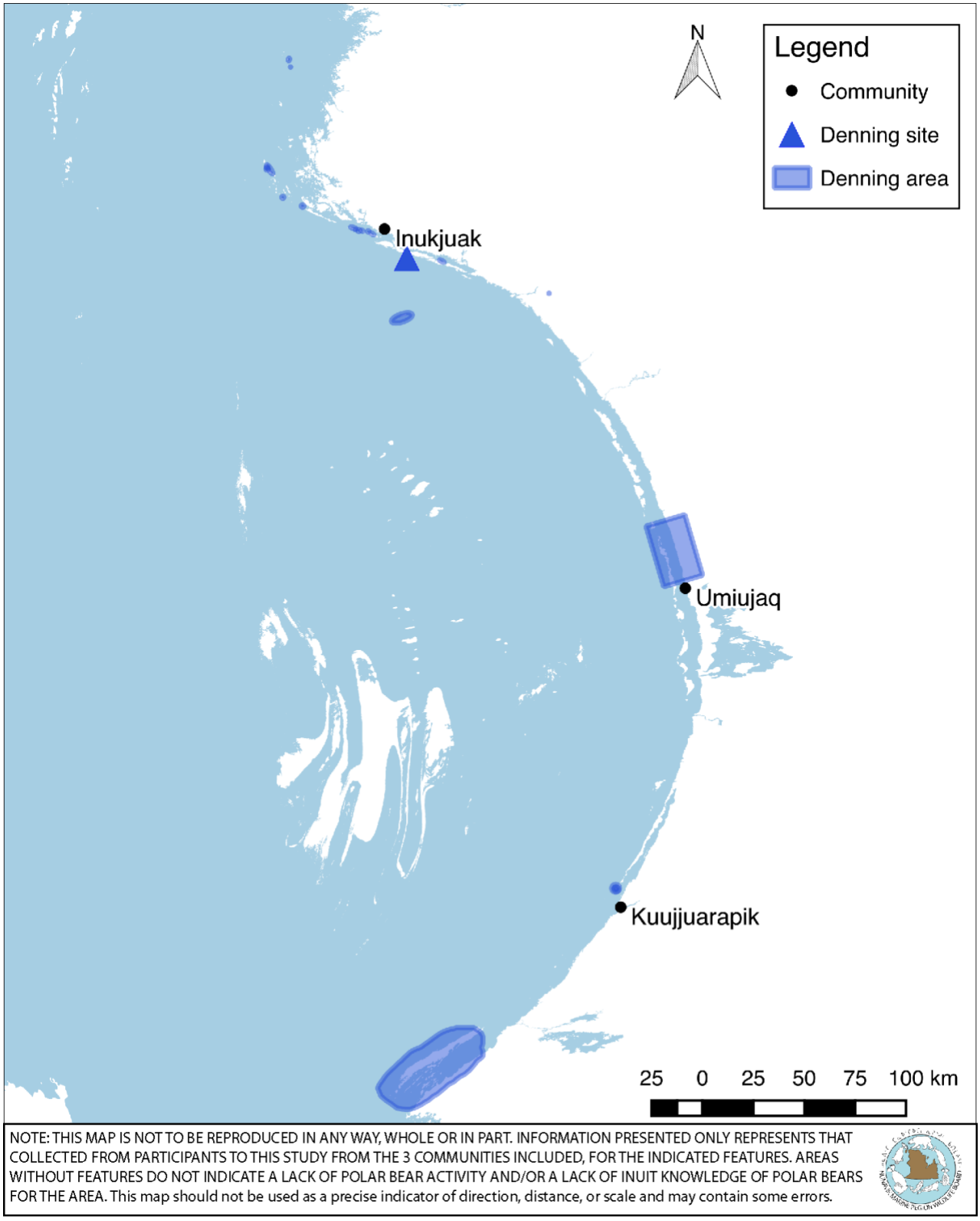


Figure 12. Map of known den locations and areas where dens are likely to be found in the SHB subpopulation range as reported by participants from three Nunavik communities.

Participants spoke of polar bears creating snow dens in the winter for use when birthing cubs, as well as for shelter when the weather was particularly bad. Generally, respondents agreed that denning started in early-mid winter (December-January) in preparation for the harsh weather. Emergence was reported to occur in late winter or early spring (February-March) in time for the best seal hunting season. The birth of cubs would occur during that timeframe. Denning generally occurred on islands, or along shorelines where snow accumulated in significant depth. Residents from Inukjuak specified that females used dens for giving birth, but that any polar bear can make a den to take shelter from harsh weather.

> *"Not only the cubbing, even those that are not cubbing. … Just to settle down. Maybe just to sleep – just to get enough sleep. … Where there's been a huge amount of snow, they make dens. This time of year they come out. … Even those that are just sleeping there [can make dens]." – Resident of Inukjuak*

Residents from Inukjuak spoke of denning and mating occurring on and around the Ottawa Islands. In general, there was little indication of denning sites being located inland. However, during the Umiujaq validation workshop, participants recounted seeing tracks of a mother and cubs coming from very far inland and were confident (based on the size of tracks and time of year) that these bears had just emerged from a den several kilometers inland. One group interview in Kuujjuaraapik indicated that they believed some denning occurs inland, as far as 10-15km into the forest.

Most participants did not speak in detail on the mating habits of polar bears. Residents from Inukjuak indicated that they believed mating occurred in February-April. Participants said that sometimes males would fight over females, and that during this time males would follow females without cubs for great distances.

5.6.4 Species interactions

Participants were asked about interactions between polar bears and other species. They indicated that, as a top predator, polar bears are not influenced very much by other species. The exception to this, noted by many participants, is bear's heavy reliance on seals.

