Results of Polar Bear Indigenous Knowledge Workshops in Inuvik, NWT Canada to Inform Northern and Southern Beaufort Integrated Population Model

Prepared for

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Inuvik, Aklavik, Tuktoyaktuk, Paulatuk, Sachs Harbour, and Ulukhaktok
Hunters and Trappers Committees

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July 10, 2023

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ACRONYMS

COY	Cubs-of-the-year
ECCC	Environment and Climate Change Canada
HTC	Hunters and Trappers Committees
I-I	Inuvialuit-Iñupiat
IK	Indigenous Knowledge
IPM	Integrated Population Model
NB	Northern Beaufort
NSB	North Slope Borough
SB	Southern Beaufort
SRB&A	Stephen R. Braund & Associates
WMAC (NS)	Wildlife Management Advisory Council North Slope
WMAC (NWT)	Wildlife Management Advisory Council Northwest Territories

ACKNOWLEDGEMENTS

Stephen R. Braund & Associates (SRB&A) would like to first and foremost express their gratitude to the 16 knowledge holders from Aklavik, Inuvik, Sachs Harbour, Ulukhaktok, Tuktoyaktuk, and Paulatuk for providing their valuable time, observations, and knowledge during the polar bear Indigenous Knowledge (IK) workshops. SRB&A would also like to thank the Wildlife Management Advisory Council (WMAC) Northwest Territories (NWT), the WMAC North Slope (NS), Environment and Climate Change Canada (ECCC), and the North Slope Borough (NSB) Department of Wildlife Management in Alaska for their efforts on the project. These organizations provided valuable insight and guidance in developing interview questions that are relevant to polar bear management and contributing to the development of methods to integrate information from IK into an integrated population model (IPM). Furthermore, these organizations provided workshop coordination and funding contributions which were integral to the success of the project.

EXECUTIVE SUMMARY

In 2020, the Wildlife Management Advisory Council (WMAC) NWT for the Northwest Territories portion of the Inuvialuit Settlement Region in Canada, the North Slope Borough (NSB) in Alaska, and the WMAC North Slope (NS) of Canada's Yukon North Slope, jointly contracted Stephen R. Braund and Associates (SRB&A) and Eric Regehr (hereafter "study team") for the project "Incorporating Indigenous Knowledge of Northern and Southern Beaufort Sea Polar Bears into an Integrated Population Model" (hereafter "IPM-IK project"). The purpose of the project was to develop a potential framework for incorporating Indigenous Knowledge (IK) as a source of information for generating an integrated population model (IPM) for Southern Beaufort Sea (SB) and Northern Beaufort Sea (NB) polar bears and employing IK to guide the research/project process (SRB&A and Regehr 2022).

In 2021, SRB&A recommended that the scope of the project be expanded to include IK data collection for the purpose of implementing the IK framework and incorporating the IK directly into the NB/SB IPM. In August of 2022, SRB&A traveled to Vancouver, B.C. to attend the Inuvialuit-Iñupiat (I-I) joint commissioners meeting to present on the work completed to date for the project and to collect feedback on SRB&A's proposed data collection protocol. After revising the protocol based on the feedback provided in Vancouver, SRB&A traveled to Inuvik in October of 2022 to conduct IK workshops regarding the SB and NB polar bear subpopulations with representatives of the six communities of Inuvik, Aklavik, Tuktoyaktuk, Paulatuk, Sachs Harbour, and Ulukhaktok. This report presents the draft results of those workshops for review by WMAC NS, WMAC NWT, and the Hunters and Trappers Committees (HTCs) associated with the six communities.

During the week of October 2-8, 2022, Stephen Braund and Paul Lawrence of SRB&A traveled to Inuvik and, following the protocol, worked with active and knowledgeable polar bear harvesters from the six Canadian study communities to document polar bear IK based on participants' knowledge and observations, focusing on IK that could best fit into an IPM.

The IK workshops were organized around the following nine primary topics:

1. Establishing an Area of Observation
2. Relative Abundance
3. Bear Age
4. Bear Sex
5. Body Condition
6. Litter Size
7. Mortality
8. Prey Population Status
9. Polar Bear Harvest Sustainability and Value of Information

Study communities provided input on all the above topics including contextual information such as how to tell how old a bear is, distinguishing between male and females, and what factors affect body condition. In addition they conducted proportional piling exercises, which is a method to arrive at quantitative/numeric data using a fixed amount of beans (or other countable/weighable objects) to generate proportions during participatory exercises. The piling results have the potential to be the most useful for inputs into the IPM due to their quantitative nature.

Based on the pilling results for relative abundance, three communities noted an increase in polar bear abundance over the last 10 years and the other three communities noted no change. For bear age, the most consistent theme was the relative lack of older bears or reduced percentage of old bears compared to 10 years ago. In terms of relative proportions of males to females today, only Sachs Harbour reported more males than females in their area of observation; all other communities noted a greater proportion of females than males. For body condition, four of the six communities reported the majority of bears encountered today to be either average or fat and that the overall trend appeared to be a smaller proportion of bears that were fat or very fat today compared to 10 years ago. For litter size, female bears with two COYs are the most common in all areas of observation, and in terms of yearlings, five of the six communities reported that two yearlings with their mother are still the most common followed by one yearling and then three yearlings. Only one community noted a change in litter size (increasing) in the past 10 years. For mortality, all communities agreed that it was exceedingly rare to encounter a dead bear, a sick bear, or a bear killing or eating

on another bear. Within the last 10 years only five incidences of sick or dead bears were recalled, and one Ulukhaktok hunter recalled one incident of a skinny bear scavenging on another skinny bear that he had just shot. Finally for prey abundance status, four of the six communities characterized the ringed and bearded seal populations as high based on their observations while hunting and traveling. Sachs Harbour and Ulukhaktok characterized the overall seal population as low based on the extreme lack of seals in their area in the past summer.

The final section of the protocol was to understand what the most important signs are for whether a polar bear population is doing well and what types of scientific information local people find valuable. Discussion regarding important signs for polar bear general abundance focused on three primary topics: (1) number of cubs and COYs (2) overall number of tracks and bears observed and (3) ice conditions. Positive observations in these areas not only tell communities that the polar bear population is doing well but also that the community can continue in their current harvest practices. Workshop participants reported that sampling programs that test contaminants and health of bears, information on DNA and age of bears, and harvest reports and population estimates that are interpreted by wildlife managing agencies within an IK-informed context are useful to local people. Participants agreed that population estimates are the most important information from a polar bear model, but that the information needs to be collected in the most humane way possible, and models should show that IK and science work together and do not clash or negate one another.

1 INTRODUCTION

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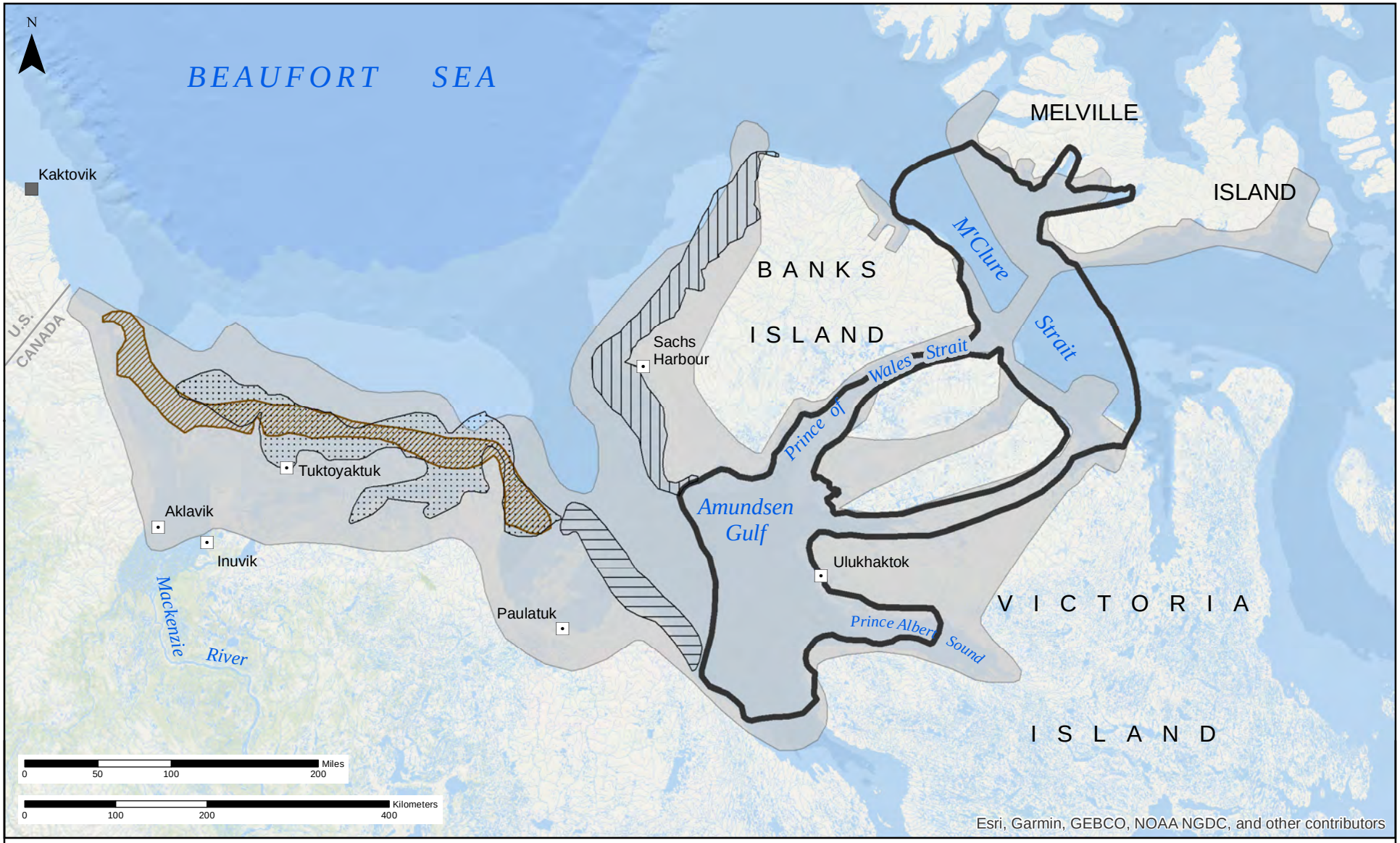

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Area of Observation
- Aklavik/Inuvik
- Paulatuk
- Sachs Harbour
- Tuktoyaktuk
- Ulukhaktok

Geographic Extent of Inuvialuit PBTK (Source: Joint Secretariat 2015)
- Other Community
- Workshop Community

SRB&A
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POLAR BEAR IK WORKSHOP
COMMUNITY AREAS OF OBSERVATION
MAP 1

11/30/2022

2 METHODS

2.1 PRE-FIELD

For the IK data collection phase of this project, the study team developed the workshop protocol and workshop methods while the WMAC NWT and WMAC NS staff coordinated workshop logistics and selection of workshop participants. Beginning in the fall of 2021, WMAC NWT began reaching out to the HTCs in the six Inuvialuit Region communities to request they identify two to three polar bear knowledge holders to attend the workshops and speak for their community's polar bear IK. Each HTC provided a list of potential workshop participants to WMAC NWT and reached out to the nominated individuals to request their participation in the upcoming workshops. Once confirmed, WMAC NWT staff arranged flight, lodging, and honorarium logistics with each of the workshop participants for the October 2022 workshop.

Prior to the workshops, the study team developed a draft of the protocol based on the two years of initial work for this project (see SRB&A and Regehr 2022). During the first two years of the project, the study team conducted a literature review of IPMs, assessed methods to incorporate IK into IPMs, developed a framework and methodology for incorporating IK into an IPM, and identified and reviewed the adequacy of available IK for inclusion in the SB and NB IPM. The literature review indicated that while there is an increasing body of knowledge related to IK and ecological modeling, there was little precedent for systematically integrating IK into an IPM. Therefore, the study team developed a framework to incorporate IK into IPMs based on Regehr, Hostetter, Wilson, Rode, Martin, and Converse (2018); original thinking based on the combined study team experience in IK, social science, and ecological modeling; and adaptation of approaches that have been used to incorporate IK into other types of models. Furthermore, based on an assessment of the IK studies reviewed, the study team determined that additional IK information was needed to address data gaps (i.e., areas where IK information was lacking) or to better inform key IK variables that are related to polar bear population dynamics and therefore are most useful to an IPM, such as Bear Age, Bear Sex, Body Condition, Mortality, and Relative Abundance.

The protocol development and overall workshop methods also benefited from several valuable outside reviews. SRB&A received input from Dr. Dominique Henri, a Research Scientist at the Wildlife Research Division of Environment and Climate Change Canada with training in human geography and ecological anthropology. Recognizing that numeric data fits best to an IPM, Dr. Henri's primary contribution was the suggestion of a data collection technique known as proportional piling, which is a method to arrive at quantitative/numeric data using a fixed amount of beans (or other countable/weighable objects) to generate proportions during participatory exercises with interviewees. This technique has been used for wide range of social science research applications from participatory epidemiology for the Food and Agriculture Organization of the United Nations (Mariner and Paskin 2000) to research on the health of neighboring polar bear populations in Davis Strait (Tomaselli, Henri, Pangnirtung Hunters and Trappers Organization, Mayukalik Hunters and Trappers Organization, Akavak, Kanayuk, Kanayk, Pitsiulak, Wong, Richardson, and Dyck 2022). The benefits of proportional piling compared to other ranking exercises is that it allows for finer scale of qualitative responses (e.g., response of high/moderate/low can be equated with number value versus only classifying responses as high/moderate/low) and is reproducible way of quantifying ethnographic responses (Elhadi 2011; Mariner and Paskin 2000).

The study team also coordinated with and received input from both Alaskan and Canadian IK and western science representatives at the I-I Joint Commission meeting in Vancouver, B.C. on August 16-17, 2022 regarding the study team's proposed IK data collection protocol and workshop methods. Finally, the study team received valuable suggestions and insight from WMAC NWT, WMAC NS, and Environment and Climate Change Canada (ECCC) staff. After receiving the various inputs, the study team revised the protocol and conducted several internal practice interview sessions to test the protocol and proportional piling methods. Prior to the workshop, WMAC NWT provided the list of protocol questions (Appendix A) to the HTCs and workshop participants so that they could be aware of the type of questions and seek information from other members in their community regarding the topics as the workshop participants were being asked to speak on behalf of their community's IK knowledge regarding polar bears. Appendix A contains the protocol and cue cards used to guide the workshops.

2.2 FIELD

During the week of October 2-8, 2022, Stephen Braund and Paul Lawrence of SRB&A traveled to Inuvik and, following the protocol, worked with active and knowledgeable polar bear harvesters from the six Canadian study communities to document polar bear IK based on participants' knowledge and observations, focusing on IK that could best fit into an IPM. One workshop occurred each day with two study communities present. As discussed above, proportional piling exercises with beans were the primary method of quantitative data collection employed in the workshops. During the workshops, each community was provided with a pile of beans weighing 300 grams and asked to divide the pile between the various response categories associated with each question (e.g., proportion of very skinny, skinny, average, fat, and very fat bears in their area today and 10 years ago for comparative purposes). The various piles of beans were weighed on a scale and the weight in grams was recorded during the workshops directly into a Microsoft Excel table with corresponding figure outputs. SRB&A staff took contextual notes as verbatim as possible on a laptop to aid in understanding the underlying reasons or observations associated with each piling exercise.

In total, 16 participants from the six study communities participated in the IK workshops. All participants reviewed an informed consent and specified how they wanted their information to be used and shared (see Appendix B for consent form). Participants were offered the choice of remaining anonymous or having their name used in the report. It should be noted that Aklavik and Inuvik workshop participants requested that they provide their IK for the two communities combined and worked together to provide a consensus for the two communities in response to the protocol questions. Additional WMAC NS and NWT staff as well as two observers, one each from Aklavik and Tuktoyaktuk, participated in the workshops throughout the week and provided input and knowledge for many of the questions. Table 1 provides a summary of the IK workshop participants by community. All participants were recommended for the workshops based on their long-standing knowledge of polar bears near their community.

Table 1: Summary of IK Workshop Participants Characteristics

Community	Date of IK Workshop	Number of Participants	Gender	Age Range	Range of Years in Study Community
Aklavik	10/4/2022	4	Male	26-60	25-60
Inuvik	10/4/2022	2	Male	58-64	8-18
Sachs Harbour	10/5/2022	1	Male	64	55
Ulukhaktok	10/5/2022	3	Male (2); Female (1)	59-73	59-63
Tuktoyaktuk	10/6/2022	3	Male	59-68	59-68
Paulatuk	10/6/2022	3	Male	60-71	45-57

Photograph 1: Tuktoyaktuk and Paulatuk workshop and proportional piling exercise for bear body condition. Left to right: Noel Green (Paulatuk), Reuben Green (Paulatuk), Steve Ilasiak (Paulatuk), Paul Lawrence (SRB&A), Édouard Bélanger (WMAC NS), Rosemin Nathoo (WMAC NWT), Hanna Currie (WMAC NWT), James Pokiak (Tuktoyaktuk), Jim Elias (Tuktoyaktuk), Lennie Emagok (Tuktoyaktuk).[1] Photo by Stephen Braund (SRB&A).

[1] Workshop photos depicting participants from Inuvik, Aklavik, Sachs Harbour, and Ulukhaktok are fewer in this report due to some participants' requests for anonymity.

As shown in the table, the participants' age range was between 58-73 for all communities except Aklavik (26-60). Most of the individuals had lived the majority of their lives in their study communities, except for the two in Inuvik who originally came from Tuktoyaktuk. In general, respondents were asked about their community's polar bear IK observations from the last 10 years compared to present (2022) to identify if there were any changes or trends in the various protocol topics; some individuals reported on events 15-20 years ago, as that was when they noticed the biggest change.

2.3 POST- FIELD

After conclusion of the fieldwork, SRB&A returned to Anchorage, Alaska and began to summarize the information received during the workshops. Similar to an IK study conducted in 2018 for the Chukchi Sea polar bear subpopulation, SRB&A distilled the IK for many of the protocol questions into short summary table outputs to potentially serve as key inputs into the IPM (see Appendix C). Additional IK gathered during the workshops provided context for the primary questions and table outputs and community input into the issue of polar bear management. It should be noted that the concept of integrating IK into an IPM is relatively new, and the study team anticipates that methods of incorporating IK into the IPM will be refined and improved based on future scientific and local community reviews and IK workshops. As a first step in the review process, SRB&A prepared this summary report for review by the relevant HTC organizations, WMAC NS, and WMAC NWT to confirm that the IK information presented in this report is accurate, and that SRB&A adequately captured the IK and any associated explanations or context for the various topics.

3 RESULTS

The IK workshops were organized around the following nine primary topics:

1. Establishing an Area of Observation
2. Relative Abundance
3. Bear Age
4. Bear Sex
5. Body Condition
6. Litter Size
7. Mortality
8. Prey Population Status
9. Polar Bear Harvest Sustainability and Value of Information

The subsequent results are organized around these nine primary topics with subheadings for each of the key themes addressed under each topic. For each of the questions with specific application as potential inputs into the IPM, SRB&A attempted to synthesize the information into succinct summary tables (Appendix C). SRB&A also evaluated the information in terms of completeness, adequacy, and any contextual information that would inform the results and potential applications into a model. All discussion and workshop results presented in the subsequent sections are a product of the workshop discussions and represent the information from the perspective of the study communities. Throughout the report, the quantitative results and contextual discussion are supplemented by direct quotes from workshop participants. All direct quotes are provided in the style shown below.

Workshop Quotes

[Topic]: [Subtopic]

Quote

3.1 AREA OF OBSERVATIONS AND OTHER CONTEXTUAL INFORMATION

This section of the workshop focused on identifying each community's unique area of observation that corresponded to the polar bear IK that they shared during the workshop. Participants were asked to draw on a map the area in which their community hunted or observed polar bears during any part of the year. These areas were then

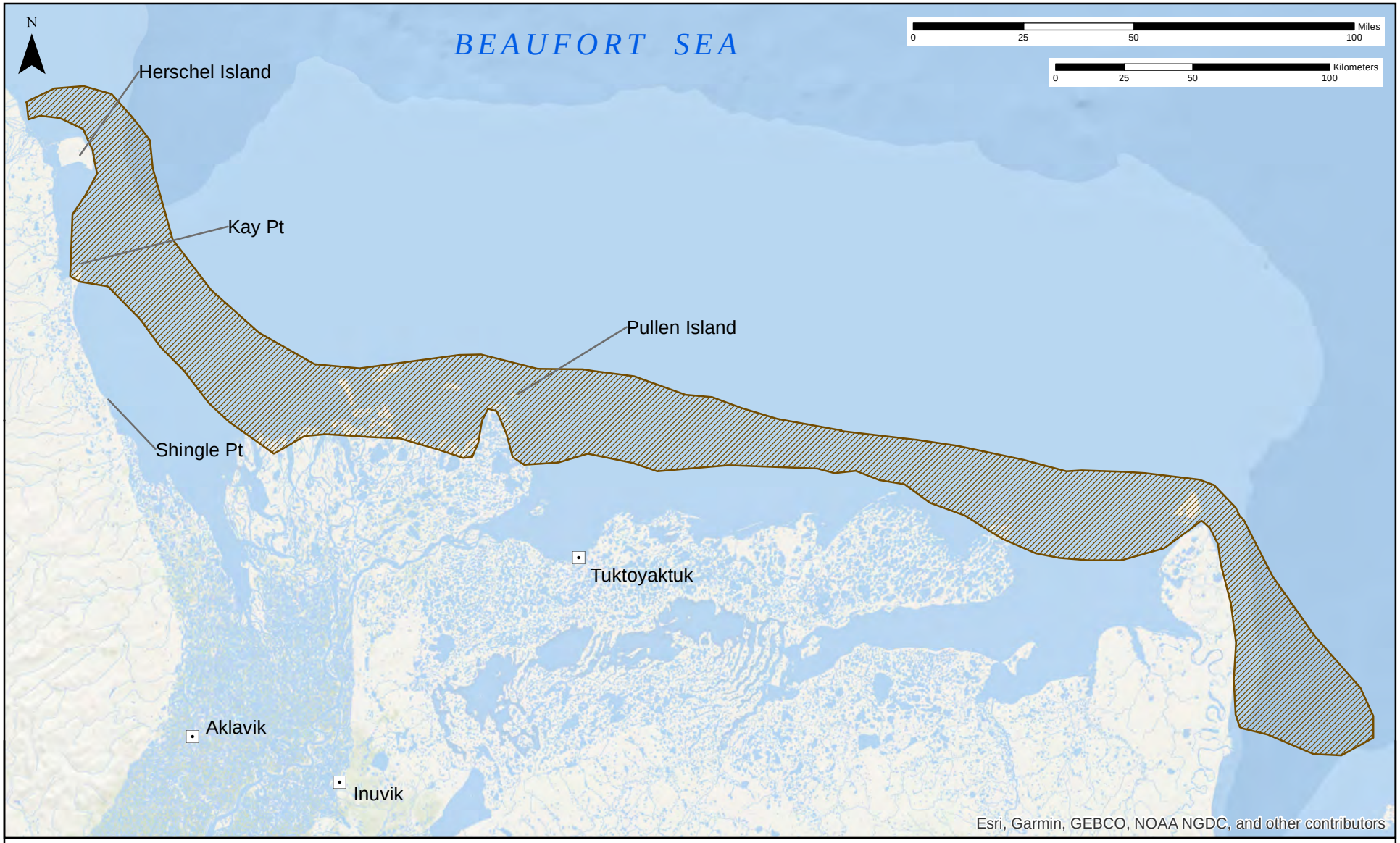
referenced throughout the workshop when asking protocol questions. Map 2 through Map 6 display each community's area of observation; Aklavik and Inuvik drew a shared area of observation during their workshop. It is critical for the IPM modeler to know the spatial extent of the IK information, and the goal of this section of the workshop was to establish that spatial extent.