> *"I think during summer they're down on open water and on the ice. Because I think they follow the ice. When the summer comes, the ice goes away and they follow the ice because they're following their food – seal." - Resident of Inukjuak*

> *"They go for seal non-stop, non-stop… They say no more seals but they don't know nothing… in the summertime they are in the ocean, there's lots of seals… When there's thin ice, you can see hundreds, hundreds of seals." - Resident of Inukjuak*

5.7 Stewardship of polar bears and traditional management

Some participants did not have an answer when asked about how Inuit traditionally 'managed' polar bear populations, responding that they are wild and cannot be 'managed'. For this reason, stewardship is likely a more appropriate term and is used here with recognition that it, too, may not most accurately represent the nature of the relationship between Inuit and bears.

Inuit stewardship of polar bears does not take the form of a science based wildlife management system. Rather, it can be better described as a suite of values, ideals, and unwritten guidelines meant to ensure the mutual survival of polar bears and Inuit (Kendrick 2013). Table 6 and the following quotes indicate some of these guidelines identified by participants.

Table 6. Traditional stewardship techniques mentioned in interviews in each of the three SHB polar bear subpopulation communities

	Kuujjuaraapik	Umiujaq	Inukjuak
Traditional technique	No cubs No summer hunts	No cubs No summer hunts Respect animals	No cubs No summer hunts Only hunt what you use

The values and ideals identified by participants in the SHB region can be summarized in three main categories. First, avoid harvesting cubs. Second, avoid harvesting during the summer, as the meat is less desirable and the fur is less valuable. Last, only harvest polar bears when all parts of the animal will be used, consumed, or sold. Adherence to these values and ideals was reported to help reduce the impact of hunting on polar bear populations while maintaining the relationship between Inuit and polar bears.

> *"We catch everything and anything… if there were a lot of game available and if we think that it is needed and if we have dogs that need to be fed then we catch anything that was alive. It's our tradition. It's our tradition since a long time it's been told to us that if we are not going to eat any animal not to kill it, not to touch it, not to bother it. Ever since the beginning it's our tradition not just to kill any animal if it's not going to be used. So it's the same." - Resident of Inukjuak*

Hunting primarily males (a common western conservation technique) is not a traditional method for Inuit. Inuit hunting is based primarily on need, and females are not considered more important than males for maintaining healthy population numbers. While females with cubs are given respect and not hunted if they aren't needed, many people believe focusing on males would be detrimental to the population.

> *"… for an example, in Kangiqsualujjuaq the caribou herd has diminished because they had hunted the males too much. It could be the same for polar bears… If it's going to be like that, if it's going to be just hunting males then for future… it will*

really kill the population itself… if it's going to become a law then it will truly be against our ways." - Resident of Inukjuak

"If we can talk to the polar bears [to say] 'don't come here' that would be okay, but it's impossible. So the traditional system we have now is safe for all of us. For the residents, and for the rest of the people around the world. We are keeping ourselves safe and at the same time conserving polar bears." - Resident of Inukjuak

5.8 Research and monitoring

Most participants expressed serious reservations about the type of polar bear research being done in the region. Inuit values generally dictate that wild animals should not be disturbed or played with, and many participants felt that many methods employed by scientists were too invasive.

Some believed that ear tags or collars caused stress to the bear by impacting their movement, or simply representing an unnatural burden on the animal. One participant gave an account of a bear that looked unhealthy, and was struggling with an ice-covered ear tag.

"… a very struggling bear, I caught one before. The tag was bigger than his head because of the ice was forming [on it]." - Resident of Inukjuak

The use of tranquilizer is also a concern for Inuit. There is a widely held belief that the tranquilizer ruins the meat.

"When they tag them and tattoo them and everything that's when we can't eat the meat because we don't want to eat -- like it's not natural to fill them with darts and stuff like that. So although it may wear off I guess it stays in the system of the polar bear so that's one thing that I would want to have stopped, the

people from Churchill to stop using darts to dose the animal, put them to sleep and move them to a different location… it's kind of like a waste of polar bear meat." - Resident of Inukjuak

"I hear the meat changes when someone tranquilizes it to test it, and when it goes to the blood, I really don't know about it, but prefer not to eat it, when it's tagged." - Resident of Umiujaq

5.9 Alternative stewardship/management strategies/advice for board

Participants were asked if they have any advice for the Nunavik Marine Region Wildlife Board with regards to a management strategy that could be implemented instead of, or in modification to, the quota system that is being discussed. Many participants' response to this was simply to leave things as they are, with no western management system being put in place. Some alternative suggestions were also provided.

One participant from Inukjuak strongly believed in creating a protected area encompassing nearby Avvilliit (Ottawa islands) to help protect bears from any type of development. He stressed that development is the main cause of changes in polar bear population numbers and health. and that this measure would ensure the survival of the Southern Hudson Bay polar bears. This area would remain open to hunting, as that is not considered to be a danger to polar bear populations.

"I think a good plan would be that these [Ottawa] islands… are a place for bears… because we need bears at all times… if we don't get a quota as long as we save these islands I think we will be able to manage. [It would be a] protected area from any development… We should understand that these islands are specifically reserved for polar bear… Hunting is okay… No development." - Resident of Inukjuak

Others did not have specific suggestions regarding approaches to management, but wanted to emphasize things the Board should take into consideration in making any decisions. Those who work and live around polar bears, and who have the best knowledge of them, were individuals considered to be the best suited to make such decisions.

> *"Listen to the community, like I said, who has the best area for polar bears… yeah, listen to the community, the people." - Resident of Umiujaq*

5.9.1 The quota system

When expressing views on a potential future quota system for polar bear hunting in the region, perspectives varied between communities (Table 7). Most expressed views against the imposition of a quota system. If a quota was to be imposed, participants shared perspectives on a community-based quota system that would take into consideration the harvesting ability of the community in the determination of community allocations or argued for equal allocation to each community. Most thought that any system should be flexibly managed over multiple years.