Photograph 2: Paulatuk respondents drawing area of observation. Left to right, Steve Ilasiak, Reuben Green, Paul Lawrence, Noel Green. Photo by Stephen Braund (SRB&A).

In addition to identifying their area of observation, workshop participants provided other contextual information to help inform the remainder of the workshop. These topics included the approximate number of polar bear hunters in the community, whether polar bears hunts are primarily targeted or opportunistic, environmental conditions affecting access to bear hunting areas, and proximity of bears to the individual communities. During the first workshop, SRB&A also added questions regarding the purpose of the hunt and timing of the hunt.

3.1.1 Number of Polar Bear Hunters and Timing of Hunt

Regarding the number of polar bear hunters in their community, workshop participants reported a range of approximately 8-10 in Aklavik to about 30 in Sachs Harbour (Table C-1). The remaining four communities reported a high of between 15-20 hunters in their respective communities. Ulukhaktok reported that the numbers of active hunters are highest during the spring, which is the primary time during which polar bear hunts occur and is also a time when the younger generations are going out and learning to hunt. In general, all communities stated that the majority of hunts occur during the spring months as the days get longer. Some late fall/early winter (Oct-Dec) hunts do occur but are not as common and are targeted at males only, as females are preparing to den during that time. By April/May, polar bear hunting comes to a close.



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Area of Observation

Aklavik/Inuvik

Workshop Community

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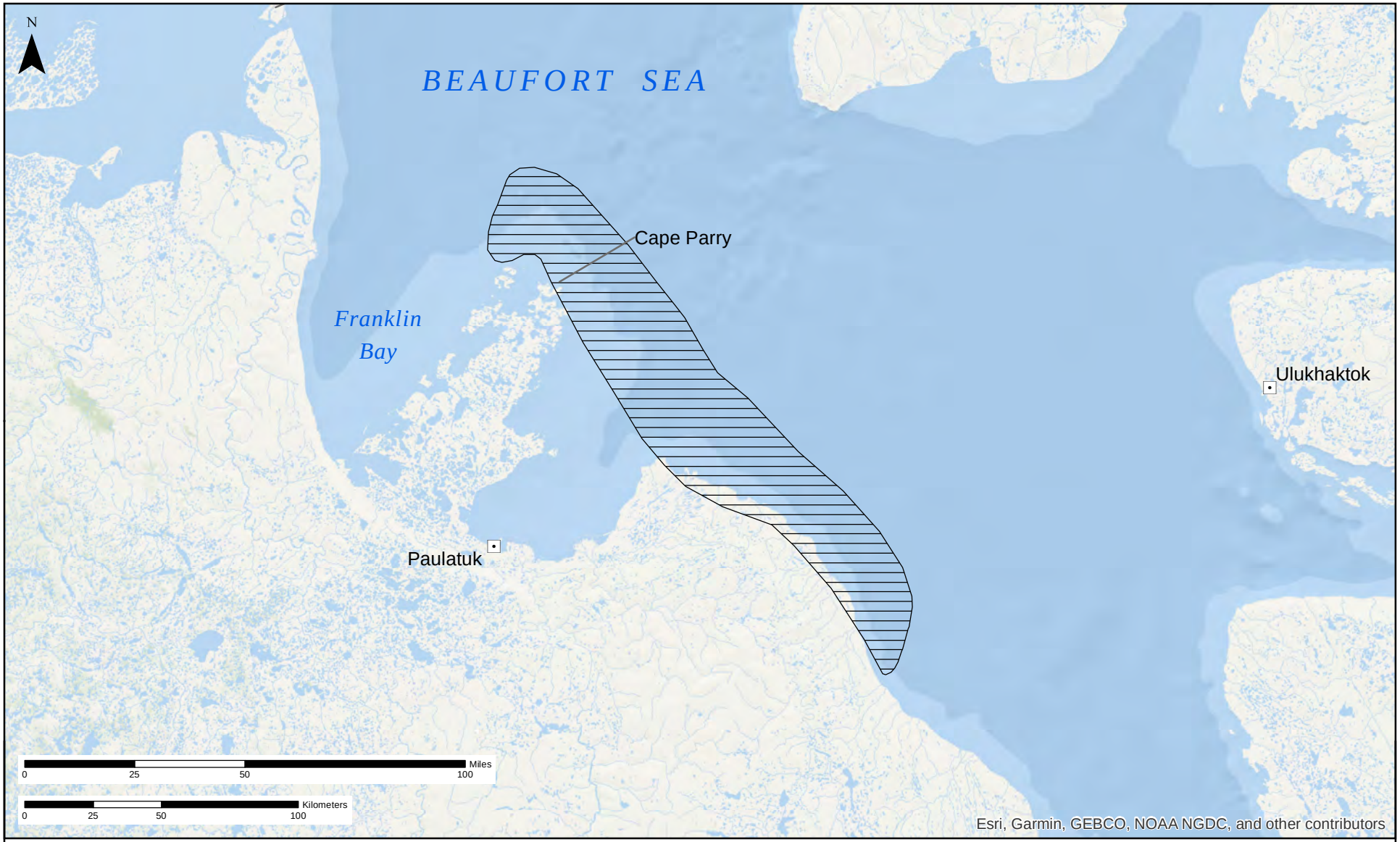
POLAR BEAR IK WORKSHOP
AKLAVIK/INUVIK AREA OF OBSERVATION

MAP 2

11/30/2022



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Area of Observation

Paulatuk

Workshop Community

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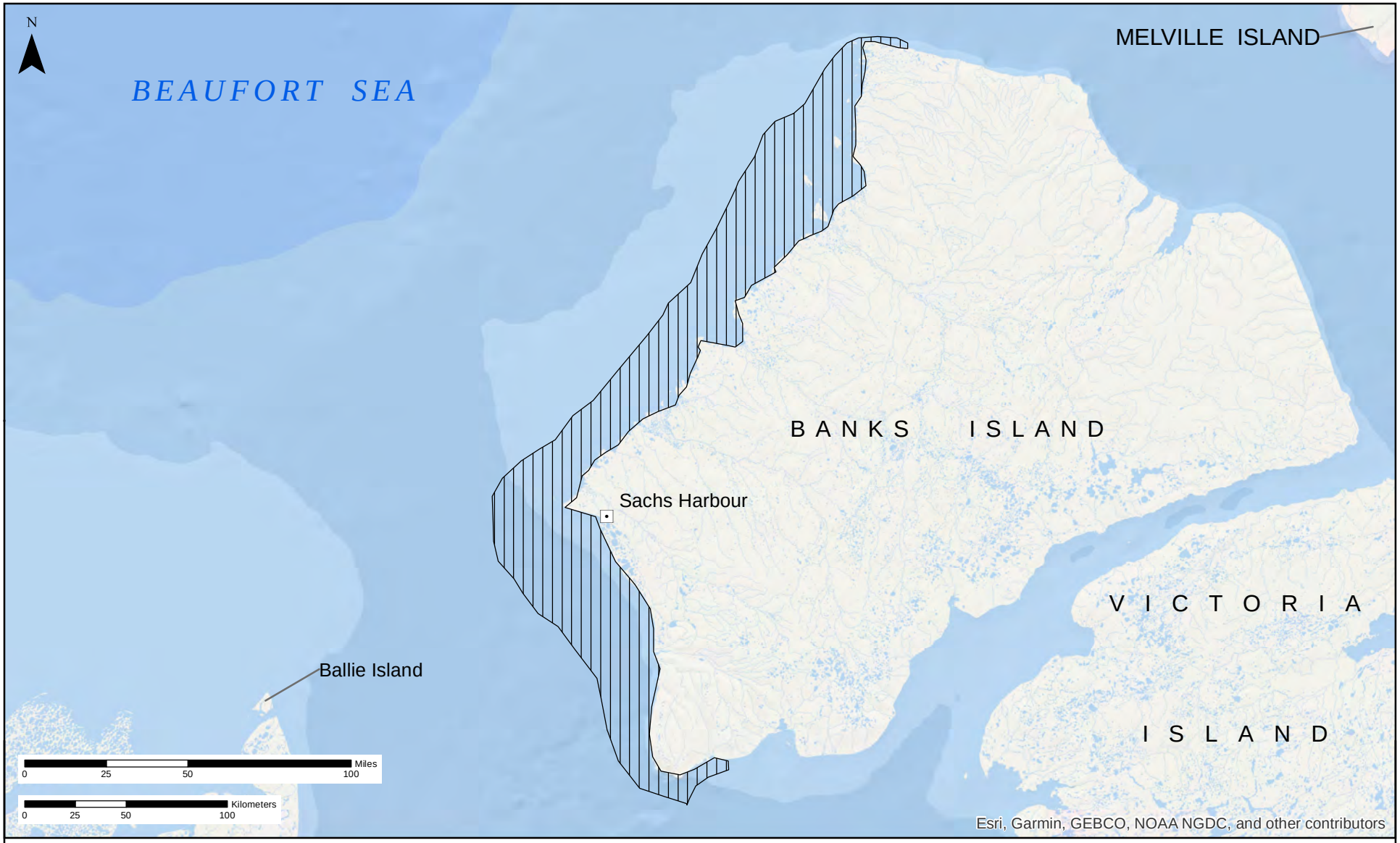
POLAR BEAR IK WORKSHOP
PAULATUK AREA OF OBSERVATION

MAP 3

12/1/2022



Area of Observation

Sachs Harbour

Workshop Community

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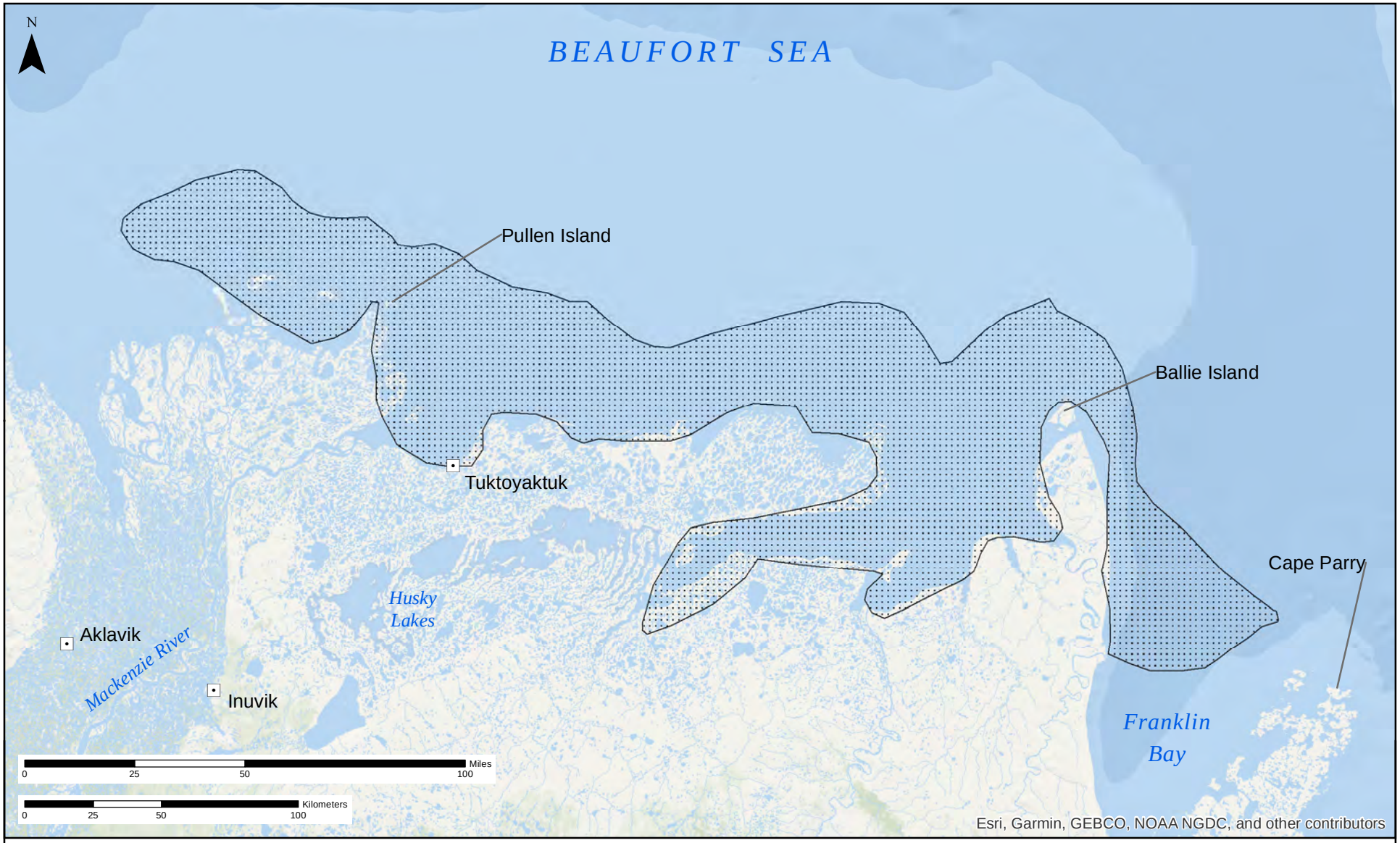
POLAR BEAR IK WORKSHOP
SACHS HARBOUR AREA OF OBSERVATION

MAP 4

11/30/2022



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Area of Observation
Tuktoyaktuk

Workshop Community

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POLAR BEAR IK WORKSHOP
TUKTOYAKTUK AREA OF OBSERVATION

MAP 5

11/30/2022

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Area of Observation
Ulukhaktok

Workshop Community

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Stephen R. Braund & Associates

POLAR BEAR IK WORKSHOP
ULUKHAKTOK AREA OF OBSERVATION

MAP 6

11/30/2022

Workshop Quotes

Timing:

James Pokiak (Tuktoyaktuk): Our season begins December 1 and ends the end of May and any time in there. People like to go right away before gets too dark. Quite a few years back, there were a lot of females taken because we started November 1, and then we decided we needed to help the females, and we changed the season to December 1. Gave the females a chance to den.

***

Anonymous (Sachs Harbour): We hunt in February, March, and April while there is still ice.

[2]

3.1.2 Targeted versus Opportunistic Harvests and Overall Purpose

In general, polar bear hunts are a targeted activity, particularly when it comes to the guided hunts (Table C-1). Polar bear hunts require the harvester to have a harvest tag and require a certain amount of preparation. However, several individuals indicated that their hunting activities are opportunistic in the sense that they are dependent on weather and ice conditions.

Workshop Quotes

Opportunistic or Targeted:

Steve Ilasiak (Paulatuk): It starts as a [targeted] hunt but is mostly opportunistic….you target for a bear, but [the hunt is] opportunistic weather wise…

James Pokiak (Tuktoyaktuk): It is mainly focused for polar bear hunting [target], but if you are hunting for a different animal, and you see one [polar bear], you will get it.

Jim Elias (Tuktoyaktuk): More or less a focused hunt; and you have to get a tag from ENR, and it is a focused hunt.

[2] *** Indicates following quote is from a separate workshop

All six communities indicated that the purpose of their polar bears hunts was for guiding, subsistence, and/or selling hides. If the market conditions are good and the furs are in good condition, the hunters will sell the hides. In recent years, Ulukhaktok participants noted the quality of the polar bear fur has changed to be thinner and of less prime quality. In addition to guiding and selling hides, polar bear hunts are also used for subsistence purposes, including as opportunities to teach the youth about cultural traditions and to harvest polar bear meat and share the meat with elders and other community members.

Workshop Quotes

Purpose of Hunt:

David Kuptana (Ulukhaktok): For both subsistence and selling hides. We get food to share with elders and people, and we sell a lot of hides privately or to taxidermists. Not many people keep their hides; they mostly sell them.

Anonymous 2 (Ulukhaktok): The fur is not so good as used to be; it is not prime fur. It must be due to what they are eating. It used to be real good fur way back when it was cold and there was food for them. Now it has changed. The fur has changed. It is good, but not as prime.

***

James Pokiak (Tuktoyaktuk): When I first started hunting, I was a subsistence hunter for meat, and then I started guiding. I took all of my kids out there and grandson teaching them how do it and be safe out there. A lot of us do that; teach our kids.

3.1.3 Environmental Conditions Affecting Access

Environmental conditions that affect hunters' access to polar bears include temperatures, ice, wind, currents, white-outs and cloudy days, and open water (Table C-1). Lack of ice or poor ice, resulting from a combination of warm conditions and waves, wind, and currents, prohibits hunters from accessing their polar bear harvest areas or makes it too dangerous to hunt. In some years, access may be affected by late freeze-ups and early breakups.

Wind direction is a key component in determining whether polar bears are accessible. Inuvik and Aklavik hunters noted that a south wind pushes out the ice. On the other hand, Ulukhaktok participants reported winds to be unpredictable in recent years. Unpredictable wind conditions affects hunters' access, as a quick shift in wind can cause a shift in the movement of ice, creating dangerous hunting conditions. Participants also noted more frequent whiteout conditions and cloudy days limiting visibility, which limit the days in which hunters can safely hunt. The lack of multi-year ice also affects hunters access to polar bears. Multi-year ice provided hunters with stable and predictable ice conditions with pressure ridges that could be used as visual lookouts. These pressure ridges are increasingly rare in today's environment.

3.1.4 Proximity of Bears to Communities

The frequency of polar bears coming near communities varied primarily according to the geographic location of each of the communities. Aklavik and Inuvik, which are situated the farthest inland, reported that it was exceedingly rare to see a polar bear near the community (Table C-1). Polar bear appearances in Tuktoyaktuk and Paulatuk were slightly more frequent, with Paulatuk noting two bears in the last 10 years within their community, and Tuktoyaktuk noting four to five bears in the past five years. Both Sachs Harbour and Ulukhaktok reported that bears do come into their communities. Sachs Harbour sees them most frequently during the summer whereas Ulukhaktok sees them more in the spring. Ulukhaktok participants noted that the frequency of polar bears near their community has declined in recent years due to poor ice conditions.

Environmental Conditions Affecting Access:

Anonymous 1 (Ulukhaktok): We used to have mostly east winds, and now we have all kinds of west and south winds. We have all kinds of winds in one day. The winds change in one day, and the winds break up the ice. The ice breaks up and stops freezing. Then, when gets cold again, it is rough ice.

Anonymous (Sachs Harbour): No more north winds, our winds changed to southeast.

Anonymous 2 (Ulukhaktok): Affects hunters too; it is hard for them. The wind changes so fast. The wind comes in and takes you away or something is going to happen. It is hard to stay out without knowing what the wind will do. And wind comes really quickly. If you not expecting it, it is hard to hear. It is really different from long ago when the wind was one direction long time ago. Now, the wind comes from one direction and then changes in one day.

David Kuptana (Ulukhaktok): Fifteen to 20 years ago, we used to go across to Clinton Point by dogs. You could set up camp. Now you can't get out there. There is open water now in five miles, and we used to go out there, and now can't use GPS where ice is not there, where we use to go out with dogs.

Anonymous (Sachs Harbour): People long ago maybe 20-30 years, more than that, my Dad and others went out hunting, way out, and they ran into people from Paulatuk in middle of the straight. That is how far they use to go.

David Kuptana (Ulukhaktok): I used to go out in the middle with my dad. Ulu use to run in to Sachs people. Not anymore. There use to be a pressure ridge from Nelson Head, and Sachs and Ulu (hunters) use that, and we use to hit each other. Not anymore. No more pressure ridges.

Anonymous 1 (Ulukhaktok): It is not just the ice. There is a lot of whiteout weather. It can be for days. My nephew and dad were stuck in a tent for four straight days with white out weather, this spring.

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Noel Green (Paulatuk): Ice conditions, a lot of open water; the ice forms way later.

Workshop Quotes

Polar Bears Near Communities:

David Kuptana (Ulukhaktok): Yes, in springtime, early fall is no ice and not much in our community. Fall time is very few. Springtime, we see quite a few numbers in our community.

Anonymous 2 (Ulukhaktok): Not in our community. They do not come close enough to the community anymore. Moved away because of no ice….

Anonymous (Sachs Harbor): Yes, a lot. One was right at my back door. This summer it was not so bad, but other years they will come right in. Usually, they stay on the outskirts. In order to pass Sachs, they have to swim across from the point. Sometimes we get the odd ones; young ones that come into town. This summer was really abundant. All of the ice melted, and they were all coming from the sea [or east?]. Once past us they make their way up north.

3.2 RELATIVE ABUNDANCE

Workshop Goal: The goal of this section was to understand the relative number of polar bears in each community's area of observation.

Workshop Results: At the start of this section, workshops participants were asked to characterize the population of polar bears in their area of observation today. Sachs Harbour, Tuktoyaktuk, and Paulatuk stated that the population was average; Aklavik and Inuvik indicated the population was high (Table C-2). Ulukhaktok reported a low population density in their area of observation.

Workshop Quotes

Polar Bears Abundance: Population Status

David Kuptana (Ulukhaktok): I would say low because it is not like it used to be. It is all from the open water; that is why the numbers went down. Also, there are not much seals around. In springtime, some came back. There are more in springtime, but right now, it is pretty low…Around Ulu, there are less than their used to be. North side of Banks Island the numbers are still the same. It is colder [there].

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James Pokiak (Tuktoyaktuk): From what I have seen and where I travel, it is an increase. You might not see them, but there are a lot of tracks.

Lennie Emagok (Tuktoyaktuk): If you go by tracks, yes there is an increase.

Jim Elias (Tuktoyaktuk): The last few years we see a lot of mothers with three-year-old cubs. The COYs grew up.

Steve Ilasiak (Paulatuk): There are pretty much the same number of bears in our area [as 10 years ago]…. We are not seeing the bears, but we are seeing the tracks

James Pokiak (Tuktoyaktuk): To give you an idea, in 2018, we saw a female and two newborns. Then, the next day, we saw a female and two cubs the same size as the mom - 5km apart. The next day, saw 5 single bears. Eleven polar bears I saw in a few days in 2018.

The study team then asked workshop to participants to compare today's bear population to the population 10 years ago. Aklavik, Inuvik, and Tuktoyaktuk reported an increase in polar bear abundance over the last 10 years, with proportional piling results showing an increase of 10 and 6 percent, respectively (Figure C-1). The remaining communities noted no change in the general population of polar bears over the last 10 years. When asked what observations had led them to conclude that the population of bears had changed, Tuktoyaktuk are observing more tracks, and Aklavik and Inuvik are seeing more bears and pairs of cubs. Aklavik and Inuvik added that the fact that the communities have been harvesting under their harvest quotas in recent years is an

indication that the population would be growing because fewer bears are being taken. Ulukhaktok discussed that while their proportional piling results indicated no change in population from 10 years ago to today, they did observe a decrease in polar bears closer to their community due to changing ice and fewer seals. This was characterized by the participants as a distribution change rather than an abundance change (Table C-2.).

When asked how a change in environment or ice could affect the population of polar bears, four communities indicated that the food chain and prey species, particularly seals, would be the first to be affected. According to these communities, changes in ice and snow cover have a direct effect on seal pupping success, which could affect the polar bear population. Furthermore, the ice is critical for the polar bear's hunting success, as it is their natural hunting habitat, and if the ice receded farther north, the polar bears would follow the ice. However, both Paulatuk and Tuktoyaktuk participants stressed that polar bears are adaptive and would change their behavior to adapt to changing ice and environmental conditions. Potential avenues for adaptation, as identified during the workshops, included more beach scavenging for whale carcasses and hunting for seals along shore haul out locations.

Workshop Quotes

Polar Bears Abundance: Response to Changes in Environment or Ice

Dennis Arey (Aklavik): It all depends on the prey. We see young ones when there is good feeding for them. When not too many seals, we see less cubs. A lot of times see three cubs, not just two but three. It all depends on their food source. If they are in good shape and have good food, they can produce more. Some are so poor they do not have cubs. How many bears you see depends on their prey (abundance).

3.3 BEAR AGE

Workshop Goal: The goal of this section was to understand the number of young and old bears in each community's area of observation.

Workshop Results:

Determining the Age of a Bear: The age of polar bears can be determined based on both observations of the bears themselves as well as their tracks (Table C-3). The greater the size of the tracks and length of the bear, the older the bear is. The lack of hair on the nose/forehead, yellow fur, and a darker face are also indications of an old bear. Paulatuk participants reported that the oldest bears will be those over nine feet.

Workshop Quotes

Polar Bears Age: Determining Age of Bear

Lennie Emagok (Tuktoyaktuk): Some years when out hunting bear and see kind of a yellow bear, it is likely an older bear, I have seen that a few times. One story; an old bear loses hair on the nose and gets dark or black. I have seen a couple like that in the past. You know it is an old bear because it has no hair on the nose; discolored – yellow. Not that color for any reason, probably an older bear.

Steve Ilasiak (Paulatuk): Usually the size of the animal and the size of the tracks. Hard if have no contrast and nothing to compare it to. It is all white out there.

Polar Bear Age: Old Bears

Lennie Emagok (Tuktoyaktuk): The old bears do not come as close to the edge; they stay way out. We do not hardly see these (old bears). These are hard to see....They just love way out there…You see some, but they stay away.

James Pokiak (Tuktoyaktuk): Does not mean there are fewer older bears, they just hang farther offshore...

Lennie Emagok (Tuktoyaktuk): When we started polar bear survey, we went to the flow ice. We hauled fuel out 100 miles. We put a caribou radio collar on the fuel stored to be able to find it. When we did that survey, that fuel up there was to go farther. Way out there, there were really lots of polar bear. They were really white. They were all healthy….

Steve Ilasiak (Paulatuk): A lot of times when we get into the area, the bigger bears go away.

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Anonymous (Sachs Harbour): There are fewer old bears today. Ten years ago, maybe more old bears. I am not sure why.
Dennis Arey (Aklavik): It could be the harvest; they try to harvest bigger bears. Bigger bears are easier to sell.
David Kuptana (Ulukhaktok): Now there are quite a few smaller bears because buyers want the bigger ones; they are not buying the small ones. Hunters are trying to catch all of the big ones because there is money. Even taxidermists are not buying small bears. Small bears are not selling. All are looking for big bears.

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Anonymous (Aklavik): Old polar bears stay close to the edge of the water; we do not see them. They are far out. That is why we see so few old polar bears.

Distribution of Polar Bear Age Groups: When asked to conduct the proportional piling exercise for polar bear age groups[3] the most consistent theme that emerged (5 out of 6 communities) was the relative lack of older bears or reduced percentage of old bears compared to 10 years ago (Figure C-2 through Figure C-6). When asked why fewer old bears were in their areas of observation, three communities indicated that old bears stay farther out on the ice and outside their communities' areas of observations, or just move away from humans in general. Compared to 10 years ago three communities noted there are fewer older bears today than there used to be. This was attributed to hunters potentially targeting more older bears today due to market conditions.

Unlike the other five communities, Ulukhaktok's observations and piling exercises regarding bear age identified a relatively considerable number of COYS and relatively few yearlings compared to other communities. Compared to 10 years ago, they had a relatively equal distribution of COYs and yearlings as well as other age classes. When asked about potential causes, Ulukhaktok participants stated that the lack of ice in their area means the yearlings and their mothers are moving farther away from their area of observation. The number of COYs is still high in their area because females are denning on land near their community.

Photograph 3: Tuktoyaktuk proportional piling results for bear age comparing 10 years ago to today (2022). Photo by Stephen Braund (SRB&A).

[3] The first workshop recommended that the piling cue cards include a distinct card for the two-year-old age class (i.e., the age class between the yearlings and the young adults). SRB&A added this age class into the cue cards for the first and remaining workshops.

Workshop Quotes

Polar Bear Age: Lack of Yearlings

David Kuptana (Ulukhaktok): Not very much [yearlings]. They are probably moving farther north where there is more snow. Where they hibernated last year, the snow has disappeared. Don't know what happened to the pups. Maybe they died someplace. In the springtime, we see a lot of first year cubs (COYs). We see fewer yearlings – they have moved farther out; they have moved somewhere else. The place we hunt for polar bear is not too far from the land, and we see most of the COY coming out from the land. Ten years ago there was lots of ice and good pressure ridges. All age groups...all of them would be even from the ice. That year there was a lot of numbers…10 years ago all the same. There was ice, pressure ridges, glaciers [and all age groups would be the same].

3.4 BEAR SEX

Workshop Goal: Understand the relative number of male and female bears in each community's area of observation.

Workshop Results:

Distinguishing between males and females: Males and females can be distinguished based on their tracks and physical appearance. Male tracks have a unique ball like feature on their heel that females lack, are pointed in a straight orientation (compared to inward pointing female tracks) and have long hair between their toes that drags in the snow and walk in a "wobbly" fashion (Table C-4). Physically, males are larger than females. Ulukhaktok noted that males typically have a longer body, shorter legs, and smaller front feet. Aklavik and Inuvik added that a bear over nine feet is generally a male and that it is rarer to see a lone female.

Workshop Quotes

Polar Bear Sex: Distinguishing Males and Females

David Kuptana (Ulukhaktok): From a distance, the size of male and female. From the tracks know male and female. Female does not have a heel and paws point in. Males have heel, paws point forward, and have smaller front feet. Females: toe in and no heel.

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Lennie Emagok (Tuktoyaktuk): Both tracks and the size of the bears. Big bears tend to stand out; they are really high – males. Even from a distance. When you hunt long enough, you recognize the female and male track.

James Pokiak (Tuktoyaktuk): When you see big bear track, the hair between the toes is long and you can see the dragging of the hair in the snow – that is a male. And the way tracks point. When my boot fits inside of the footprint, that is a big bear.

Relative Number of Males/Females: In terms of relative proportions of males to females, only Sachs Harbour reported more males than females in their area of observation at an approximate 60/40 percent split during proportional piling exercises. Tuktoyaktuk, Aklavik, and Inuvik piling showed a 45/55 percent male to female ratio. Paulatuk and Ulukhaktok piling showed an even greater proportion of females in their areas at nearly 25/75 and 10/90 percent male to female, respectively (Figure C-7 through Figure C-11). When asked for their observations related to the relative presence of males/females in their area, a common theme emerged that most hunting (and therefore most observations) occur in the springtime when females are coming out of their dens and males are farther offshore where hunting/ice conditions are more favorable to the bears. Sachs Harbour, the farthest north community, reported that females are more cautious, and they just see more males moving around in their area.

Workshop Quotes

Polar Bear Sex: Male and Female Distribution

David Kuptana (Ulukhaktok): Why more females in our area? Now, not much ice around; lots of open water. Females are coming out of the den in early spring walking around, so we see more and more when springtime comes. Males go farther out for seal hunting. Not too much males because they are probably farther out where the ice is.

Aklavik and Inuvik were the only ones to identify a change in the proportion of males/female from 10 years ago to today. Their piling exercise showed there were more males 10 years ago (approximately 60/40 percent split between males and females), whereas today that distribution is 45/55 males and females. Explanations for this revolved around the number of people hunting and targeting males.

3.5 BODY CONDITION

Workshop Goal: The goal of this section was to understand the health of bears in each community's area of observation.

Photograph 4: Sachs Harbour proportional piling results for body condition comparing 10 years ago to today (2022). Photo by Stephen Braund (SRB&A).

Workshop Results:

Factors Affecting Body Condition:

The communities observed that ice conditions have the greatest effect on the condition of polar bears (Table C-5). Lack of ice affects the availability of seals which, in turn, makes for tougher hunting for bears and leads to thinner bears. Rough ice also creates poor hunting conditions for bears. Tuktoyaktuk participants noted that body condition is dependent on the hunting skills of the individual bear and how well they learned to hunt from their mother.

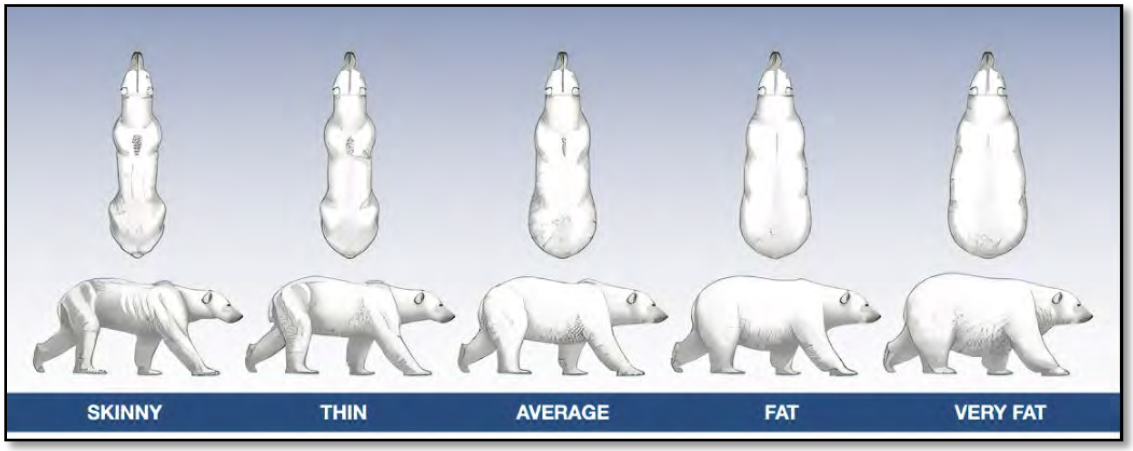
Photograph 5: Ulukhaktok proportional piling results for body condition. Right side: David Kuptana. Photo by Stephen Braund (SRB&A).

Photograph 6: Paulatuk proportional piling results for body condition. Left side: Noel Green, Reuben Green, Steve Ilasiak, Édouard Bélanger (WMAC NS). Photo by Stephen Braund (SRB&A).

Workshop Quotes

Polar Bear Body Condition: Factors

Steve Ilasiak (Paulatuk): It all depends on weather and ice conditions. One year way too much wind, the ice was rough and there was nowhere for these bears to concentrate on hunting seals. The bears that were harvested that year were skinny bears due to ice conditions. There was no young ice, no push up ice. It was all basically rough ice, and the bears could not concentrate on food. That same year we were lucky to have some biologist working in the area. They were finding the same thing – the bears that year were all skinny due to the wind turning the young ice to rough ice.



Body Condition Distribution: During the piling exercises, four of the six communities reported the majority of bears encountered today to be either average or fat (Figure C-12 through Figure C-16). Sachs Harbour and Ulukhaktok primarily encountered thin or average bears. Ulukhaktok attributed the thinner bears to lack of snowbanks and pressure ridges and associated difficulties related to hunting. Over the past 10 years, the overall trend identified during the piling exercises appeared to be a smaller proportion of bears that were fat or very fat today compared to 10 years ago. This trend was attributed to changes in the conditions of ice, weather, and other factors that led to poorer polar bear feeding conditions today.

Workshop Quotes

Polar Bear Body Condition Today vs. 10 Years Ago:

David Kuptana (Ulukhaktok): Ten to 15 years ago, it was really cold, nice ice, lots of pressure ridges, polar bear were feeding, and polar bear were very fat. We did not have very much skinny ones. Everything was pretty well equipped at that time.

Anonymous 2 (Ulukhaktok): They were all fat.

David Kuptana (Ulukhaktok): …It is all the climate change. The ice can change everything. They need a good home; a place where they will feed. If the seals move, the polar bear will move. The seals have moved. I have seen them. They have gone north where there is more ice. In our area, there is no more place for rough ice. No more place to make ice. Seals move more north where there are glaciers where they can make pups.

Anonymous (Sachs Harbor): In the summer we watch seals pass the community and then head straight north.

3.6 LITTER SIZE

Workshop Goal: The goal of this section was to understand the size of litters and the number of newborn cubs (cubs of the year [COY]) that live to be at least one year old in each community's area of observation.

Photograph 7: Tuktoyaktuk proportional piling results for litter size comparing 10 years ago to today (2022). Right side: Dennis Arey (Aklavik) and James Pokiak. Photo by Stephen Braund (SRB&A).

Workshop Results:

Distribution of Litter Sizes:

According to the piling exercises, female bears with two COYs are the most common in all areas of observation (Table C-6; Figure C-17 through Figure C-21). Except in Tuktoyaktuk, females with single COYs are the next

most common followed by females with triplets. Tuktoyaktuk reported females with triplets is more common than females with one COY.

In terms of yearlings, five of the six communities reported that two yearlings with their mother are still the most common followed by one yearling and then three yearlings (Figure C-22 through Figure C-26). In general, the distribution of yearlings compared to COYs reflected an observation that there are COYs that die before reaching yearling status (e.g., greater proportion of females with single yearlings and less with yearling pairs compared to distribution of females with two COYs). According to workshop participants this is a natural phenomenon and is expected. Aklavik and Inuvik reported more similar COY and yearling distributions. None of the communities indicated that the difference between the distribution of COYs and yearlings was alarming or concerning.

Regarding the distribution of COYs and yearlings compared to 10 years ago, only Tuktoyaktuk noted a change. They observed fewer groups of females with three COYs 10 years ago. The more frequent occurrence of females with three COYS today was attributed to good feeding conditions in the last couple of years which are conducive to three COY litters.

Workshop Quotes

Polar Bear Litter Size – COYs and Yearlings:

Noel Green (Paulatuk): A mother with three cubs is rare. Mostly, we see two cubs with a mother bear. I do not think there was that much change in 10 years….

James Pokiak (Tuktoyaktuk): The last couple of years, we see much more moms with three cubs. Last couple of years were good conditions for food. Sometimes find dead bowhead and beluga whale on shore….

Lennie Emagok (Tuktoyaktuk): It is easy to tell tracks from a yearling to newborn (COY).

Jim Elias (Tuktoyaktuk): We see more (females) with two (yearling) cubs. With three cubs, the COY never survived with three; so we see more with two (yearling) cubs.

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Patrick Gruben (Inuvik): One time I saw three with three different cubs, which were the same age. See the majority with two cubs; two cubs is normal.

3.7 MORTALITY

Workshop Goal: The goal of this section was to understand the number of dying or dead bears observed in each community's area of observation.

Workshop Results:

Observations of dead, dying, or cannibalistic bears: All communities agreed that it was exceedingly rare to encounter a dead bear, a sick bear, or a bear killing or eating on another bear. Within the last 10 years only five incidences of sick or dead bears were recalled, and one Ulukhaktok hunter recalled one incident of a skinny bear scavenging on another skinny bear that he had just shot (Table C-7). Three of the dead bear incidences were reported to the communities by surveyors or park rangers and not actually observed by workshop communities. The other two involved one thin/sick bear with a collar on it that did not come off; an Ulukhaktok community member euthanized this bear. The other incident concerned a very obese bear floating in the water by Sachs Harbour, and workshop participants thought it had perhaps died of a heart attack.

Workshop Quotes

Polar Bear Mortalities:

Dennis Arey (Aklavik): The only mortality is after we shoot them.

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Lennie Emagok (Tuktoyaktuk): I have never seen a dead bear unless someone harvested it…

Steve Ilaskiak (Paulatuk): There has not been any observations in the last 10 years in Paulatuk.

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Anonymous (Sachs Harbour): The obese bear I mentioned above. In July. It was hot. It was really fat. It just floated in the water. Just across the harbor in Sachs Harbor. I skinned it and took samples. That was five to six years ago maybe.

3.8 PREY POPULATION STATUS

Workshop Goal: The goal of this section was to understand the number of prey species in each community's area of observation.

Workshop Results: Ringed seals are the most common prey species for polar bears followed by bearded seals (Table C-8). Paulatuk indicated that polar bear diet consists of a 50/50 split of ringed and bearded seals due to the abundance of bearded seal in their area. Aklavik and Inuvik indicated that polar bears also eat spotted seals and potentially even hunt beluga based on observations of scars on belugas where polar bears tried to grab them.

Four of the six communities characterized the ringed and bearded seal populations as high based on their observations while hunting and traveling. Tuktoyaktuk participants stated the population had even increased (25 percent based on proportional piling) in the last 10 years as evidenced by the overall number they are seeing, including the greater number of seals that are showing up in Husky Lake system (which is connected to the Beaufort Sea) (Figure C-27). Paulatuk, Aklavik, and Inuvik indicated the prey population had stayed about the same in their area over the past 10 years.

Sachs Harbour and Ulukhaktok characterized the overall seal population as low based on the extreme lack of seals in their area in the past summer. Both communities indicated they rarely saw seals in the past summer and that the population had greatly (and suddenly) decreased from what it was 10 years ago. Ulukhaktok thought that a possible heavy concentration of jelly fish in their area for the past 2-3 years had affected the fish population and caused the lack of seals in their area which feed on the fish. These observations were reflected in the piling exercises as a 99 percent decrease in seal population over the past 10 years compared to the most recent summer.

Workshop Quotes

Prey Population Status:

David Kuptana (Ulukhaktok): Like jelly fish in the water. Affecting the seals. Only about three feet under the water surface. All of that stuff is in the water. I have photos. Not much fish. Starting in May; disappeared in August….This happened two to three years in a row…. Animals dive and cannot see.

Anonymous (Sachs Harbor): Happened a few years back.

Anonymous 1 (Ulukhaktok): Slimy and heavy. Affected the seals. Shocking them? Not sure.

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Jim Elias (Tuktoyaktuk): More now, when you have a boat in the water, they are popping up all over; all up beside you.

James Pokiak (Tuktoyaktuk): In the past few years more and more seals are going into Huskey Lake; it is connected to the ocean. People are seeing more seals in that lake.