Table 7. Participant opinions towards the potential of a quota system on polar bear hunting in Nunavik, and the number of interviews in which perspectives were expressed in each community (percentage in parentheses).

Community		Kuujjuaraapik	Umiujaq	Inukjuak	Total
	Total Interviews in Community	**2**	**4**	**7**	**13**
In support of quota			1 (25%)		**1 (8%)**
Against quota		1 (50%)		3 (43%)	**4 (31%)**
Willing to work with quota, if necessary	**Community quota-based on harvest ability**			1 (14%)	**1 (8%)**
	Equal allocation to each community		25% (1)		**1 (8%)**
	Flexible quota over multiple years	1 (50%)		2 (29%)	**3 (23%)**
	Regional quota			2 (29%)	**2 (15%)**

It is important to note that most interviews indicated a lack of support for a quota system. Table 8 summarizes the most common reasons why participants argued against a quota for polar bears in the region.

Table 8. Common arguments against a quota system for managing polar bear hunting in Nunavik, and the number of interviews in which each argument was expressed (percentage in parentheses).

Community		Kuujjuaraapik	Umiujaq	Inukjuak	Total
	Total Interviews	**2**	**4**	**7**	13
Arguments against instituting a quota	**Safety**		1 (25%)	2 (29%)	3 (23%)
	Inuit traditional management preferred	1 (50%)		1 (14%)	2 (15%)
	Quota leads to more hunting			1 (14%)	1 (8%)

Participants were asked what they thought of a quota system, and what it would mean for polar bear populations, and for Inuit in the region. One participant from Inukjuak brought attention to the fact that polar bears are dangerous animals, and that limiting hunting could create hazardous situations.

> *"We have no control over polar bears going to this area. We cannot limit the numbers of polar bears going in there. So for us establishment of quota or total amount of [kill] is meaningless to us. If they impose quotas on us they'll put us in danger. There will be more polar bears around and we have to be scared all the time. We have to be prepared all the time." - Resident of Inukjuak*

Participants pointed out that the quota system could even have a reverse effect for polar bear population size.

> *"If there was a limitation like the voluntary agreement… it works fine, but once we start having like the quota system… I think people go crazy… The hunters agree to the quota but when it's from the government you know they'll say you*

can only catch 15 so people will scramble to catch the polar bears." – Resident of Inukjuak

The concept of limiting the number of animals that can be taken by a community is at odds with the Inuit approach to hunting. Many hunters are content to wait for the opportunity to hunt any animal, including polar bears. There was concern expressed that if a limit on the number of polar bears to be taken is put in place then individuals would worry that they would not be allowed to hunt a polar bear if and when the opportunity arose. This may lead to higher polar bear harvests earlier in the year than would otherwise happen in the absence of a quota system. Some participants have claimed that this is already the case for other species such as beluga, and it causes hunters, especially young people, to rush to make sure they don't miss their opportunity.

To mitigate this effect, and to account for annual variation in abundance, one participant suggested that if there must be a quota, it should span more than one season or year. This would allow hunters to harvest more in years when there are more bears, and less in years when they are less available.

"So, a quota instead of having a quota for a year, you have a quota that's for like three years or a quota for five years so it accounts for the years where there's no polar bears." - Resident of Kuujjuaraapik

Participants were concerned with how quotas would be distributed across communities or sub-regions in Nunavik as well. Concerns ranged from wanting one quota for very large areas, to shared quotas between communities, to wanting each community to have its own quota.

"Yeah, my big concern is with zoning. I would like to see none of it, with one quota system because the polar bear that we're hunting is the same thing. He's going to be in that area tomorrow and the next day he's going to be in another area." - Resident of Kuujjuaraapik

In the end, what every participant wanted is a fair system. Many believe that any quota system will be unfair, and counterproductive. However, some believe in the necessity (or at least eventuality) of a quota system, and simply want it to be implemented in a way that takes into consideration the concerns of all the people that are affected by it.

6.0 Discussion

A 2011/2012 survey of SHB Polar Bears, estimated the subpopulation at 943 bears, and the subpopulation is considered stable (Obbard et al. 2013). Bears in this sub-population occupy sea ice, costal, inland and island areas of Nunavut, Quebec and Ontario. As in other regions of the circumpolar North where Inuit reside, bears from this sub-population have been a central part of culture and survival for generations and the knowledge of these animals and the environment in which they exist is diverse and significant. The interviews with hunters and Elders in the three Nunavik communities presented in this report are evidence of that rich knowledge and represent a significant contribution to future management and stewardship discussions regarding these animals.

6.1 Ecological and biological information

Participants to this study provided a wealth of traditional and observation-based biological information on polar bears (see sections 5.4, 5.5, 5.6). This information provides significant insight into the status of polar bears in the region, and specifics about their behaviour and habitat. Figures 7, 8 and 9 (movement and distribution maps) provide insight into the general geographic areas that are used by polar bears and how this may have changed over time. Perhaps most importantly, these maps indicate areas that have been frequented by polar bears in recent years, as well as historically. These overlapping areas may be of specific importance to polar bear populations, and may indicate areas of important or critical habitat.

This study also highlights the importance of seals in the diet of polar bears, consistent with scientific findings (Derocher et al. 2002; Thiemann et al. 2008). Participants spoke of other food sources that polar bears make frequent use of as well, namely bird eggs and beluga whales, which could be an avenue of further investigation given the concerns about polar bears losing access to ringed seals with changing ice conditions (Stirling and Parkinson 2006; Thiemann et al. 2008; Iverson et al. 2014).