3.9 POLAR BEAR HARVEST SUSTAINABILITY AND VALUE OF INFORMATION

Workshop Goal: The goal of this section was to understand what the most important signs are for whether a polar bear population is doing well and what types of scientific information local people find valuable. The following five questions were asked regarding this topic:

1. What are the key indicators you are looking for in deciding whether a polar bear population is decreasing, stable, or increasing?
2. What factors do you consider in determining whether your community's harvest amounts are sustainable?
3. What types of scientific information related to polar bears do you find the most useful and reliable?
4. In your opinion, what is the most important information that a polar bear population model should provide?
5. Are there important types of information about polar bears that have not been provided by scientific field studies and population models in the past?

3.9.1 Indicators of Decreasing, Stable, or Increasing Polar Bear Population

Discussion regarding key indicators focused on three primary topics: (1) number of cubs and COYs (2) overall number of tracks and bears observed and (3) ice conditions. The presence of more cubs, particularly those that survive to become yearlings, indicates to local people that the population is doing good. Additionally, more observations of polar bears or polar bear tracks, including those in inland areas, are indicators that the population is increasing. Indicators that the population could begin to decrease include climate change causing poor ice conditions such as more warm, open water, and less ice and less snow.

Indicators of Increasing Population:

Jim Elias (Tuktoyaktuk): I look when I am hunting...when start seeing a mother with cubs...a mother with two cubs. I start seeing more mothers with two-year-old cubs. That all shows me that those cubs survival rate is doing okay. They did not die in first or second year. They are on their third year. When start seeing more of those when hunting out there it tells me the population is increasing because the numbers are rising

Noel Green (Paulatuk): That makes sense. Zero to two years old to three-year-old shows the numbers are increasing

Jim Elias (Tuktoyaktuk): Eventually those grow up bigger because most hunters are looking for bigger bears and leave those smaller ones alone

Lennie Emagok (Tuktoyaktuk): You can be out and just like there is no bears and as soon as you get a seal and cut and take it home…and go back next day and there are bear tracks all over. Before there was nothing. Could be nothing one day and all of sudden all kinds of bears tracks the next day just where you were the day before…

Jim Elias (Tuktoyaktuk): Also, when hunting we see old tracks, fresh tracks. We see a lot more bear tracks, and that tells you there are more bears than the previous year. We also go to a lead and sometimes see a highway of tracks. Another way to know there are more bears, see all of those tracks. They are still there until March.

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Patrick Gruben (Inuvik): We are seeing more cubs.

Workshop Quotes

Indicators of Decreasing Population:

Anonymous (Sachs Harbor): We are stable for now, but I think it will just get worse because of the ice conditions. Climate change. That is where we will start seeing a decrease in polar bear population if this keeps up.

David Kuptana (Ulukhaktok): Polar bear go down because we have open water all year round. There are not many places where they can hunt. They need to get to a place where there is a lot of ice and good ice, like farther north. Ulukhaktok was finally frozen the whole year last spring. Other years there is so much open water from December to springtime, and the ocean was pretty close to the shore all of the time. Not much traffic, so it is a big change to now from 10 years ago. The only way polar bear will increase is if it gets cold again. Ice forms and more snow and the animals will come back to raise pups and the water is good for the fish. That is the only time the numbers will go back up. The climate change is affecting everything. The ice is not getting thick anymore for seals to make pups, and for polar bear to hunt seals. There is not much pressure ridges for pupping.

3.9.2 Sustainable Community Harvests

Workshop participants identified that sustainable community harvests are quota informed. If the communities are not filling their quota, then the harvest amounts are sustainable. Furthermore, observations by harvesters and the Hunter and Trapper Committees inform their decisions on whether the community harvests are sustainable. The hunters are the communities' first lines of observation and will notice changes or indicators which point to the sustainability of the harvest. Such observations may include the body condition of the bears or how healthy the seals are. Positive observations are indicators that the community can continue in their current harvest practices.

Workshop Quotes

Indicators of Sustainable Harvests:

Dennis Arey (Aklavik): Quotas are set on sustainability. We never, ever fill the quota.

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Reuben Green (Paulatuk): Polar bear that is healthy is shown by the amount of fat. A lot of seals means a healthy polar bear population.

Jim Elias (Tuktoyaktuk): One of best research areas in the whole world in western science, and we get the numbers from them. They give us what is sustainable for our quota. Today with TK and western science, we have a pretty good idea of what is sustainable. Goes to HTC associations in each of our communities. We are the first responders; we know if something is going well or not.

3.9.3 Scientific Information that is Useful and Reliable to Local People

Workshop participants reported that sampling programs that test contaminants and health of bears are useful to local people as well as general information on DNA and age of bears. These are pieces of knowledge that are not readily apparent, observable, or known by local people and thus have use to the communities. Harvest reports and population estimates can also be useful if interpreted in the right context and not misused. Scientific surveys and resulting population estimates that reinforce existing IK observations are considered particularly useful. Scientific information is also useful if it educates other countries or organizations that the polar bear population is sustainable.

Scientific Information that is Useful to Local People:

Noel Green (Paulatuk): What I find useful on polar bears is the contaminants. What type of contaminants do they have when they do take the samples? People still like to eat polar bears. We would like to know for sure if polar bear is safe to eat. Contaminants would be number one.

James Pokiak (Tuktoyaktuk): To convince other countries we have a sustainable population of polar bears. They are dictating what we can and cannot do with polar bears. We cannot send them to the States. We keep telling them it is a healthy population. Some of Americans are still coming to harvest bears on guided hunts. They cannot take their trophy home.

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Anonymous (Sachs Harbour): Surveys and sample collection

Anonymous 2 (Ulukhaktok): Sample collection is really important to see what they are eating. It changes.

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Patrick Gruben (Inuvik): The harvest reports are good except when they criticize us for killing polar bears, an iconic species. They say we shoot too many females that is reducing the population. Informing us we are shooting too many females is useful to us; it gives us history. It is telling us we need to educate our youth to not shoot the first animal you see. We would like to see survey results when they estimate. Are we hitting right sweet spot when TK says numbers are increasing? Are we correct? It gets to the boards….

Dennis Arey (Aklavik): Darting to get DNA and informs diet.

3.9.4 Most Important Information from a Polar Bear Model

Participants agreed that population estimates are the most important information from a polar bear model, but that the information needs to be collected in the most humane way possible. In particular, the use of any type of collaring is concerning due to potential health and behavioral implications for the bears (e.g., physical harm from collar, aggressive bears from negative human interactions). Echoing comments from the previous question, participants emphasized that the models should show that IK and science work together and do not clash or negate one another. One individual added that models that show the location of dens would be of interest.

Workshop Quotes

Most Important Information from Models:

Dennis Arey (Aklavik): Collaring is the biggest concern. It is hard for us to accept collaring. In the fall time the polar bears grow and get really wide necks

Jim Elias (Tuktoyaktuk): One of things I like how they do population estimates now is the fact they are trying to find better ways, more humane ways to get population estimates of polar bears. It always comes down to money. There is lots of technology, but no funds to get it. They do not have the money to use the new technology.

***

Patrick Gruben (Inuvik): Polar bear are not declining. We have to battle big corporations like Coco Cola backing up people who are against killing polar bear. For us to make a living we have to sell hides; we were raised doing that. Big corporations became big doing that – the fur industry, Hudson Bay Co. The population model has to be fool proof. Have to prove to us it is working, whether polar bear are declining or increasing. How will it determine the final number? How do we know it is fool proof? I have no idea how you come up with population estimates. We think the polar bear population is increasing and sustainable. Western science has to prove it before they can believe us.

***

Anonymous (Sachs Harbour): Numbers [polar bear population numbers]

3.9.5 Important Information Not Previously Provided by Western Science

In general, workshop participants expressed that they are well informed by the various types of information provided by western science. Two suggestions for future studies included greater inclusion of IK from elders into models and more studies into polar bear variations like the “weasel bear.” These weasel bears were described as polar bears that have long necks and smaller heads than other bears.

Workshop Quotes

Important Information Not Previously Provided by Western Science:

Reuben Green (Paulatuk): I go back to the elders, and there is no information in the science information from elders. There are no studies shown from elders. They do not utilize our science from our elders. They [elders] are scientists. Information coming from the elders, I have not seen that in any scientific reports in last 10 to 20 years. They do not utilize them. Elders know about polar bears, and they [scientists] are not using that information. Somebody has to wake up. Elders did everything for us; they forced the land claims.

Jim Elias (Tuktoyaktuk): Through our elders I always heard about weasel polar bear with longer necks and smaller heads. Back in 1960s and 70s there used to be a frequency of those. Nobody has reported that. Were my elders wrong? Abnormalities? I do not think so.

Noel Green (Paulatuk): I do not think our elders were wrong about the “weasel” bears. How come western science has not reported that? If they do not see it, they do not know about it. If all communities in the ISR knows about that, obviously, there used to be polar bear types other than what we are seeing now. As far back as I was a kid, there was a polar bear that has a longer neck and smaller head than regular polar bear. We do not see them anymore.

***

Anonymous (Sachs Harbour): I think we are pretty well informed on information on polar bears.

---

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5 APPENDIX A: FIELD PROTOCOL AND CUE CARDS

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Polar Bear IK-IPM Workshop Protocol
Stephen R. Braund & Associates (SRB&A)

Interviewers:_____
Workshop ID:_____
Date:_____
Start Time:_____

SECTION 1: RESPONDENT INFORMATION

Collect the following information for each individual completing the workshop

Respondent ID	Respondent Name	Gender	Birth Year	Community	Years in Study Community
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

SECTION 2: ESTABLISHING AN AREA OF OBSERVATION AND TIME PERIOD OF OBSERVATION

1. [TO EACH COMMUNITY]: On the map, please mark the general area or territory where **your community** has hunted for or observed polar bears over the last 10 years. The area will be **your community's** "area of observation" for today's workshop.
2. **CONTEXT QUESTION:** Approximately, how many people hunt for polar bear in your community? Is it primarily an opportunistic or targeted hunt?
3. **CONTEXT QUESTION:** What environmental conditions are affecting your access to hunting bears? How?
4. **CONTEXT QUESTION:** Do you see polar bears in or near your community? If so, what months of the year are you usually seeing polar bears in your community? How frequently do you see them?

SECTION 3: RELATIVE ABUNDANCE

GOAL: To understand the number of polar bears in your **community's area of observation**.

1. **CONTEXT QUESTION:** How would you characterize the population of polar bears today (e.g., low, average, high)?
2. **CONTEXT QUESTION**: Has the number of polar bears in your **community's area of observation** increased, decreased, or stayed about the same since approximately 10 years ago.
    a. **DISCUSSION:** You said [INCREASED/DECREASED/STAYED THE SAME] regarding the abundance of polar bears. Are there specific observations that have helped you come to this conclusion? Why?

[IF INCREASED OR DECREASED, MOVE TO PILING EXERCISE QUESTIONS 3]

3. **PILING QUESTION:** If this first pile of beans in front of you represented the polar bear population today, please adjust the second pile by adding or taking away beans to show how many polar bears were in your **community's area of observation** approximately 10 years ago (2010-2012).
4. **ADDITIONAL CONTEXT QUESTION:** How could a change in the environment or ice affect the population of polar bears now and in the future?

SECTION 4: BEAR AGE

GOAL: To understand the number of young and old bears in your **community's area of observation**.

1. **CONTEXT QUESTION:** What information do you use to determine the age of a polar bear?

2. **PILING QUESTION:** For your community, distribute the pile of beans into five piles which represent the **proportions** of polar bears by age group in your **community's area of observation** today:

    (1) Cubs-of-the-Year (less than 1 year old)
    (2) Yearlings (between 1-2 years old)
    (3) Young adults
    (4) Adults
    (5) Old bears

    a. **DISCUSSION:** Based on your responses, you said [SUMMARIZE RESPONSES] regarding bear age. Are there specific observations that have helped you come to this conclusion?

3. **10 YEARS AGO FOLLOWUP:** Has the distribution of polar bears by age group today changed from 10 years ago? If yes, please distribute the pile of beans into five piles which represent the **proportions** of polar bears by age group in your **community's area of observation** approximately 10 years ago (2010-2012)

    a. **DISCUSSION:** Why do you think the **proportions** of [SUMMARIZE RESPONSES] bears have [INCREASED/DECREASED]?

SECTION 5: BEAR SEX

GOAL: To understand the relative numbers of male and female bears in your **community's area of observation**.

1. **CONTEXT QUESTION:** What information do local people use to distinguish between male and female bears when you see them at a distance or when you come across their tracks?
2. **PILING QUESTION**: For your community, distribute the pile of beans into two piles which represent the relative **proportion** of polar bears by sex (Male/Female) in your **community's area of observation** today.
    a. **DISCUSSION**: Based on your responses, the majority of you said [SUMMARIZE RESPONSES] regarding bear sex. Are there specific observations that have helped you come to this conclusion?
3. **10 YEARS AGO FOLLOWUP**: Has the relative **proportion** of polar bears by sex changed from 10 years ago? If yes, please distribute the pile of beans into two piles which represent the relative **proportion** of polar bears by sex (Male/Female) in your **community's area of observation** approximately 10 years ago.
    a. **DISCUSSION:** Why do you think the **proportion** of [MALE/FEMALE] bears have [INCREASED/DECREASED]?

SECTION 6: BODY CONDITION

GOAL: To understand the health of bears in your **community's area of observation**.

1. **CONTEXT QUESTION:** What factors have you observed that affect polar bear body condition during different seasons?

2. **PILING QUESTION**: For your community, distribute the pile of beans into five piles which represent the relative **proportion** of polar bears you encounter in **late spring** by body condition (skinny, thin, average, fat, very fat) in your **community's area of observation** today.

    a. **DISCUSSION**: Based on your responses, you said [SUMMARIZE RESPONSES] regarding the status of polar bear body condition. Are there specific observations that have helped you come to this conclusion?

3. **10 YEARS AGO FOLLOWUP:** Has the distribution of polar bears by body conditions changed from 10 years ago? If yes, please distribute the pile of beans into five piles which represent the relative **proportion** of polar bears you encountered in **late spring** by body condition (skinny, thin, average, fat, very fat) in your **community's area of observation** approximately 10 years ago (2010-2012)

    a. **DISCUSSION:** Why do you think polar bear body condition has [IMPROVED/GOTTEN WORSE]?

SECTION 7: LITTER SIZE

GOAL: To understand the size of litters and the number of newborn cubs that live to be at least one year old.

1. **PILING QUESTION**: For your community, distribute the pile of beans into three piles which represent the relative frequency of **cub-of-the-year** litter size (e.g., 1 cub, 2 cubs, 3 cubs) in your **community's area of observation** today.
    a. **DISCUSSION:** Based on your responses, you said [SUMMARIZE RESPONSES] regarding the status of **cub-of-the-year** litter size. What kind of observations have helped you come to this conclusion?

2. **PILING QUESTION**: For your community, distribute the pile of beans into three piles which represent the relative frequency of **yearling** litter size observations (e.g., 1 cub, 2 cubs, 3 cubs) in your **community's area of observation** today.
    a. **DISCUSSION:** Based on your responses, you said [SUMMARIZE RESPONSES] regarding the status of **yearling** litter size. What kind of observations have helped you come to this conclusion?

3. **10 YEARS AGO FOLLOWUP:** Has the relative frequency of polar bears by **cub-of-the-year** or **yearling** litter size changed from 10 years ago? If so, please distribute the pile of beans into three piles which represent the relative frequency of **cub-of-the-year** or **yearling** litter size observations (e.g., 1 cub, 2 cubs, 3 cubs) in your area of observation approximately 10 years ago (2010-2012)
    a. **DISCUSSION:** Why do you think **cub-of-the-year** litter size has [INCREASED/DECREASED]?
    b. **DISCUSSION:** Why do you think **yearling** litter size is [INCREASED/DECREASED]?

SECTION 8: MORTALITY

GOAL: To understand the number of dying or dead bears observed in your **community's area of observation**.

1. **CONTEX QUESTION:** Have you observed any dying or dead bears in the last 10 years?
    a. Please describe the areas where you've encountered this
    b. Month/Season/Year
    c. Environmental conditions (e.g., unusually warm winter, pack ice farther from shore, early breakup)
    d. Ecological context (inland, coastal, on sea ice, low abundance of prey)
    e. Other context
2. **CONTEX QUESTION:** Have you observed a polar bear kill or eat another polar bear in the last 10 years?
    a. Please describe the areas where you've encountered this
    b. Month/Season/Year
    c. Environmental conditions (e.g., unusually warm winter, pack ice farther from shore, early breakup)
    d. Ecological context (inland, coastal, on sea ice, low abundance of prey)
    e. Other context

SECTION 9: PREY POPULATION STATUS

GOAL: To understand the number of prey species in your **community's area of observation**.

1. **CONTEXT QUESTION:** What is the most common prey species for polar bears in your area?

2. **CONTEXT QUESTION:** How would you characterize the population of that prey species today (e.g., low, average, high)?

3. **CONTEXT QUESTION**: Has the number of common prey species in your **community's area of observation** increased, decreased, or stayed about the same since approximately 10 years ago.

    a. **DISCUSSION:** You said [INCREASED/DECREASED/STAYED THE SAME] regarding the abundance of prey species. Are there specific observations that have helped you come to this conclusion? Why?

[IF INCREASED OR DECREASED, MOVE TO PILING EXERCISE QUESTIONS 4]

4. **PILING QUESTION**: If this first pile of beans in front of you represented the common prey species population today, please adjust the second pile by adding or taking away beans to show how many prey species were in your **community's area of observation** approximately 10 years ago (2010-2012).

5. **ADDITIONAL CONTEXT QUESTION:** How could a change in the environment or ice affect the population of that food source now and in the future?

SECTION 10: POLAR BEAR HARVEST SUSTAINABILITY AND VALUE OF INFORMATION

GOAL: To understand what the most important signs are for whether a polar bear population is doing well and what types of scientific information local people find valuable.

QUESTIONS:

1. What are the key indicators you are looking for in deciding whether a polar bear population is decreasing, stable, or increasing?
2. What factors do you consider in determining whether your community's harvest amounts are sustainable?
3. What types of scientific information related to polar bears do you find the most useful and reliable?
4. In your opinion, what is the most important information that a polar bear population model should provide?
5. Are there important types of information about polar bears that have not been provided by scientific field studies and population models in the past?

OTHER WORKSHOP NOTES/OBSERVATIONS

END TIME:_____

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CUE CARDS

10 YEARS AGO

TODAY

SAME

RELATIVE ABUNDANCE (SECTION # 3)

POLAR BEAR (NANUQ) POPULATION

Protocol Section # 3 (Relative Abundance)

POLAR BEAR AGE (SECTION # 4)

OLD POLAR BEARS

Protocol Section # 4 (Bear Age)

ADULT POLAR BEARS

Protocol Section # 4 (Bear Age)

YOUNG ADULT POLAR BEARS

Protocol Section # 4 (Bear Age)

YEARLING POLAR BEARS

Protocol Section # 4 (Bear Age)

CUB-OF-THE-YEAR POLAR BEARS

Protocol Section # 4 (Bear Age)

BEAR SEX
(Section # 5)

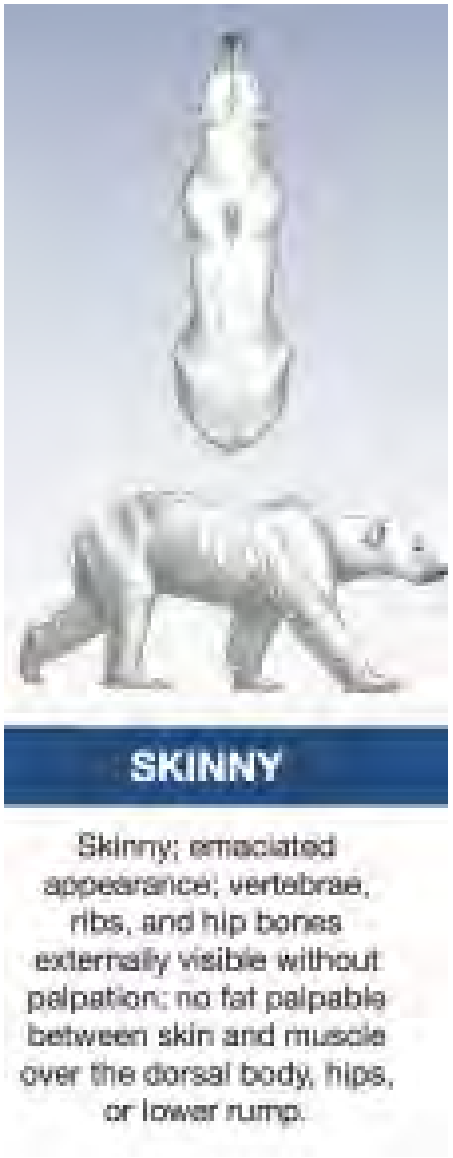
MALE POLAR BEARS

Protocol Section # 5 (Bear Sex)

FEMALE POLAR BEARS

BODY CONDITION, LATE SPRING (Section # 6)

SKINNY POLAR BEARS



Protocol Section # 6 (Body Condition)

THIN POLAR BEARS

AVERAGE POLAR BEARS

AVERAGE

Average; healthy appearance; vertebrae and hip bones not visible; upper 1/3 to 1/2 of the spinal column can be felt under the skin; detectable layer of fat between skin and muscle over rear half of body, thickening slightly but detectably over lower rump.

Protocol Section # 6 (Body Condition)

FAT POLAR BEARS

Protocol Section # 6 (Body Condition)

VERY FAT POLAR BEARS

Protocol Section # 6 (Body Condition)

LITTER SIZE (Section # 7)

FEMALE WITH
ONE CUB
(CUB-OF-THE-YEAR)

FEMALE WITH TWO CUBS
(CUB-OF-THE-YEAR)

FEMALE WITH THREE CUBS
(CUB-OF-THE-YEAR)

FEMALE WITH ONE CUB (YEARLING)

FEMALE WITH TWO CUBS
(YEARLING)

FEMALE WITH THREE CUBS
(YEARLING)

PREY POPULATION (Section # 9)

PREY POPULATION

Protocol Section # 9 (Prey Population Status)

6 APPENDIX B: INFORMED CONSENT

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INFORMED CONSENT STATEMENT

Incorporating Indigenous Knowledge into Polar Bear Integrated Population Models
Researchers: Stephen Braund, Stephen R. Braund & Associates and Eric Regehr, University of Washington

You are invited to participate in a research study conducted by Stephen Braund and Paul Lawrence from Stephen R. Braund & Associates (SRB&A). If you have any questions or concerns about the research, please feel free to contact Stephen Braund, 907-276-8222, stephen.braund@srbak.com.