6.1.1 Considerations

While identifying a wealth of knowledge and observations by Inuit of polar bears in the region, it is important to acknowledge that the information in this report is limited to that shared by participants of this study. It therefore does not represent all possible Nunavimmiut knowledge of polar bears from the region. This limitation is especially important to remember when there is an apparent absence of information. Further, as with any study of this type, results of the interviews may be influenced by factors such as the interviewer's gender or familiarity with the culture, and loss of information through translation (Brook and McLachlan 2005). While qualitative methods (e.g. purposeful sampling strategy) were used to ensure the quality and reliability of the results presented here, it is important to recognize these limitations. An example of a situation where the information could be misinterpreted is in regards to information collected on denning (Section 5.6.3, Table 5, Figure 12). The majority of information gathered indicated that polar bear denning occurs along shorelines of the coast and on islands. Few participants indicated polar bear dens farther inland - only one observation recounted during the validation workshop in Inukjuak and in one interview in Kuujjuaraapik indicated this possibility. However, since the information gathered represents a minimum of ecological data on denning in the region, it does not suggest that denning does not occur inland. Indeed, denning sites were not well known to all participants, including those on shorelines and islands. Therefore, it is possible that inland dens would go unnoticed by participants, due to many factors including, for example, participants spending less time

inland than along shorelines, or inland dens occurring in areas that are less accessible (Martinez et al. 2016).

Denning is just one example of how traditional ecological data could be misinterpreted or misrepresented. Other biological and ecological data such as information on feeding behavior and diet, habitat selection, health, and patterns in movement can be misinterpreted the same way. Similarly, it is important to remember that the absence of information in this IK study should not be used to indicate a lack of priority, knowledge or understanding of a topic among Inuit. When this knowledge is considered for decision making, whether alone or alongside results from scientific and other studies, it is important to note these issues that influence its interpretation and ultimately its use (Furgal and Laing 2012).

6.2 Polar bears and Nunavimmiut

The roles that polar bears play in the lives of Nunavimmiut are varied and diverse. These roles are affected by both a long history of interactions, as well as the current status of bear populations, and contemporary cultural and societal pressures from both within and outside Inuit culture. It is also clear from the results of this study that the importance of polar bears to Nunavimmiut is not limited to the tangible, visible gains from hunting bears. Likewise, the role of polar bears in the lives of Inuit goes beyond their important position in Arctic ecosystems. It is clear from the results presented here that polar bears occupy a unique position in the psyche of Inuit of this region that goes beyond that which is typical of most other animals. Whether through actual vocabulary or subtle inferences, many participants speak about polar bears in a way that implies more of a species-to-species relationship rather than a human-resource interaction. Participants often spoke about polar bears in a way that implied a feeling of kinship, or even reverence, and of bears occupying a special role in Inuit culture. For Inuit, polar bears can play the role of prey, competitor, or even a dangerous predator. The nature of a human-bear interaction is entirely situational, and can change quickly. Considering these points, it stands to

reason that having respect for polar bears was a common theme when participants spoke about both interactions with bears, and traditional management and stewardship.

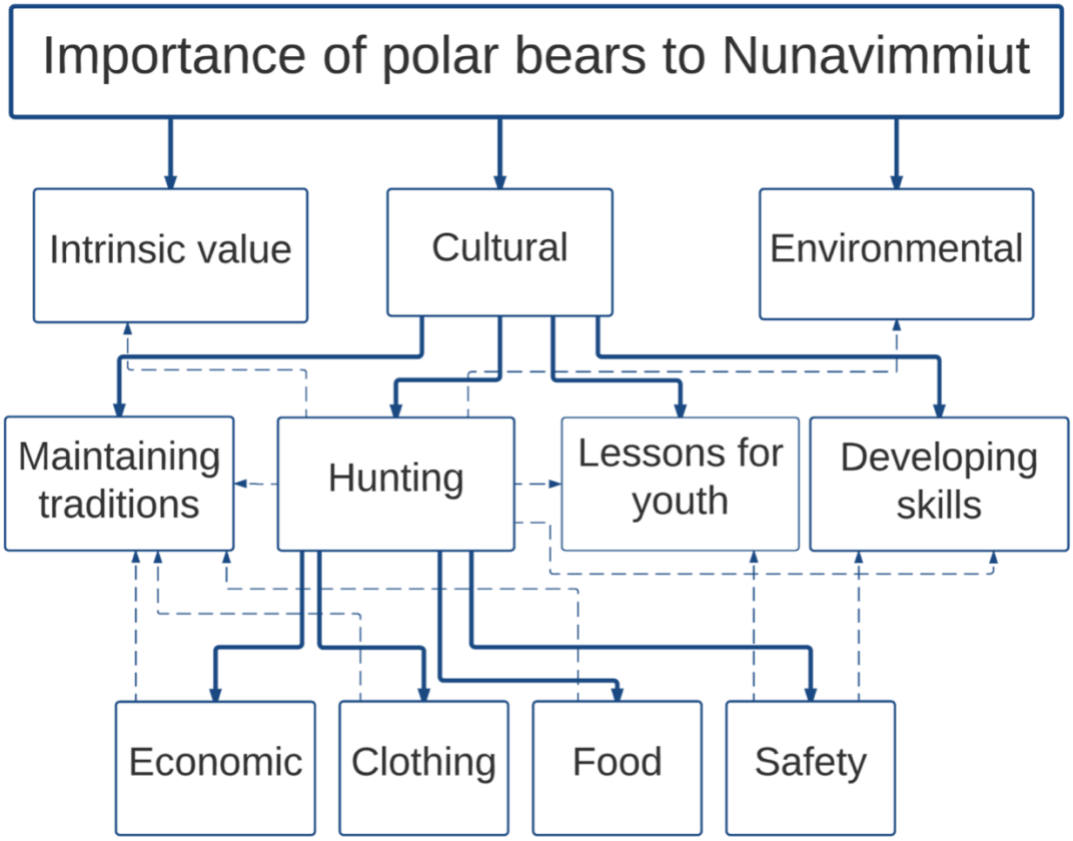


Figure 13. Flowchart showing the ways polar bears were indicated to be important to participants, and the complex relationships between them.