This study has been approved by the Inuvialuit Game Council, Wildlife Management Advisory Council (NWT), and Wildlife Management Advisory Council (NS).

PURPOSE OF THE STUDY

The purpose of the workshop is to document Indigenous knowledge regarding polar bear abundance over the last 10 years to be used by the researchers to inform a future integrated population model (IPM) that will be used to estimate the abundance of Northern Beaufort and Southern Beaufort polar bear subpopulations.

INFORMATION ABOUT PARTICIPANT RIGHTS IN THE STUDY

This study is endorsed by the Inuvialuit Game Council, Wildlife Management Advisory Council (NWT), and Wildlife Management Advisory Council (NS), and uses the "First Nations Principles of OCAP®." The OCAP Principles are Ownership, Control, Access, and Possession. These principles are now used in any research involving Indigenous participants, Indigenous knowledge, or both to protect every Indigenous community's values and decision-making. OCAP asserts that First Nations alone have control over data collection processes in their communities, and that they own and control how this information can be stored, interpreted, used, or shared. The information contained in this form explains the study and how OCAP is followed.

This study wants to understand the abundance of polar bears in your area over the last 10 years. You will be asked about your knowledge and experiences related to polar bears. You will be interviewed using a series of question and your answers will be recorded. You are being asked to participate in a one-day workshop with breaks.

Researchers must protect and keep confidential Inuvialuit knowledge that is obtained. Inuvialuit knowledge may only be shared with permission from the Inuvialuit Game Council and the relevant Hunters and Trappers Committee. Inuvialuit participants must also be contacted about future study participation if they so request in this form. Your personal information must also be kept confidential.

RISKS

Due to the group nature of the workshop, risk from your participation in this study may include community effects (disclosure of information, potential knowledge by others of their participation). Also, the approach used in this study to incorporate Indigenous knowledge into an IPM is a new approach, and it is not known to the researchers what the final outcome of that model will be once all the scientific and indigenous knowledge data sets have been incorporated.

BENEFITS

Benefits of this research could include gaining knowledge from other participants, helping to develop a new method for incorporating Indigenous knowledge in scientific models/research, contribution of Indigenous knowledge to be incorporated directly into western science models that estimate population abundance (e.g., IPM), and an honorarium.

CONFIDENTIALITY

We will ensure the confidentiality of any identifying information that is obtained in connection with your participation. The results of this study may include quotes from your discussions in the workshop today. All individuals will be identified by generic community specific workshop identifiers only and no names will be used (e.g., Inuvik Workshop Participant 1, Inuvik Workshop Participant 2). Data from these workshops will be compiled into an Excel file of tabulated responses from the workshop exercises. This information will be stored on computer hard drives in a locked facility. Due to confidentiality concerns, only selected quotes that have been removed of personal identifiers and the Excel of tabulated responses will be distributed to other researchers involved in this project.

COMPENSATION FOR PARTICIPATION

Each participant will receive a honorarium of $350 per day, including travel days. Travel expenses, hotels, and per diems will all be covered. Catering will be provided throughout the meeting, including lunches.

CONTACT

If you have questions about the research or experience any negative effects, you may contact the researcher Stephen Braund, in person if applicable, and at either 907-276-8222 or stephen.braund@srbak.com.

If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated through this research, you may contact the Inuvialuit Game Council Chair via igc-c@jointsec.nt.ca or 867-777-2828, or your local Hunters and Trappers Committee.

PARTICIPATION

You can choose whether or not to participate in this study. If you choose to participate, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. If you withdraw from the study and later would like your information to be removed, the researcher will remove your data from the study if still possible.

FEEDBACK AND PUBLICATION

The publication of any results from this study in the IPM or other potential related research will only be made after a review and approval of the workshop results by the Inuvialuit Game Council and Hunters and Trappers Committees. Each organization will also have a chance to review the results of the incorporation of the IK into the IPM. Results of the study may also be used in related journal articles and conference and commission presentations, with permission.

Results of the study and any presentations and publications may be accessed by contacting the researcher, Stephen Braund. Results of the study will likely be available by 2023. Please provide your contact information below if you wish to receive a report on the study.

CONSENT

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights, or remedies because of your participation in this research study. If you have questions regarding your rights as a research participant before, during, or after the study, please ask the researcher or Joint Secretariat/WMAC (NS) staff at 867-620-0289, 867-777-2828, or wmac-bio@jointsec.nt.ca.

I have read and understood the contents of this form. I have received my own copy of this form. I understand that I do not have to sign this consent form and I declare that my consent has been given voluntarily.

Having had any questions answered, I agree:

(1) to participate in this study, and (2) to allow my participation to contribute to data that may be used for the incorporation of Indigenous knowledge into the Northern and Southern Beaufort polar bear IPM and related journal publications and conference presentations.

Participant's signature _____ Date _____

Researcher's signature _____ Date _____

[and, if applicable:]

(3) I permit the use of de-identified quotations for research purposes and publications

Participant's signature _____ Date _____

Researcher's signature _____ Date _____

(4) I would like my name to be cited in quotations (not de-identified)

Participant's signature _____ Date _____

Researcher's signature _____ Date _____

I wish to be contacted about future research participation opportunities: ☐ Yes ☐ No

I wish to receive a copy of the findings: ☐ Yes ☐ No

Contact information (email, address, or phone)

Name: _____

Email/Phone: _____

Please keep a copy of this consent form for your records and reference. The Inuvialuit Game Council has cleared this research.

7 APPENDIX C: PROPORTIONAL PILING DATA RESULTS

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Table C-1: Contextual Information Regarding Polar Bear Hunting and Overall Availability

Protocol Question (App A)	Question	Aklavik/ Inuvik	Sachs Harbour	Ulukhaktok	Tuktoyaktuk	Paulatuk
2.2a	How many people hunt polar bear	8-10 / Up to 20	About 30	20	10-15	15
2.2b	Opportunistic or targeted?	No answer	No answer	No answer	Targeted and opportunistic	Targeted and opportunistic
2.3	What environmental conditions affect access?	South wind, white outs, cloudy days, current, waves	Late freeze-up and early breakup	Climate change, thin or lack of ice, late freeze-up, early break-up, open water, and wind	Air traffic	Open water and poor ice. Lack of multi-year ice; lack of ice ridges for spotting bears
2.4	Do you see polar bears in your community?	No, very rare	Yes, summer	Yes, spring. Not recently	4-5 in past 5 years primarily in late fall	Twice in 10 years, September and March
Added During Workshops	Purpose of hunt?	Guiding, selling, and teaching kids	Subsistence and selling hides	Subsistence and selling hides	Subsistence and guided. Teaching youth	Subsistence and guided, teaching youth, less guiding recently
Added During Workshops	Timing of hunt?	Feb-Apr when days are longer	Jan-Apr when days are longer	Oct-Apr, mostly in springtime	Dec-May	Jan-Apr

Table C-2: Relative Abundance

Protocol Question (App A)	Question	Aklavik/ Inuvik	Sachs Harbour	Ulukhaktok	Tuktoyaktuk	Paulatuk
3.1	How would you characterize population of polar bears today?	High	Average	Low	Average	Average
3.2	Number of bears increase/decreased/stayed same since 10 years ago?	Increased	Same	Decreased near community but overall same	Increased	Same
3.2a	Observations that helped come to conclusion regarding change in number?	Seeing more bears and pairs of cubs. Not filling quota	No answer	No longer seeing near town, changing ice, and fewer seals	Seeing more tracks	Seeing same number of tracks
3.3	Proportional Piling Exercise – Change in Population	10% increase in last 10 years	No change, same	No change, same	6% increase in last 10 years	No change, same
3.4	How could change in environment or ice affect population of polar bears?	Affect prey species	Lack of ice affect seal pupping	Lack of ice affect seal pupping	Bears will adapt. Warmer weather easier on COYs and better survival	Bears will adapt

Table C-3: Bear Age

Protocol Question (App A)	Question	Aklavik/ Inuvik	Sachs Harbour	Ulukhaktok	Tuktoyaktuk	Paulatuk
4.1	What info do you use to determine age of a polar bear?	Greater length of bear and size of track = older bear. Also no fur on forehead	No answer	Greater size of bear and size of track = older bear. Also, older male has yellow fur	Larger size, size of track, yellow fur, and lack of hair on nose and darker face = old bear	Greater size of bear and size of track = older bear. Older bears over 9ft
4.2	Proportional Piling Exercise – Age Groups Today	Gradually increasing from COY to adult with notable lack of old bears	Greatest concentration in 2yr, 3-4yr, and adult age classes	Relatively large number of COYS compared to other communities with fewer yearlings	Greatest concentration in 3-4yr, adults, and old bear age classes	Greatest concentration in 2yr, 3-4yr, and adult age classes
4.2a	Observations that helped come to conclusion regarding age groups?	Old bears farther out from where they observe. Part of why fewer	Just noticing fewer older bears; could be they target larger (older) bears for harvest	Few yearlings. They see many cubs because females den on land near their community	Older bears stay farther offshore outside area of observation	Bigger, older bears move away from humans
4.3	Proportional Piling Exercise – Age Groups 10 Years Ago	No change	Fewer older bears today than 10 years ago	All age groups were about the same because good ice conditions	Fewer older bears today than 10 years ago	Fewer older bears today than 10 years ago
4.3a	Why proportions changed?	Not applicable; no change	Not sure why, potentially hunters targeting larger bears	Lack of ice means yearlings are moving out to ice. Still seeing lots of cubs because mothers denning on land	Fewer people hunting bigger older bears 10 years ago because no market for polar bears.	No answer

Table C-4: Bear Sex

Protocol Question (App A)	Question	Aklavik/ Inuvik	Sachs Harbour	Ulukhaktok	Tuktoyaktuk	Paulatuk
5.1	What info do you use to distinguish between male and female polar bears?	Males have unique heel feature. Bears over 9ft primarily male	No answer	Males have heel, paws pointed straight, smaller front feet. Females have no heel & paws point in ("toe in"). Males larger with long bodies, short legs	Tracks & size of bears. Males have long hair between toes and hair drags in snow. Have different orientation of way track points. Have extra ball on heel	Males have larger feet and walk with a wobble; they push the snow with hair
5.2	Proportional Piling Exercise – Males /Females Today	45/55% male/female ratio today	~60/40% male/female ratio today	~10/90% male/female ratio today	45/55% male/female ratio today	~25/75% male/female ratio today
5.2a	Observations that helped come to conclusion regarding bear sex?	No answer	Females more cautious and males moving around in area	Not much ice around and males out following the ice whereas females are coming out of den in spring and in area more	Males are farther offshore, and most hunting occurs in spring when females are out of dens	
5.3	Proportional Piling Exercise – Males/ Females 10 Years Ago	More males (~60/40%)	No change			
5.3a	Why proportions changed?	Change in number of people hunting (Covid, elders)	Not applicable			

Table C-5: Body Condition

Protocol Question (App A)	Question	Aklavik/ Inuvik	Sachs Harbour	Ulukhaktok	Tuktoyaktuk	Paulatuk
6.1	What factors affect polar bear body condition during different seasons?	Rarely see skinny ones or fat ones. In April/March see them when they eat a lot of seal pups.	No answer	Presence / absence of ice and associated seals affects body condition. Lack of ice = lack of seals = thinner bears. Male bears skinnier in spring because they are mating and walking a lot and hunting for prey.	Body condition dependent on bear's hunting skill	Weather (wind) and ice conditions affect body condition the most. Wind driven rough ice creates poor hunting conditions for polar bears and they get skinny
6.2	Proportional Piling Exercise – Body Condition Today	Primarily average or fat	Primarily thin and average		Primarily average or fat	
6.2a	Observations that helped come to conclusion regarding body condition?	Rarely see skinny ones, only sick ones. Rarely see the very fat ones who are way out on the ice	No answer	Observations made while hunting. Thought thinner bears because no snowbanks and pressure ridges	No answer	Observations made while hunting
6.3	Proportional Piling Exercise – Body Condition 10 Years Ago	Fewer very fat bears compared to 10 years ago	More average, fat, and very fat bears 10 years ago	More fat and very fat bears 10 years ago	Slight increase in very fat and thin bears but overall average and fat	No change

Protocol Question (App A)	Question	Aklavik/ Inuvik	Sachs Harbour	Ulukhaktok	Tuktoyaktuk	Paulatuk
6.3a	Why has body condition changed?	Not seeing really fat ones which stay out where ice and food are more available	See lots of rubble ice which is poor environment for seals and bears	Cold weather, good ice, lots of pressure ridges all conducive to good polar bear feeding 10 years ago. Lots of seal carcasses. Lots of fat bears. Today, thin ice with ripples, broken ice; poor ice conditions for seals and polar bears	It was different 10 years ago. Depends on the season, conditions of the ice	Not applicable

Table C-6: Litter Size

Protocol Question (App A)	Question	Aklavik/ Inuvik	Sachs Harbour	Ulukhaktok	Tuktoyaktuk	Paulatuk
7.1	Proportional Piling Exercise – Cubs of the Year (COY) Today	Majority is 2 cubs followed by 1 then 3.			Majority is 2 cubs followed by 3 then 1.	Majority is 2 cubs followed by 1 and 3.
7.1a	Observations that helped come to conclusion regarding COYs?	Seeing mostly mothers with 2 cubs.			See mostly 2 and when see 1 it likely started off as having a sibling. Can tell number of cubs by physical bears they see in addition to tracks.	Seeing mostly mothers with 2 cubs.
7.2	Proportional Piling Exercise – Yearlings Today	Similar to COY distribution.	Primarily 1 yearling, followed by 2, then 3. Greater proportion of single yearling sightings and less of 2 yearlings compared to COY distribution	Primarily 2 yearlings followed by 1 and then 3. Greater proportion of single yearling sightings and less of 2 yearlings compared to COY distribution	Primarily 2 yearlings with equal sightings of 1 and 3 yearlings. Decrease in 3 yearlings and increase in 2 yearlings compared to COY distribution	Primarily 2 yearlings followed by 1 and then 3. Slight increase in 1 and 3 yearlings compared to COY distribution
7.2a	Observations that helped come to conclusion regarding yearlings?	Observations on the land	No answer	See less with 3 cubs and more with 1	See more yearlings with 2 present. With 3 COYs, 1 is not surviving to yearling.	No answer
7.3	Proportional Piling Exercise – COY/Yearling 10 Years Ago	No change in either COY or yearlings			Fewer groups with 3 COYs 10 years ago. No change in yearlings.	No change in either COY or yearlings
7.3a	Why COY litter size changed?	Not applicable			Good feeding conditions last couple of years which are conducive to 3 COY litters	Not applicable
7.3b	Why yearling litter size changed?	Not applicable				

Table C-7: Polar Bear Mortality

Community	Area	Date/Year	Context
Paulatuk	Cape Parry	2022	Surveyors at the DEW Line site found a dead bear in late summer. Local people did not see the bear.
Aklavik/Inuvik	Herschel Island	2021	A 16-year-old sickly bear with arthritis was encountered by park rangers. Local people did not see the bear.
Ulukhaktok	South of Ulukhaktok about 15 miles	2019	Skinny polar bear scavenging on a bear that had just been shot by a hunter
Ulukhaktok	Ulukhaktok Area	2017	Sickly polar bear with a collar that did not come off. Community euthanized the bear.
Sachs Harbour	Sachs Harbour	July 2016 or 2017	Very obese bear found floating dead in water. Assumed heart attack.
Ulukhaktok	Ulukhaktok Area	2014	Surveyors found one dead

Table C-8: Prey Population Status

Protocol Question (App A)	Question	Aklavik/ Inuvik	Sachs Harbour	Ulukhaktok	Tuktoyaktuk	Paulatuk
9.1	What is most common prey species for polar bear?	Ringed seals, bearded seal, & spotted seals	Ringed seals followed by bearded seals			Ringed seals and bearded seals (50/50)
9.2	How would you characterize population of prey species today?	High	Low (based on most recent summer)		High	High
9.3	Number of prey increase/ decreased/ stayed same since 10 years ago?	Same	Decreased		Increased	Same
9.3a	Observations that helped come to conclusion regarding change in number?	Seeing them the same	Did not see many last summer. Increased appearance of jelly fish potential cause		Observing more, including in Husky Lake system connected to Beaufort Sea	Seeing the same
9.4	Proportional Piling Exercise – Change in Population	Not applicable	Nearly 100 percent decrease based on last summer's abundance		25 percent increase	Not applicable
9.5	How could change in environment or ice affect population of prey species?	Industry noise impacts	Increased shipping and dumping gray water affects seals and fish	Climate change will affect fish, which affects seals, which affects polar bears; lack of thick ice habitat; gray water from ships.	Less ice cause seals to haul up on shore. Increased ship traffic and spill risk. Killer whales moving into area killing seals	Less ice cause seals to haul up on shore. Killer whales moving into area killing seals