The results of this study show that SHB polar bears are important to Nunavimmiut for many different reasons, as both a cultural and natural resource. While it is useful to demonstrate and discuss the variety of individual reasons for which polar bears are important, it must also be acknowledged that these reasons are largely interrelated (Figure 13). For example, the use of polar bear hides as an economic resource is not isolated from the ways in which polar bears are a cultural resource. Money has become a necessity for Inuit, stemming from colonial influences. Even for those individuals maintaining a subsistence livelihood of hunting, some level of income has become a requirement. The economic benefit of a polar bear hide can be essential in supporting the

maintenance of culture, by allowing individuals to support themselves financially, while maintaining cultural practices.

6.3 Abundance and conservation

The majority of participants in all three communities believe that polar bear numbers have either stayed stable or increased, at virtually any time scale, greater than a single year. Several participants were aware of the general international perception that polar bears are endangered, and felt strongly about pointing out that this is not the reality for them. Indeed, Environment Canada lists the SHB sub-population as “stable” (ECCC 2017).

Recognition of the complex relationship between polar bears and Nunavimmiut dictates that there is a great deal to consider in terms of what is important for polar bear management and conservation. While most of the world is concerned mainly with the conservation and ecological aspects of polar bear management, for Nunavimmiut polar bear management affects a suite of important issues fundamental to life in the North. For Inuit living in the SHB range in Nunavik concern over the status of polar bear populations is considered alongside issues fundamental to livelihood such as personal safety, food and economic security, cultural identity, and the intergenerational transmission and retention of knowledge. Unlike many other stakeholders, polar bears affect the daily lives of Inuit. While their conservation was considered important by study participants, given the indications that populations are seen as healthy in the area, the need for implementing new conservation measures and practices was not necessarily considered important, especially when considered alongside other factors.

6.4 Management, stewardship and quotas

A primary objective of this study is to inform the NMRWB of the knowledge and values of Inuit of the three communities to help inform the Board's consideration regarding the establishment of a Total Allowable Take for polar bear hunting within the SHB polar bear

range, as requested by the Government of Canada. Overall, while most participants do not favour the implementation of a quota, several factors identified by participants in section 5.9.1 could make a quota more acceptable, and less at odds with traditional practices. Creating competition between hunters, communities, and regions is a damaging side effect that many participants spoke directly about. Most of the suggestions regarding the implementation of a quota would serve to mitigate the competition created, and are aimed at maintaining traditional Inuit stewardship practices and a system of fairness among communities at the same time.

It was clear that participants are concerned with both the health of polar bear populations, as well as the aspects of Inuit livelihood which are closely associated and integrated with polar bears. In order for conservation and management of polar bears to be effective, it is essential that any rules, measures, or regulations represent the needs of, and respect the people they affect (Berkes 2009). A quota system is not considered ideal by most of the participants of this study, and every effort should be made to ensure that the implementation of any quota takes into account the concerns and desires of participants to the highest degree possible.

6.5 Conclusions

This project gathered observations and knowledge from 25 Inuit elders, hunters and other individuals in the three Nunavik communities within the Southern Hudson Bay polar bear sub population boundary. While it can only represent the knowledge and observations of the participants involved, and should not be taken to reflect the entirety of Nunavimmiut knowledge on the topic, the information presented as both narrative and mapped features within this report is illustrative of the depth and breadth of Inuit knowledge, to be considered in future discussions and actions on polar bears in the NMR.

7.0 References

Berkes, F. 2009. Evolution of co-management: role of knowledge generation, bridging organizations and social learning. Journal of environmental management 90(5): 1692-1702.

Brook, R. M., and S. M. McLachlan. 2005. On using expert-based science to "test" local ecological knowledge. Ecology and Society 10(2): r3.

Creswell, J. W. 2009. Research design: Qualitative, quantitative, and mixed methods approaches. 3rd ed. Thousand Oaks, CA: SAGE.

Davis, A and J.R. Wagner. 2003. Who Knows? On the importance of identifying "experts" when research local ecological knowledge. Human Ecology 31(3): 463-489.

Derocher, A. E., Wiig, Ø., and M. Andersen. 2002. Diet composition of polar bears in Svalbard and the western Barents Sea. Polar Biology 25(6): 448-452.

Environment and Climate Change Canada. 2017. Maps of Global and Canadian Sub-populations of Polar Bears and Protected Areas. https://canada-preview.adobecqms.net/en/environment-climate-change/services/biodiversity/maps-sub-populations-polar-bears-protected.html

Furgal, C., and R. Laing. 2012. A Synthesis and Critical Review of the Traditional Ecological Knowledge Literature on Narwhal (*Monodon monoceros*) in the Eastern Canadian Arctic. DFO Can. Sci. Advis. Sec. Res. Doc. 2011/131 iv + 47 p.

Garshelis, D., Stapleton, S., Peacock, E., and Atkinson, S. 2012. Foxe Basin polar bear aerial survey, 2009 and 2010 Final Reort. Government of Nunavut.

Henri D., Gilchrist H.G., and E. Peacock. 2010. Understanding and Managing Wildlife in Hudson Bay Under a Changing Climate: Some Recent Contributions From Inuit and Cree Ecological Knowledge. In: Ferguson S.H., Loseto L.L., Mallory M.L. (eds) A Little Less Arctic. Springer, Dordrecht

Huntington H. 1998. Observations on the utility of the semi-directive interview for documenting traditional knowledge. Arctic 51(3): 237-242.

Intergovernmental Panel on Climate Change. 2014. Fifth assessment report (WGII AR5) of the IPCC (2014) on climate change Chapter 28—Polar Regions. IPCC, Singapore.