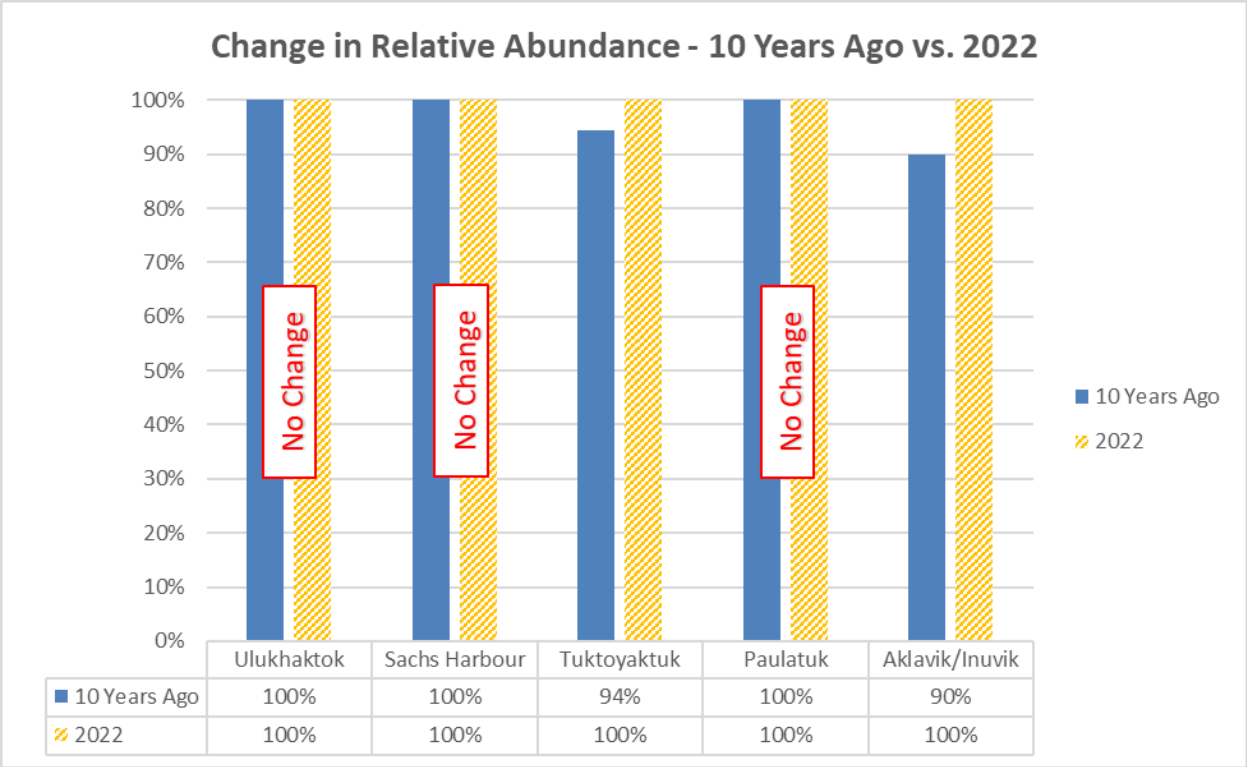


Figure C-1: Relative Abundance Proportional Piling Exercise Results

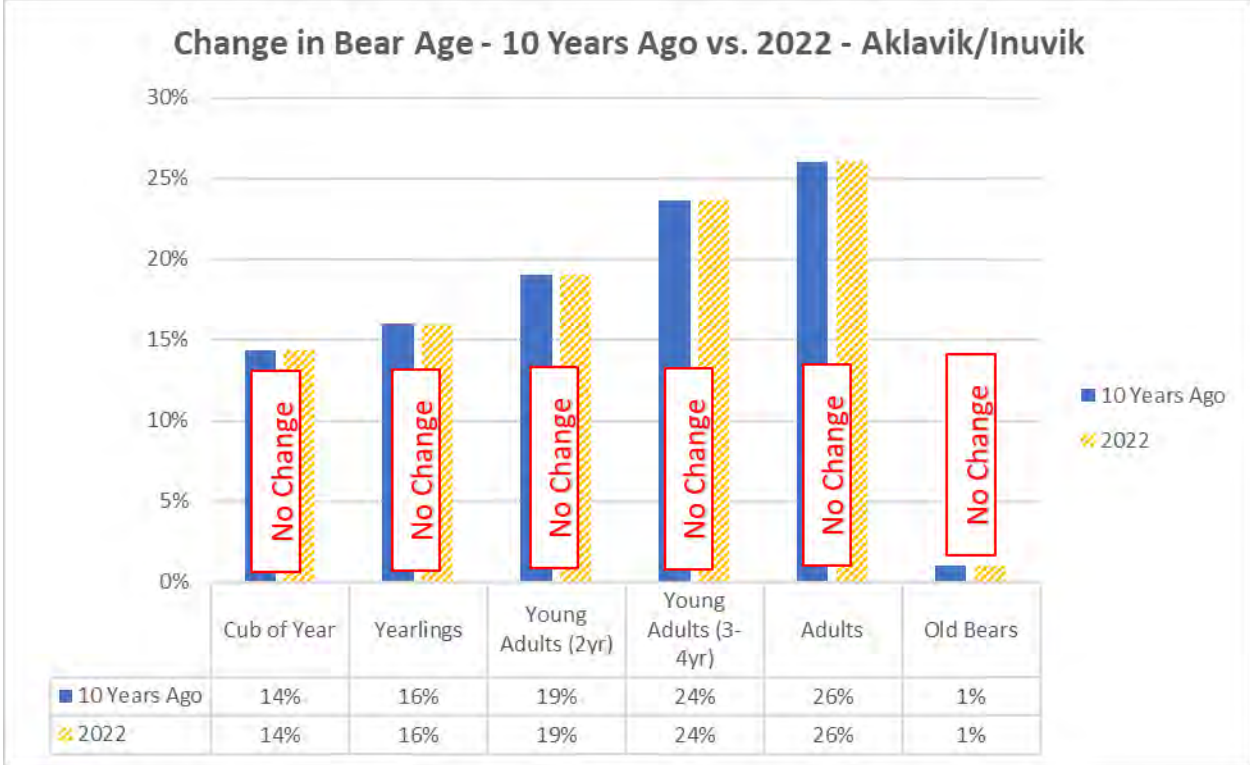
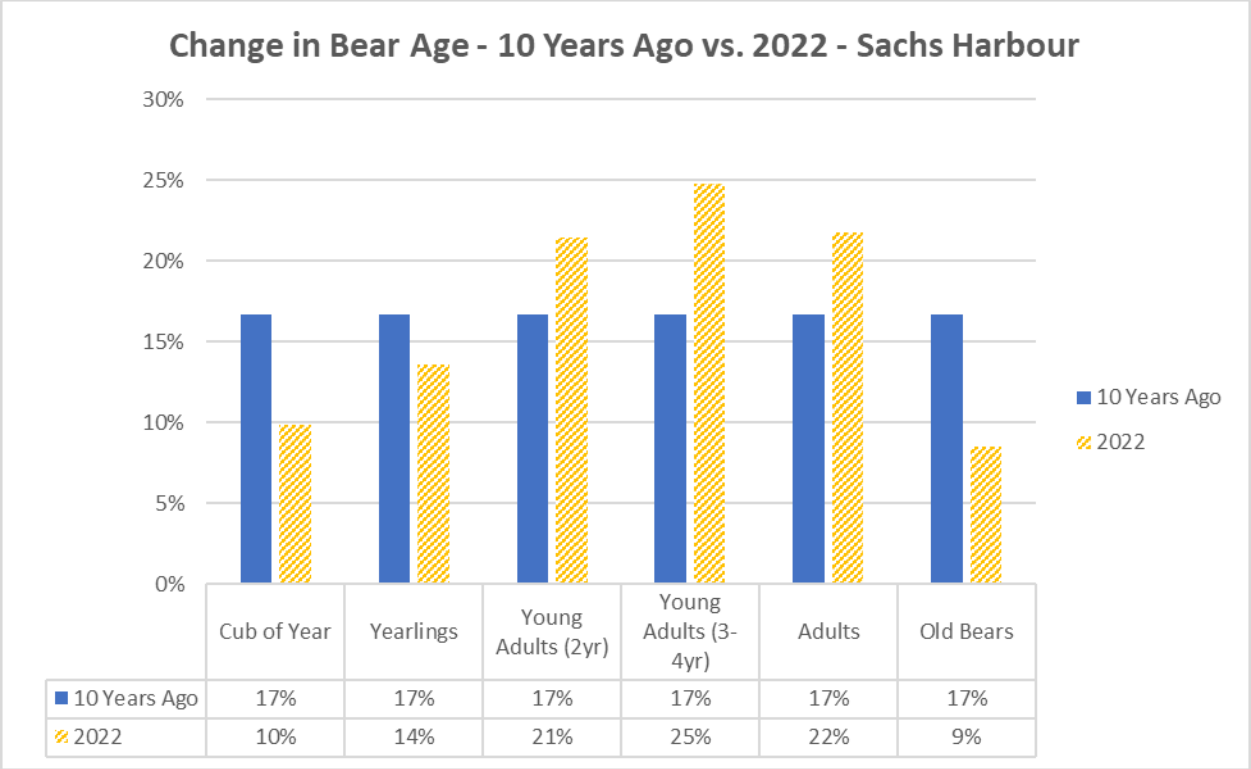
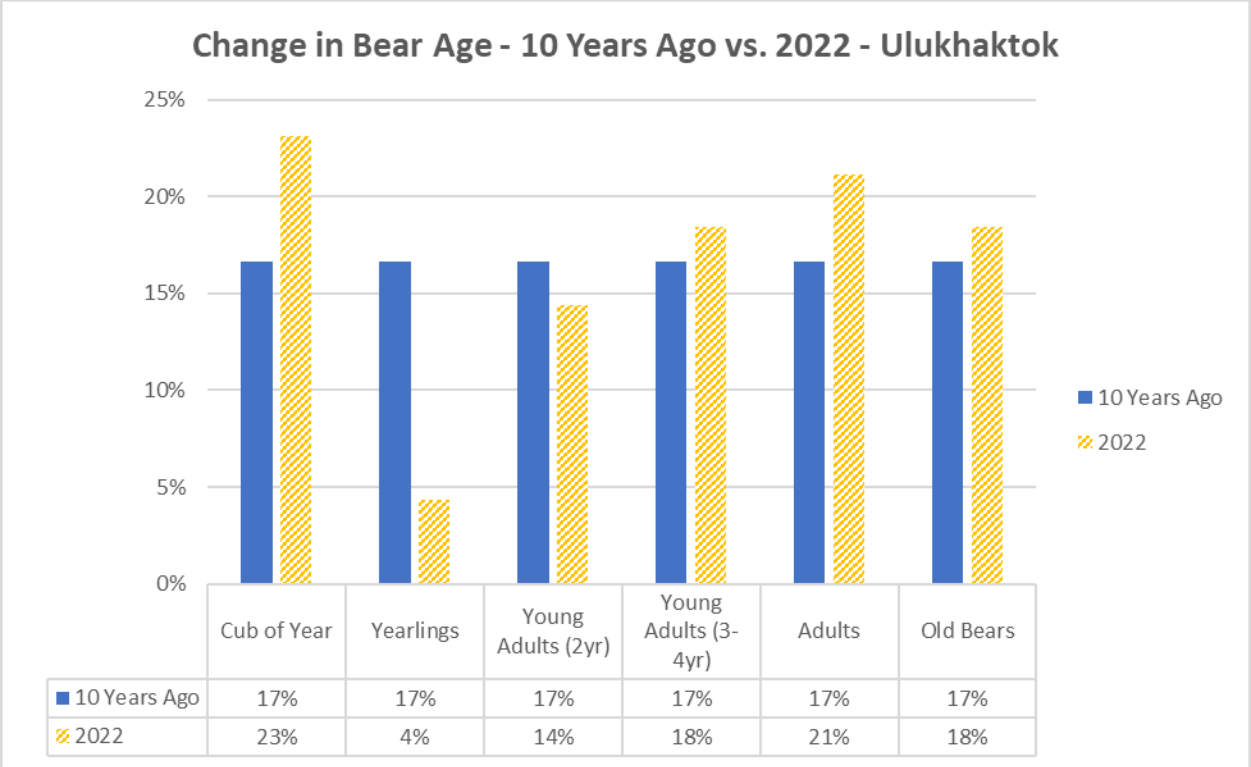


Figure C-2: Bear Age Proportional Piling Exercise Results – Aklavik/Inuvik



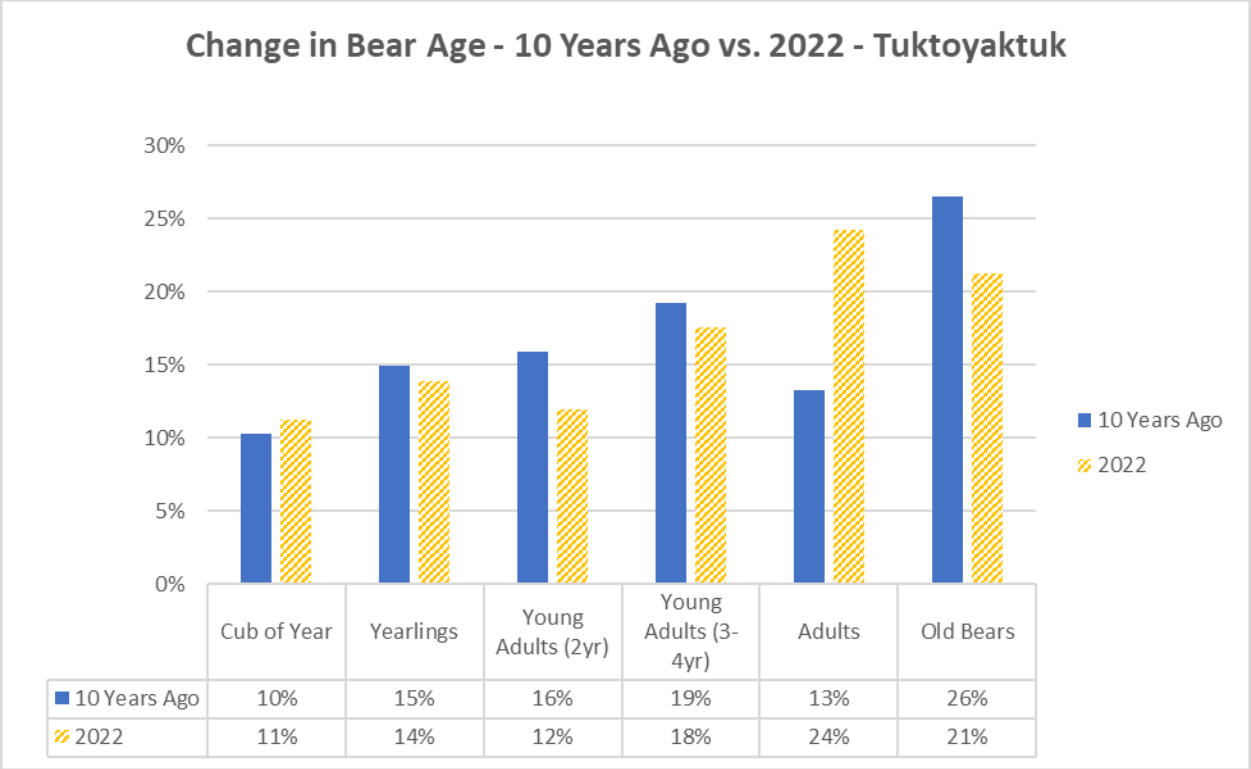
	Cub of Year	Yearlings	Young Adults (2yr)	Young Adults (3-4yr)	Adults	Old Bears
10 Years Ago	17%	17%	17%	17%	17%	17%
2022	10%	14%	21%	25%	22%	9%

Figure C-3: Bear Age Proportional Piling Exercise Results – Sachs Harbour



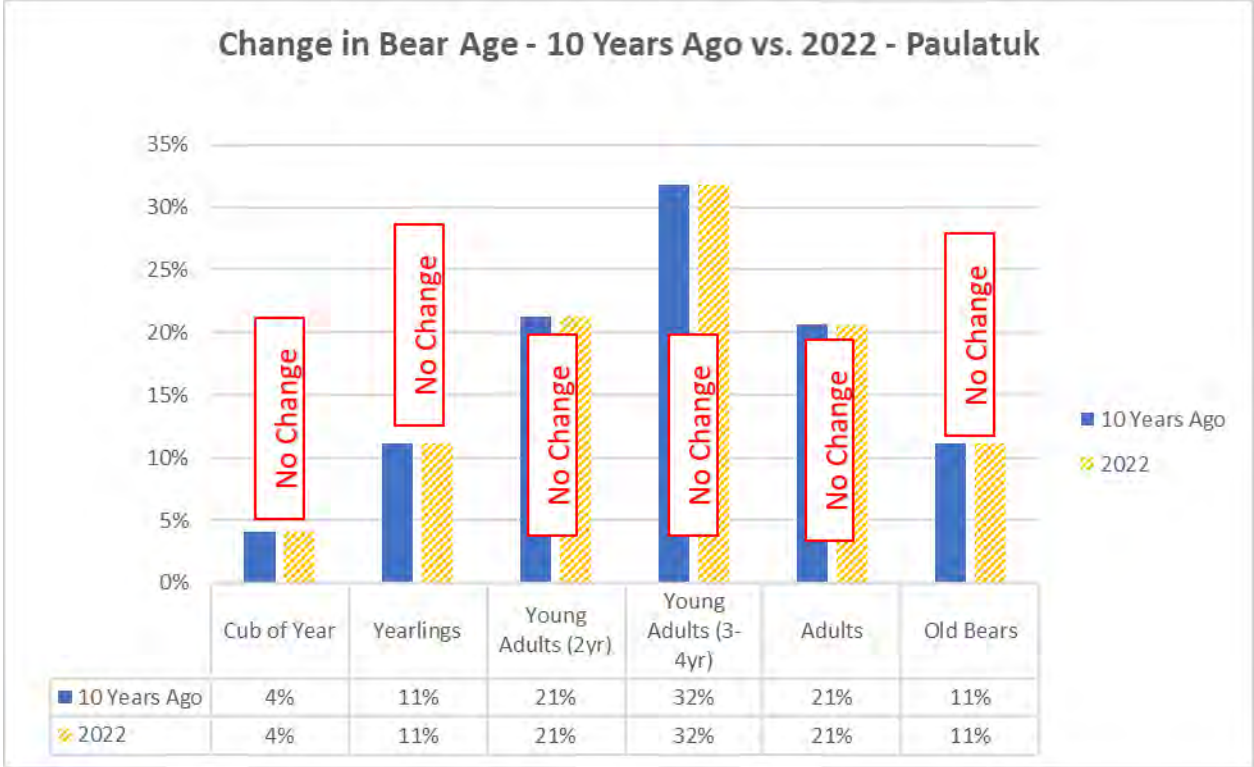
	Cub of Year	Yearlings	Young Adults (2yr)	Young Adults (3-4yr)	Adults	Old Bears
10 Years Ago	17%	17%	17%	17%	17%	17%
2022	23%	4%	14%	18%	21%	18%

Figure C-4: Bear Age Proportional Piling Exercise Results - Ulukhaktok



	Cub of Year	Yearlings	Young Adults (2yr)	Young Adults (3-4yr)	Adults	Old Bears
10 Years Ago	10%	15%	16%	19%	13%	26%
2022	11%	14%	12%	18%	24%	21%

Figure C-5: Bear Age Proportional Piling Exercise Results – Tuktoyaktuk



	Cub of Year	Yearlings	Young Adults (2yr)	Young Adults (3-4yr)	Adults	Old Bears
10 Years Ago	4%	11%	21%	32%	21%	11%
2022	4%	11%	21%	32%	21%	11%