Iverson, S. A., Gilchrist, H. G., Smith, P. A., Gaston, A. J., and M .R. Forbes. 2014. Longer ice-free seasons increase the risk of nest depredation by polar bears for colonial

breeding birds in the Canadian Arctic. Proceedings of the Royal Society of London B: Biological Sciences 281: 20133128.

Kendrick, A. 2013. Canadian Inuit sustainable use and management of Arctic species. International Journal of Environmental Studies Vol. 70 (3): 414-428.

Kitchin, R. and N. Tate. 2000. Conducting research in human geography: theory, methodology and practice. Harlow: Pearson Education Limited.

Laidre, K. L., Stern, H., Kovacs, K. M., Lowry, L., Moore, S. E., Regehr, E. V., ... and E. W. Born. 2015. Arctic marine mammal population status, sea ice habitat loss, and conservation recommendations for the 21st century. Conservation Biology 29(3): 724-737.

Letcher, R.J., Bustnes, J.O., Dietz, R., Jenssen, B.M., Jorgensen, E.H., Sonne, C., Verreault, J., Vijayan, M.M. and G. W. Gabrielsen. 2010. Exposure and effects assessment of persistent organohalogen contaminants in arctic wildlife and fish. Science of the Total Environment 408: 2995-3043.

Martinez-Levasseur, L.M., Furgal, C.M., Hammill, M.O., and G. Burness. 2017. Challenges and strategies when mapping local ecological knowledge in the Canadian Arctic: the importance of defining geographic limits of participants' common areas of observations. Polar Biology 40(8): 1501-1513.

McKinney, M. A., Peacock, E. and R. J. Letcher. 2009. Sea ice-associated diet change increases the level of chlorinated and brominated contaminants in polar bears. Environmental Science & Technology 43: 4334-4339.

Nunavik Inuit Land Claims Agreement (NILCA). Accessed from http://www.aadnc-aandc.gc.ca/eng/1320425236476/1320425393532

NVivo qualitative data analysis Software; QSR International Pty Ltd. Version 10, 2014.

Obbard, M.E., Thiemann, G.W., Peacock, E. and T. D. DeBruyn (eds). 2010. Polar Bears: Proceedings of the 15th Working Meeting of the IUCN/SSC Polar Bear Specialist Group, Copenhagen, Denmark, 29 June–3 July 2009. pp. 235. IUCN, Gland, Switzerland and Cambridge, UK.

Obbard, M.E., K.R. Middel, S. Stapleton, I. Thibault, V. Brodeur, and C. Jutras. 2013. Estimating abundance of the Southern Hudson Bay polar bear subpopulation using aerial surveys, 2011 and 2012. Ontario Ministry of Natural Resources, Science and Research Branch. Wildlife Research Series 2013-01. 33pp.

Peacock, E., Taylor, M. K., Laake, J. and I. Stirling. (2013), Population ecology of polar bears in Davis Strait, Canada and Greenland. The Journal of Wildlife Management 77: 463–476. doi:10.1002/jwmg.489

Polar Bear Range States. 2015. Circumpolar Action Plan: Conservation Strategy for Polar Bears. A product of the representatives of the parties to the 1973 Agreement on the Conservation of Polar Bears.

Saldana, J. 2013. The Coding Manual for Qualitative Researchers, 2nd ed. Thousand Oaks, CA: SAGE.

Stirling, I. and A. E. Derocher. 2012. Effects of climate warming on polar bears: a review of the evidence. Global Change Biology 18: 2694-2706.

Stirling, I., and L. C. Parkinson. 2006. Possible effects of climate warming on selected populations of polar bears (*Ursus maritimus*) in the Canadian Arctic. Arctic 59(3): 261-275.

Stroeve, J. C., Kattsov, V., Barrett, A., Serreze, M., Pavlova, T., Holland, M., AND W. N. Meier. 2012. Trends in Arctic sea ice extent from CMIP5, CMIP3 and observations. Geophysical Research Letters 39(16): L16502

Taylor, M. and J. Lee. 1995. Distribution and abundance of Canadian polar bear populations: A management perspective. Arctic 48**,** 147–154.

Taylor, M. K. et al. 2001. Delineating Canadian and Greenland polar bear (*Ursus maritimus*) populations by cluster analysis of movements. Can. J. Zool. 79**,** 690–709.

Taylor, M.K., Lee, J., Laake, J. and McLoughlin, P.D. 2006. Estimating population size of polar bears in Foxe Basin, Nunavut, using tetracycline biomarkers. Government of Nunavut, Department of Environment, Final Wildlife Report. Iqaluit.

Thiemann, G. W., Iverson, S. J., and I. Stirling. 2008. Polar bear diets and arctic marine food webs: insights from fatty acid analysis. Ecological Monographs 78(4): 591-613.

Tobias, T. N. 2010. Living Proof: The essential data collection guide for indigenous use-and-occupancy map surveys. Union of British Columbia Indian Chiefs, British Columbia, 486pp.

Wiig, Ø. et al. 2015. *Ursus maritimus*. The IUCN Red List of Threatened Species 2015. 8235.

8.0 Appendices

Nunavik Inuit Knowledge of Polar Bears

(Consent Form, Participant Index and Interview Guide)

Consent Form

Nunavik Inuit Knowledge of Polar Bears

(Ursus maritimus)

Primary Contact – Wildlife Liaison Officer: Bobby Epoo
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In 2014 the Nunavik Marine Region Wildlife Board (NMRWB) will coordinate a Nunavik wide research project to collect and document Nunavik Inuit Knowledge of polar bears (*Ursus maritimus*). This study is led by the NMRWB and is being conducted in partnership with researchers at Trent University. The purpose of this initiative, which is funded through the NMRWB, is to gain a better understanding of polar bear ecology and biology as well as traditional stewardship practices and the importance of polar bears for Nunavik Inuit. The results of this project will be presented to the NMRWB as part of their public hearing process and will help to inform their decisions for establishing Total Allowable Take (TAT) of polar bears in the Nunavik Marine Region (NMR).