Figure C-6: Bear Age Proportional Piling Exercise Results – Paulatuk

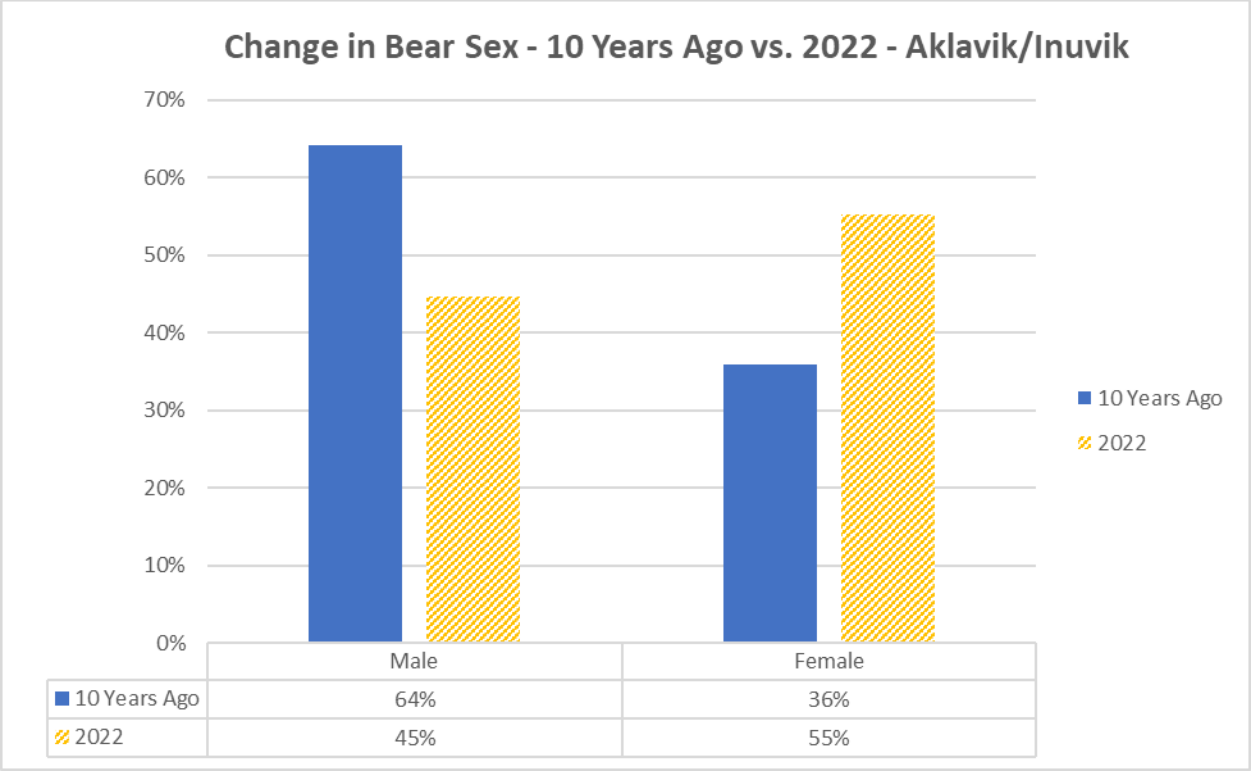


Figure C-7: Bear Sex Proportional Piling Exercise Results – Aklavik/Inuvik

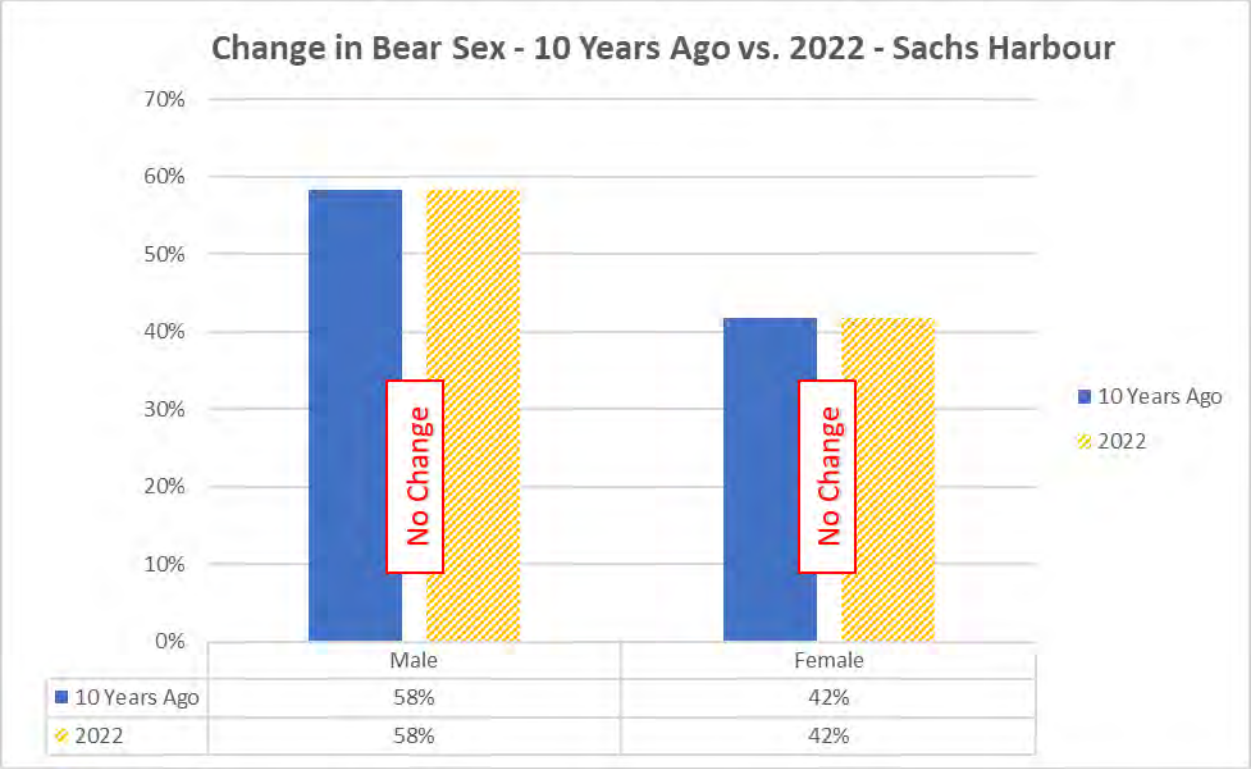


Figure C-8: Bear Sex Proportional Piling Exercise Results – Sachs Harbour

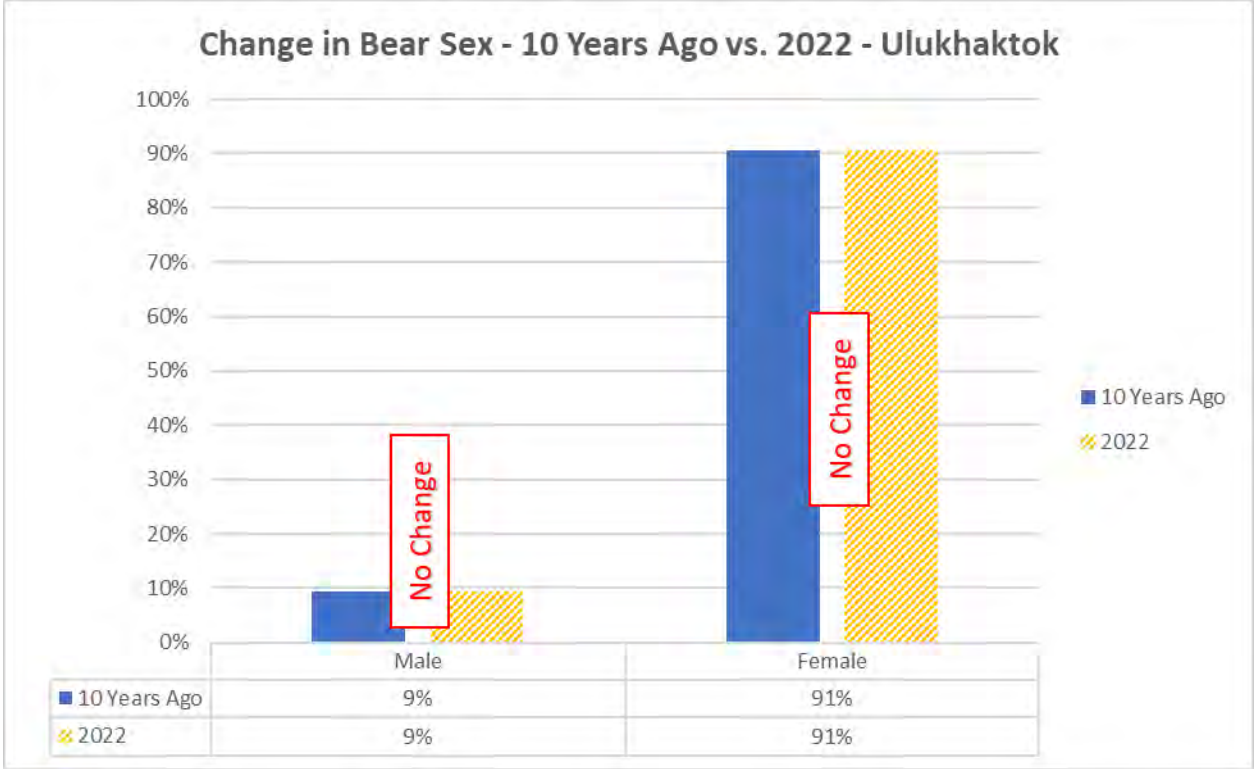


Figure C-9: Bear Sex Proportional Piling Exercise Results - Ulukhaktok

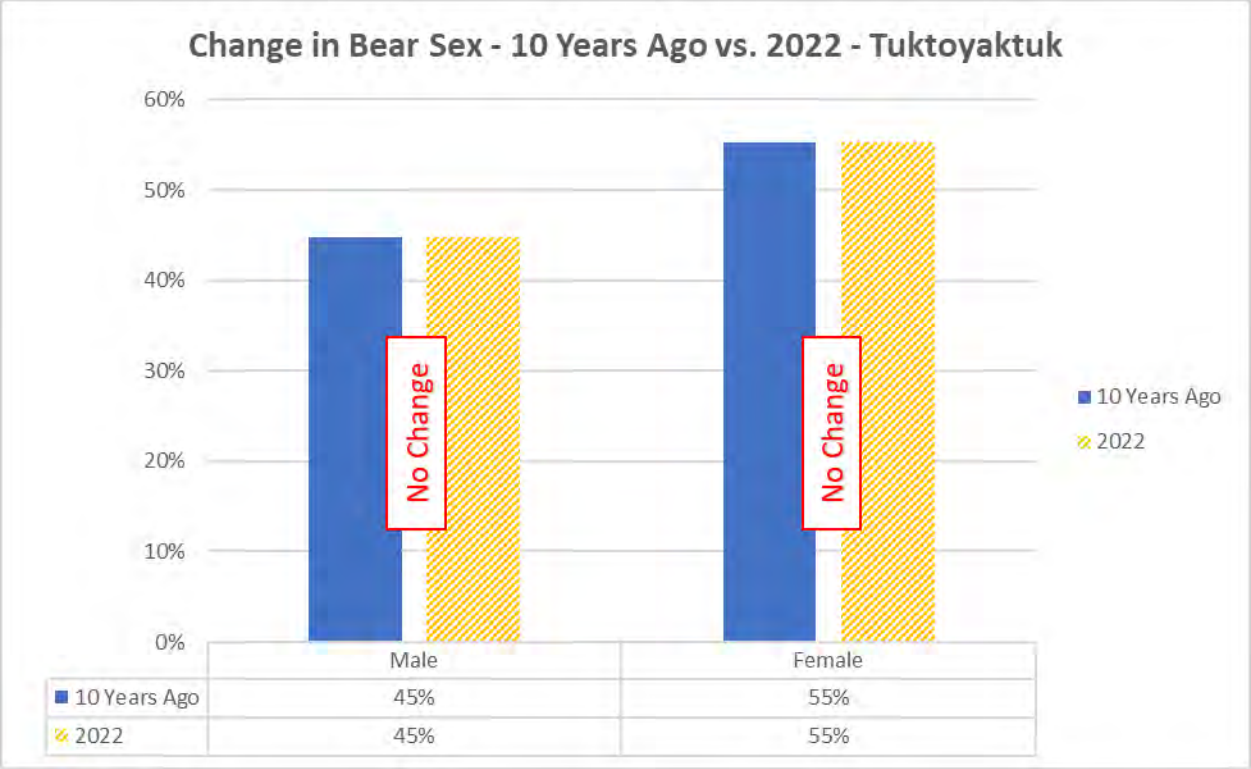


Figure C-10: Bear Sex Proportional Piling Exercise Results – Tuktoyaktuk

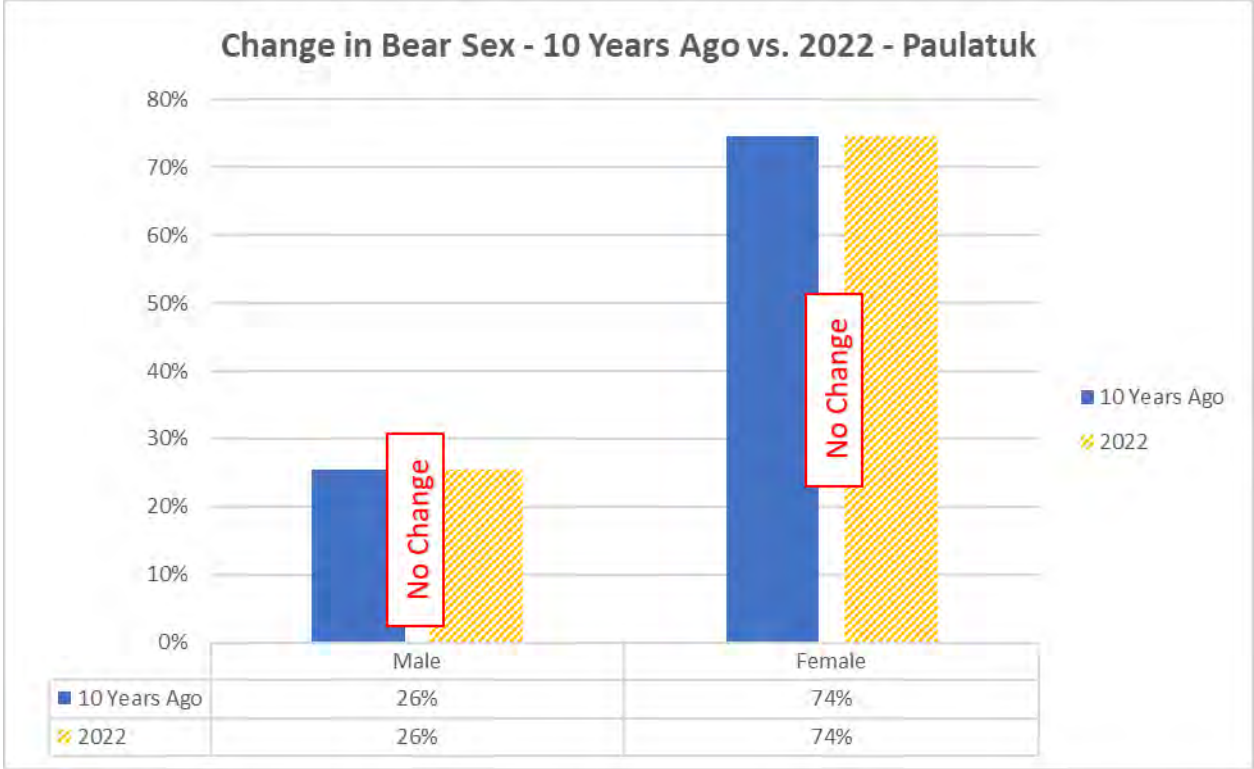


Figure C-11: Bear Sex Proportional Piling Exercise Results - Paulatuk

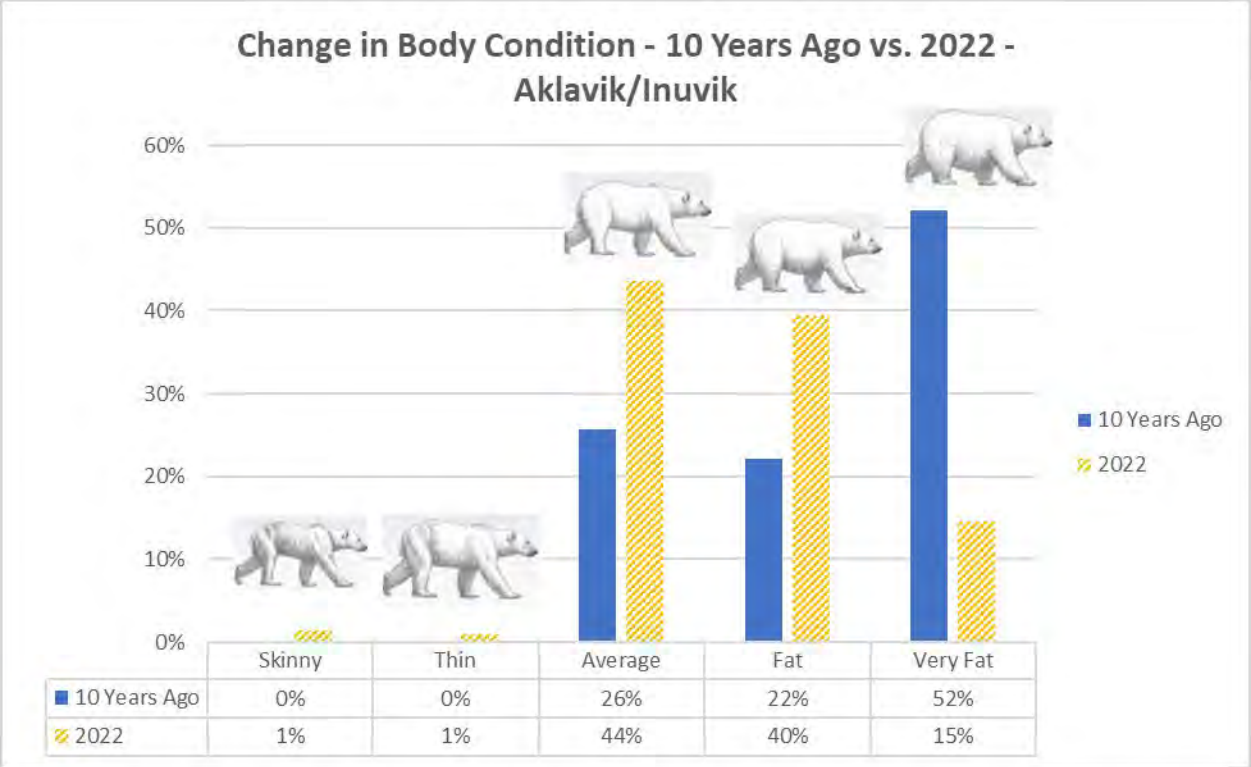


Figure C-12: Body Condition Proportional Piling Exercise Results – Aklavik/Inuvik