My participation will consist of attending one 1-3 hour interview, either individually or with fellow hunters.

This information will be collected and recorded on a digital tape recorder (if I provide consent) or by personal note-taking. Some information will also be documented through drawings on a map. It is intended that there is no risk in participating in this project and I should feel comfortable with its nature at all times.

I understand that the contents will be used in a research project report to the NMRWB and potentially in other publications, which stem from this research. It is possible that media releases relating to the report may occur, but the information is not intended for any commercial use.

I understand that my confidentiality will be respected. No personal identifiers such as my name will be utilized and the information I provide will be used in a collective sense.

However, if there are circumstances where the researcher wishes to use a direct quote from my interview in any publication, I give them permission: **yes** ☐ **no** ☐

If ***yes***, I would like to have a made up name or term (e.g. 'resident of Inukjuak') instead of my real name ☐

or I would prefer to be attributed by my real name ☐

All information will be stored at the NMRWB office in Inukjuak, Nunavik, and will only be accessible to project team members, thought it is subject to access to information. A copy of this information will also be stored at Trent University during the project.

My participation in this project is voluntary and I am free to withdraw from the project at any time. I can refuse to participate and refuse to answer any questions. If I decide to withdraw from the project, any information I have given will be promptly destroyed and will not be included in the project in any way. I understand that my withdrawal will have no consequences and no judgements or prejudice will be held against me. I will receive compensation for my time after the completion of the interview and if I decide to withdraw my interview after it is completed, my payment will not be revoked.

There are two copies of the consent form, one of which I may keep for my records.

By signing below, I (_____) agree that I have been fully informed and understand the nature of the project, and agree to participate.

_____ _____
Signature of Respondent Date

_____ _____
Signature of Researcher - Witness Date

By signing below, I authorize the inclusion of my name in the acknowledgements section of the final report.

_____
Respondent's Authorization

Copy of interview transcript requested yes ☐ no ☐
If you would like it emailed to you please write email: _____
Copy of final written materials requested yes ☐ no ☐

I consent to be involved with the following activities:

Involvement (check all that apply)
I agree to take part in an:

___ Interview

Recording (check all that apply)
I agree to have my contributions to the project recorded using:
___ audio recording
___ audio & video recording
___ photographs
___ maps

Contact Address: _____
_____
Email: _____
Telephone: _____

– Protect this form when filled –

Participant information

Name: _____ Age: _____
Last First
Gender? M F

Interview information

Date : _____ Location: _____
yy-mm-dd *(general description; address; coordinates)*

Interpreter/Translator: _____
Last *First*

Interviewer(s): _____
Last *First*

Other people present (interview participants): _____

_____

_____

Consent form: ☐ Yes at the interview

Other information: _____

_____

_____

– Protect this form when filled –

INTRODUCTION TO PROJECT PURPOSE AND OBJECTIVES

This project is focused on Nunavik Inuit Knowledge (NIK) of polar bears and is being led by the Nunavik Marine Region Wildlife Board (NMRWB). There is currently very little documented NIK for the region, which leaves a significant gap in the understanding of polar bears. It is particularly important to address this gap in the context of the upcoming decisions related to establishing Total Allowable Takes (TAT) for the three polar bear populations (South-Hudson Bay, Fox Basin and Davis Strait) in the Nunavik Marine Region (NMR). The results of this work will help to ensure that the NMRWB has access to the best available information in order to make these decisions.

The main objective of this project is to document NIK of polar bear ecology and biology in Nunavik. Additionally, there is interest in learning more about the role and importance of polar bear to Inuit and traditional Inuit approaches to stewardship of polar bears, including best practices related to hunting.

Individual and small group interviews will be held in all 14 Nunavik communities throughout 2014. In each community, meetings will first be held with LNUK members in order to share information related to the project, identify key individuals to participate in the interviews, and to collect secondary data (e.g. harvesting records). Interviews will be done in three sessions related to the three sub-populations of polar bears, beginning with the South-Hudson Bay population. Following the interviews, preliminary reports for each population will be presented back to the communities for verification and validation, and to the NMRWB. The final reports, including a comprehensive report for all of Nunavik, will incorporate suggestions and additions from the verification and validation feedback. All documents will be available in English and Inuttitut.

For interviewers:

- Questions should be asked using an unbiased approach (i.e. not leading the participants). The first question is the most open-ended but additional questions are provided to prompt participants in the case that the first question was not easily understood (i.e. did not elicit a significant response) and to gain additional insights.
- Examples of issues or solutions should be used only if participants are stuck or unable to understand the intent of a question.
- Use map to record any observations which are associated with a location discussed by participants.

QUESTIONS

PART 1: Participant background information

Expert Information

- Where and when were you born?
- How long have you lived in this community?
- What other communities have you lived in?
- Did you hunt in those areas? If yes, where, when and amount of time?
- How old were you when you first hunted polar bears? (year?)
- How often do you hunt polar bears?
- Where are polar bear hunting areas? (*Draw on map*) Where have you hunted?
- Are there areas where you used to hunt but no longer hunt polar bears? If so, why it is that those areas were abandoned?
- Who do you hunt with?
- At which time of year do you hunt polar bears? Has this changed? Explain (earlier, later, shorter season)?
- What are the best practices for hunting polar bears? What methods and techniques do you use to hunt? Have your techniques, strategies changed over time or since you first hunted bears? If yes, how?
- What equipment do you currently use to hunt? Has that changed? If yes, how?

Importance of Polar Bears

- Are polar bears important to you? Why?
- When was the first time you got a polar bear? Can you tell me about that hunt? What did it mean to you, how did you feel?
- When was the last time you were polar bear hunting? Can you tell me about that hunt? Was it a successful hunt? (How many days were you out? Who was with you?)
- If you got a bear, what did you do with the hide? The meat? Any other part?
- What did it mean to you to go on that hunt? How did it make you feel?
- Do you eat polar bear meat?
- Is it important for you to continue to harvest polar bears? Why?
- Is it important for other Nunavimmiut to continue to harvest polar bears? Why? (Cultural? Economic? Food? Safety?)
- What do young Inuit learn from hunting polar bears? Why is this important for them? Can they learn these things from hunting any other animals or is there something particular about a polar bear hunt?

PART 2: Biology and Ecology of Polar Bears

Distribution and Migration

- At which times of the year do you see polar bears? Tracks? Do you see tracks inland?
- Where do you see polar bears? (*record on map*)

- Do you see family groups (i.e. females and cubs)? Size of groups?
- Do you also see males? Groups?
- Do males/females/family groups arrive in the area at the same time of year?
- Where are they coming from? (Direction? Inland? From ice?)
- Has the timing or location of where you see bears changed since you started hunting them? How?

Feeding

- Do you observe polar bears feeding while they are in the area?
- What are polar bears eating? How do you know that is what they are eating?
- Do you ever look at polar bear stomach contents? (If yes, can you identify any species?)
- Has anything changed about what the bears are eating? If yes, what? What tells you this?

Body Condition

- Do the polar bears you see look healthy? How can you tell?
- Are bears fat when you see them?
- Do you ever observe sick/dead polar bears? What have you observed?
- Do you ever see polar bears with bugs or worms on or in them?
- Do bears behave differently depending on their condition?
- Has their body condition changed in general since you started hunting? If yes, when and how?

Mating and Denning

- Do you know when and where polar bears mate? (*record on map*)
- Do you know when and where polar bears den? (*record on map*) (Differentiate between dens for shelter vs. birthing dens)
- How many cubs do you usually observe with a female?
- Has anything about where and when polar bears mate or den changed? If yes, what?

Habitat

- What makes for good polar bear habitat? For feeding? For denning?
- Have there been changes in the environment that have meant changes in polar bear habitat in the areas of Nunavik you hunt or travel ? If yes, how is this affecting polar bears?
- Does the health of bears depend on the health of other animals? If so, are you observing any changes in regards to interactions with other species?

Additional Behaviour

- Do bears that have been collared/tagged behave differently? Explain.
- Are there any other behaviours of bears or changes in their behaviour you have observed that you would like to discuss?
- Has anything about polar bear behaviour changed since you started hunting them that you would like to discuss?

Abundance

- How frequently do you see polar bears?
- When do you typically see them?
- Have you noticed any changes in the number of bears you see? Adults? Cubs and juveniles? Males? Females? Females with cubs?
- Are there natural fluctuations in the number of bears?
- Are there different groups / sub-populations of bears in your area? Can you tell the difference?
- Has anything else about the numbers of bears or how often you see them changed since you started hunting them?

PART 3: Interactions

Human – Bear Interactions

- Do you see bears while doing other things than specifically looking for and hunting polar bears?
- Do bears ever come into your community?
- Are there, or has there been any issues with these encounters? Aggressive bears?
- Has there been any destruction of cabins? Or individuals hurt?
- Has the frequency or location of these interactions changed since you started hunting bears? (more or less?)

Hunting Preference

- Do you have a preference of which type of polar bear to hunt? Male / female? Age? Size? Why?
- Is it easy to tell the sex of a bear before it is hunted?
- Do you hunt cubs? If so, why?
- Has anything changed about the bears you prefer to hunt or your ability to tell the difference between males and female bears?

Harvest Monitoring and Sampling

- How many bears have you hunted on average in the past 5 years? 10 years? Is this different from earlier hunting you have done?
- Do you always complete the Quebec hunter return form? If not, why?
- Do you always use the tags? If not, why?
- Have you ever harvested a bear that had previously been captured (i.e. w/ ear tags, lip tattoo, collar, etc.)? If so, did you report the tag numbers? If not, why?
- Has your reporting of harvests changed over the years?
- Are you aware of the sampling program run by Makivik?
- Do you send samples and take measurements of bears? If not, why? (Too much work? Not enough compensation? Lack of result communication? Not interested? Do you think it is not right to do this?)
- Does it ever happen that a bear has been shot, but cannot be recovered? Are these instances reported?
- Do you know of any incidences of poaching? (harvesting by non-beneficiaries)

Stewardship of Polar Bears

- For your community, what are traditional practices related to polar bear hunting? (Seasonal restrictions? Avoidance of certain groups or individual bears? Avoidance of areas that are important for bears (e.g. denning sites)?)
- Do you believe the number of bears hunted is sustainable? Should the number taken be increased? Decreased? How can you tell?
- The NMRWB is in the process of establishing a Total Allowable Take (TAT) for all populations of polar bears, as requested by Canada's Minister of Environment. Do you have any advice for the board as they make these decisions? Do you have any suggestions for an alternative management system to a quota system?

Extent of knowledge

- For each season can you draw the extent of where you are familiar and have knowledge and experience of the area. Not specific to polar bear. (Where you hunt, fish, travel, camp)

CLOSING

Is there anything else that you would like to add or think we should know about polar bears in Nunavik, what is changing, or their importance to you and other Inuit? Do you have any other concerns related to bears in the region?

THANK YOU

Thank you for your time and sharing your information in this interview.

The interview team held interviews in (name previous communities and times) and will also be holding interviews in (name next communities and times). In all interviews, experts, like yourself, are being asked to discuss similar issues in relation to their communities. Once interviews are completed preliminary findings will be shared with the NRWRB. Any publications related to this work will only be published following full verification by participants and subsequent approval by the NMRWB. Any reports will be shared with all communities.

If you have any questions about the project or the information you shared please contact any of the people listed on the Consent Form to get more information.

Thank you!