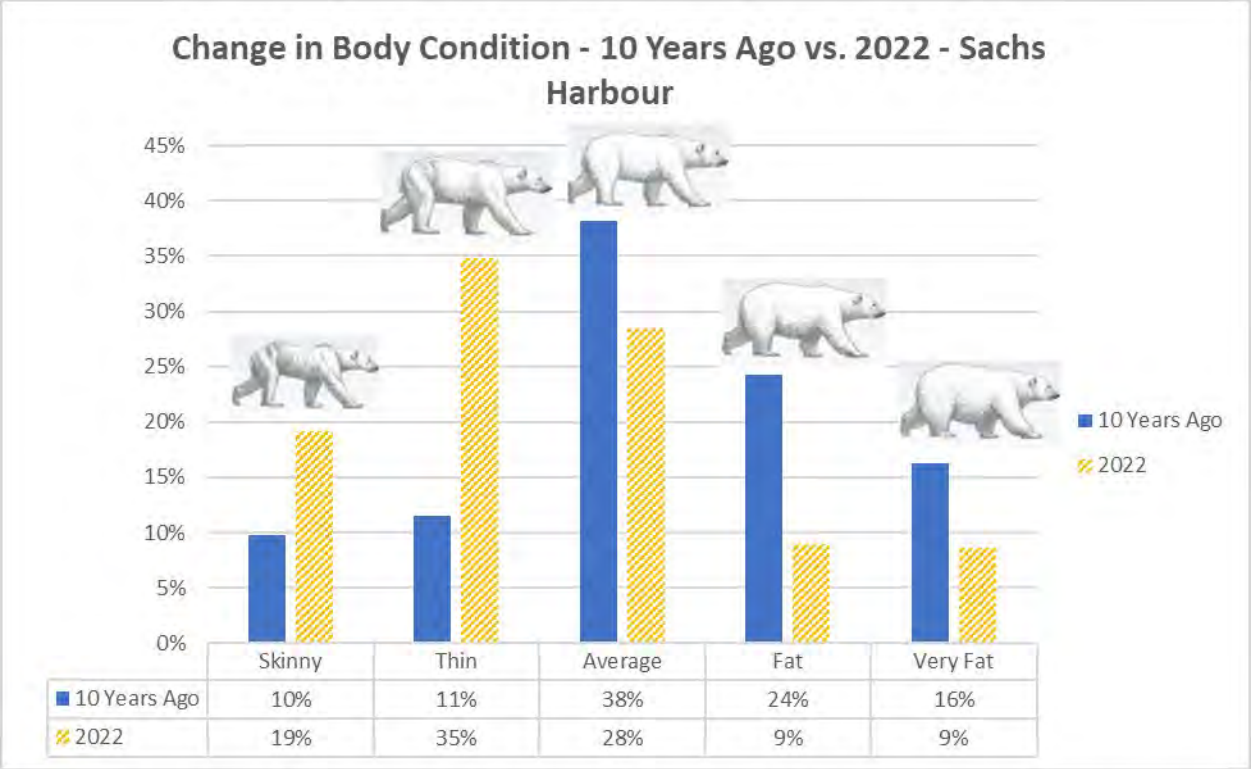


Figure C-13: Body Condition Proportional Piling Exercise Results – Sachs Harbour

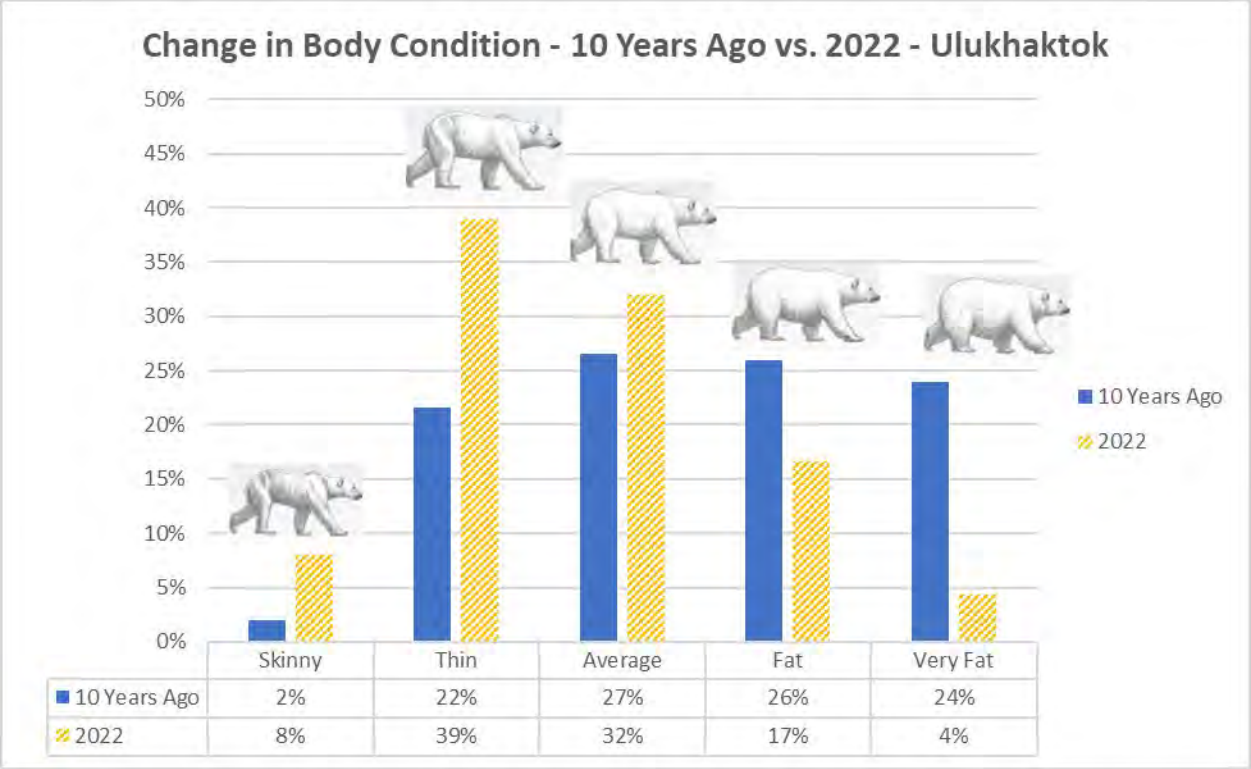


Figure C-14: Body Condition Proportional Piling Exercise Results - Ulukhaktok

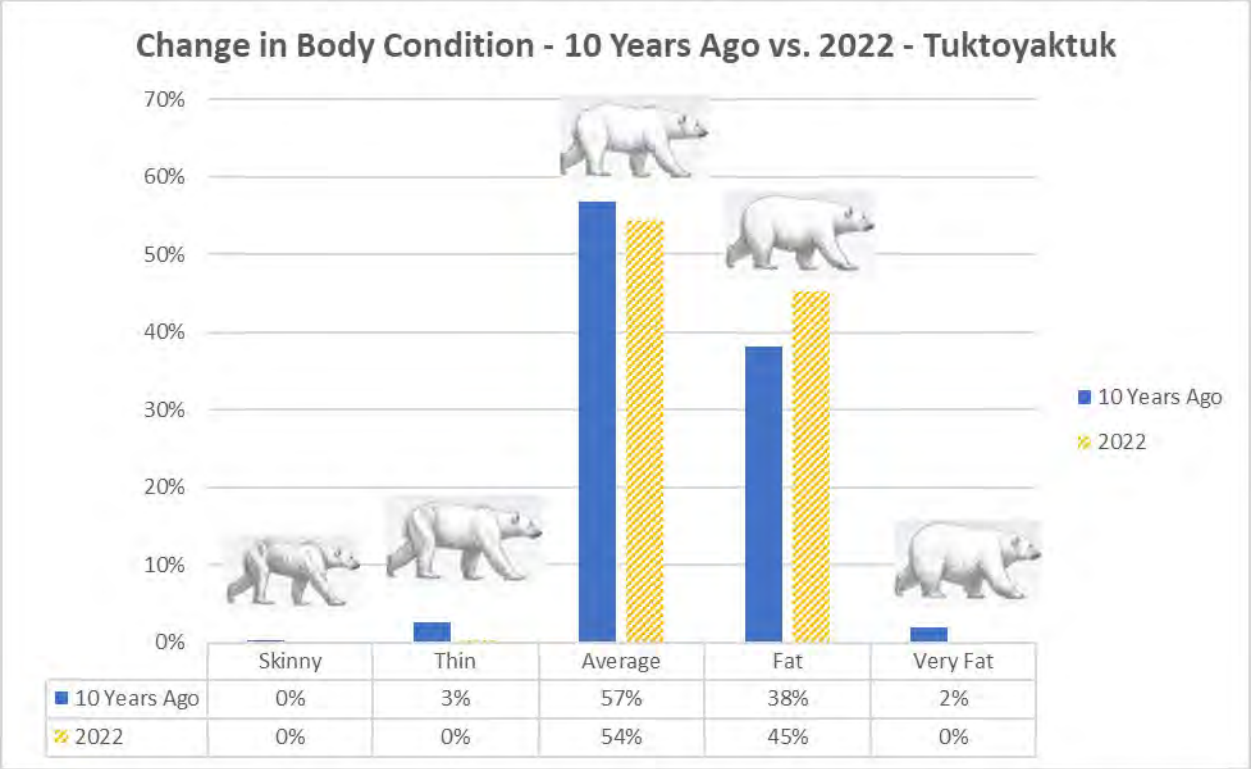


Figure C-15: Body Condition Proportional Piling Exercise Results – Tuktoyaktuk

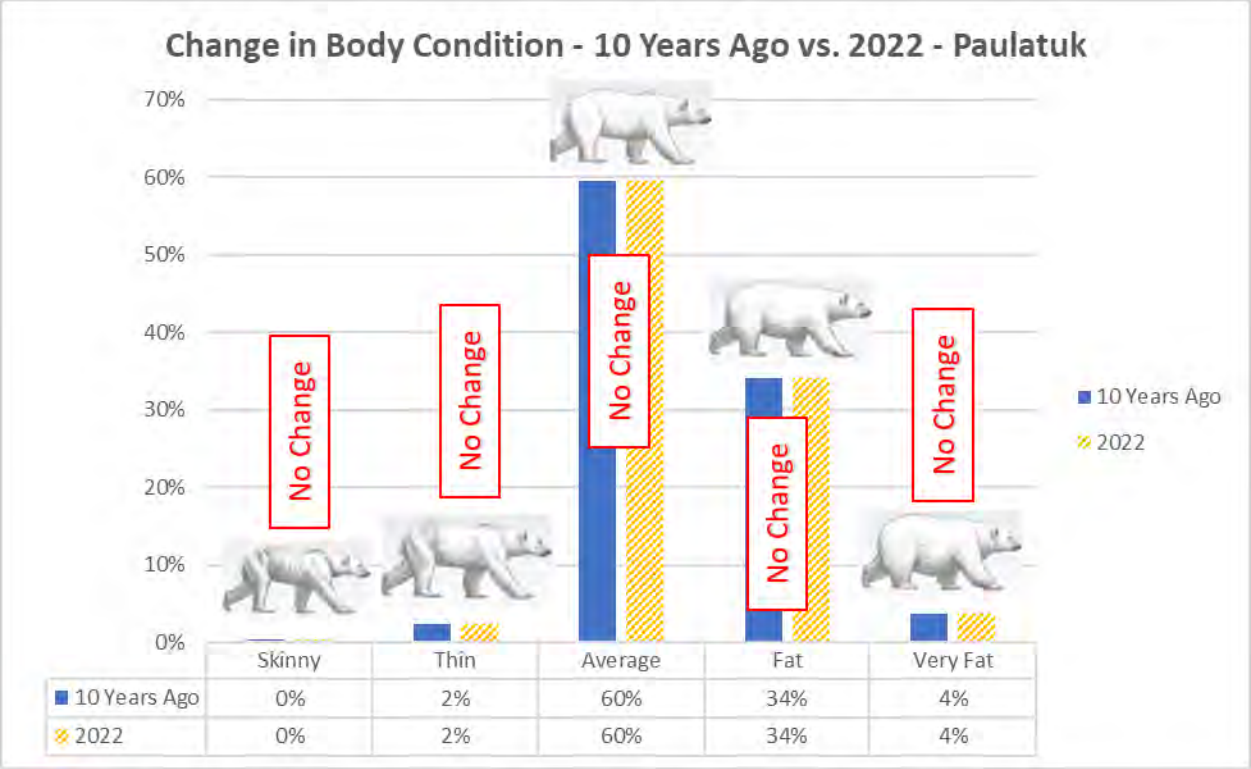


Figure C-16: Body Condition Proportional Piling Exercise Results - Paulatuk

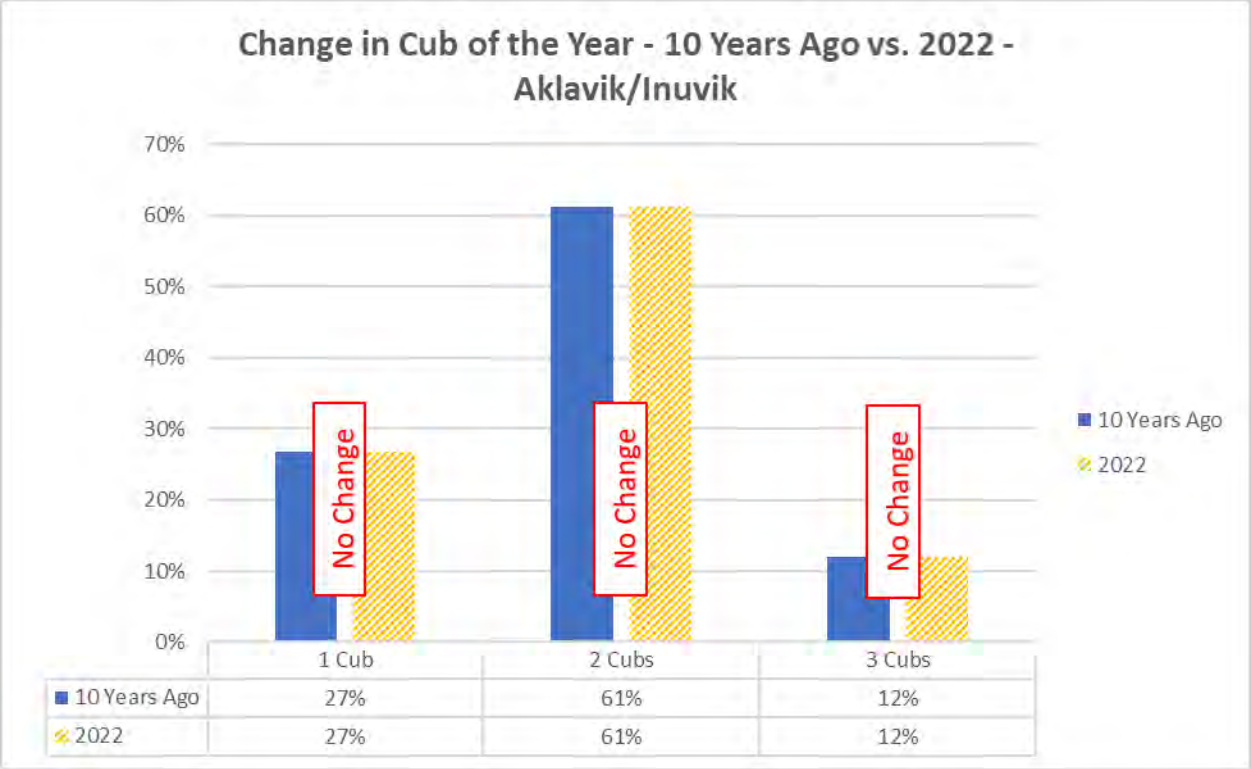


Figure C-17: Cub of Year Proportional Piling Exercise Results – Aklavik/Inuvik

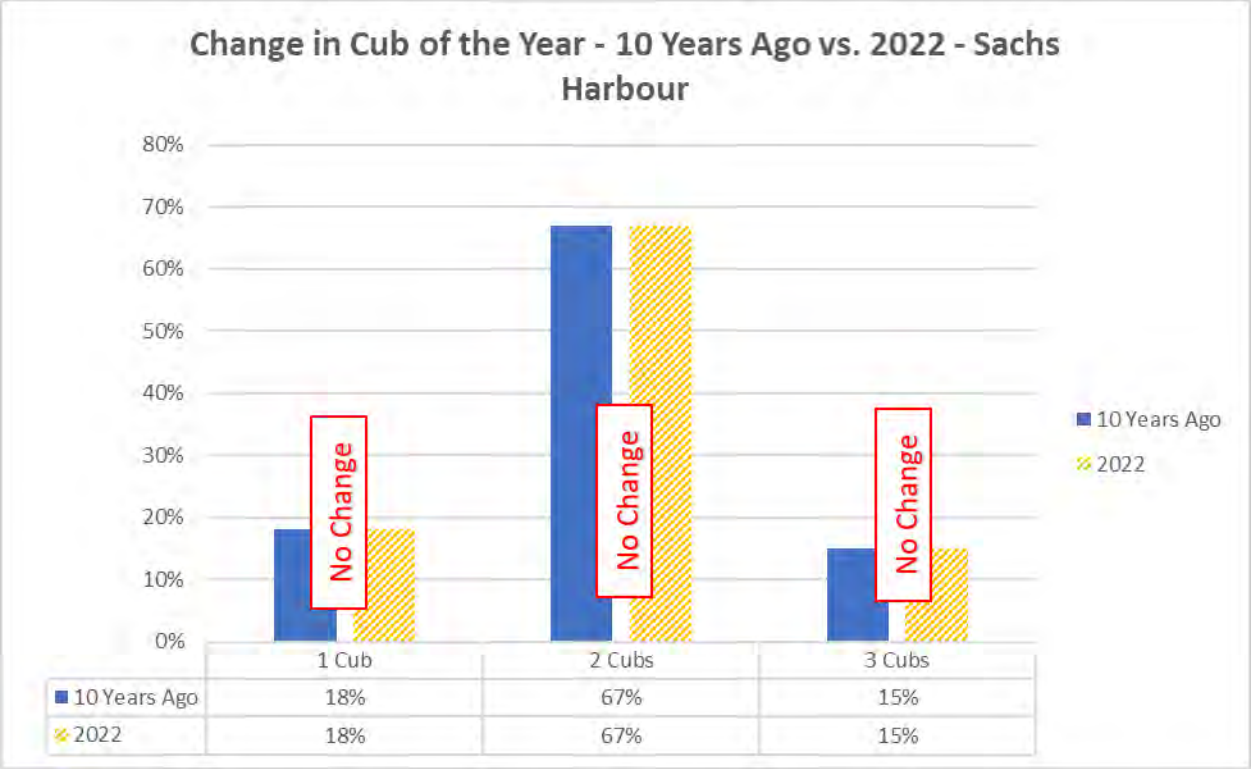


Figure C-18: Cub of Year Proportional Piling Exercise Results – Sachs Harbour

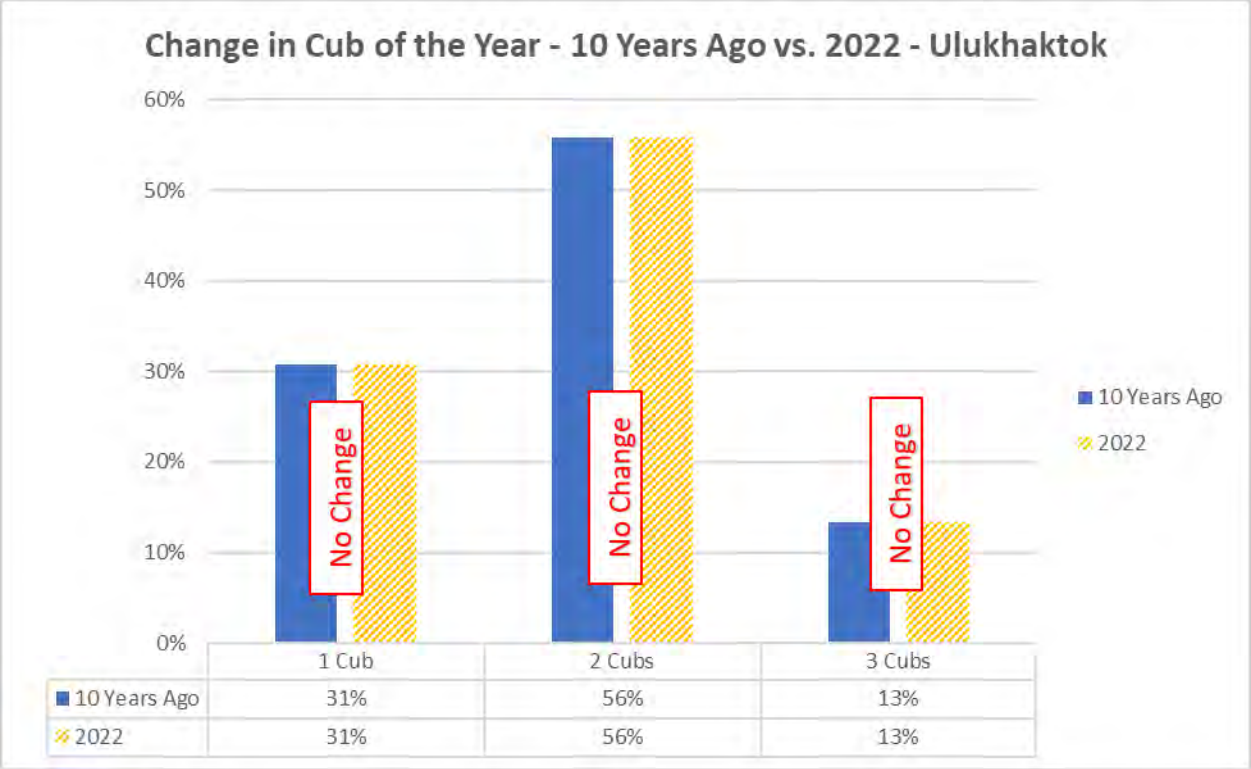


Figure C-19: Cub of Year Proportional Piling Exercise Results - Ulukhaktok

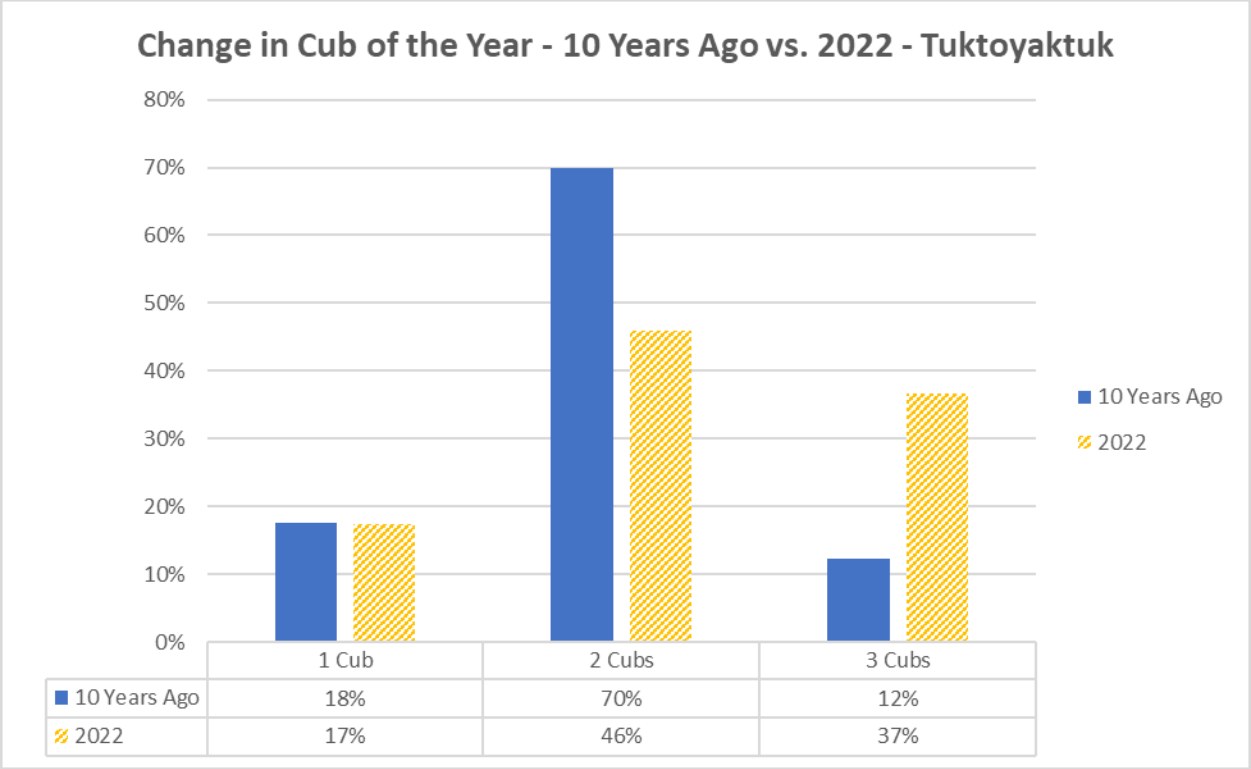


Figure C-20: Cub of Year Proportional Piling Exercise Results – Tuktoyaktuk

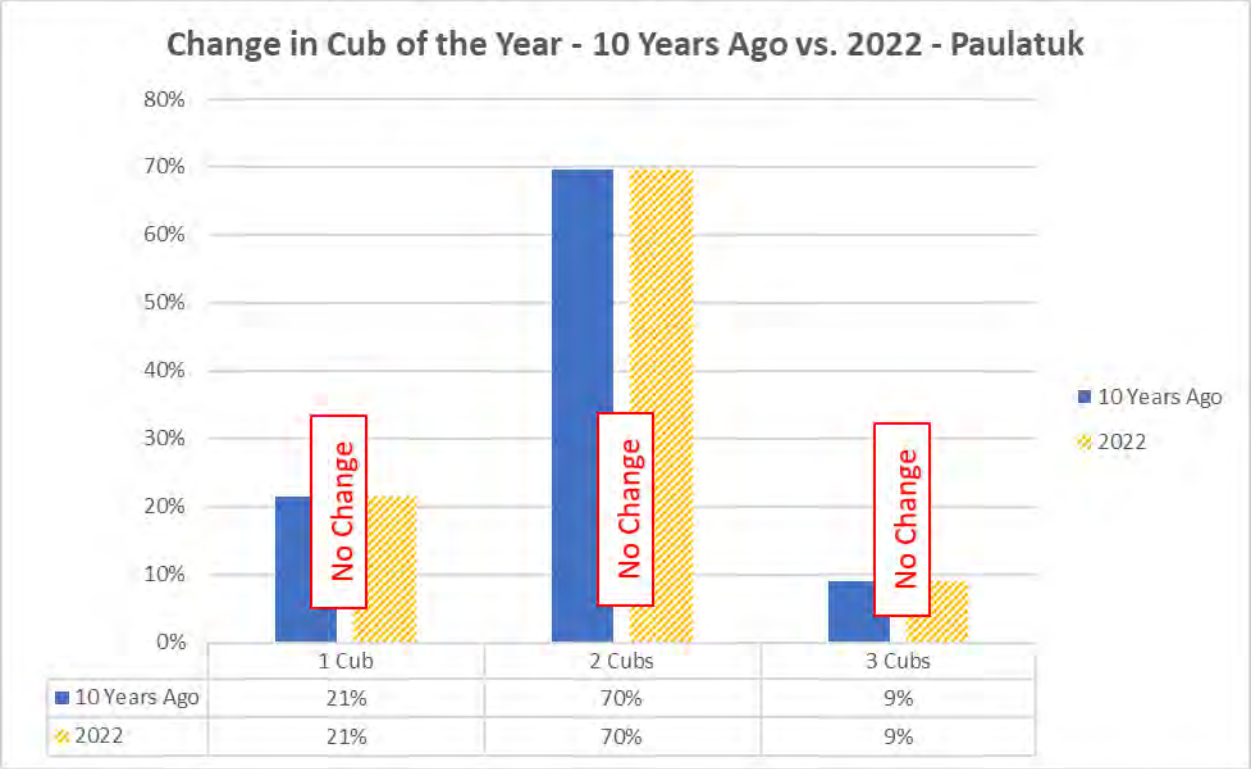


Figure C-21: Cub of Year Proportional Piling Exercise Results - Paulatuk

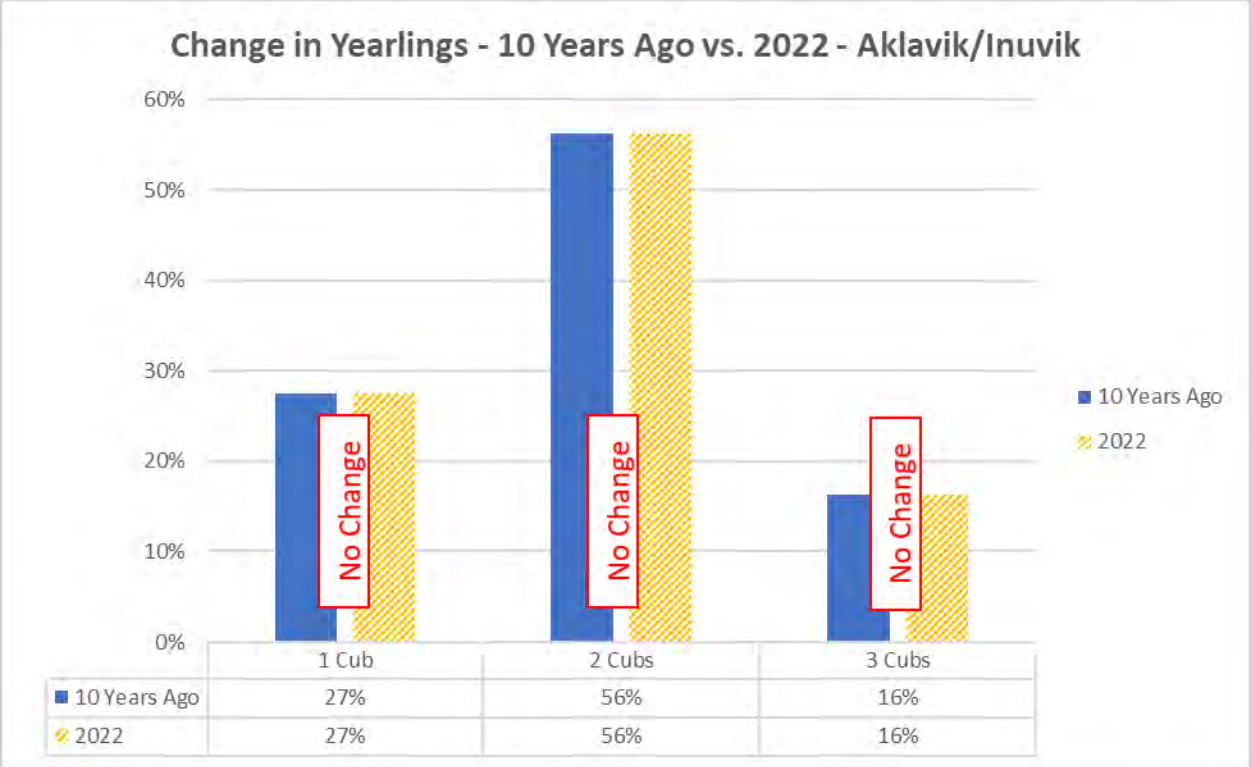


Figure C-22: Yearling Proportional Piling Exercise Results – Aklavik/Inuvik

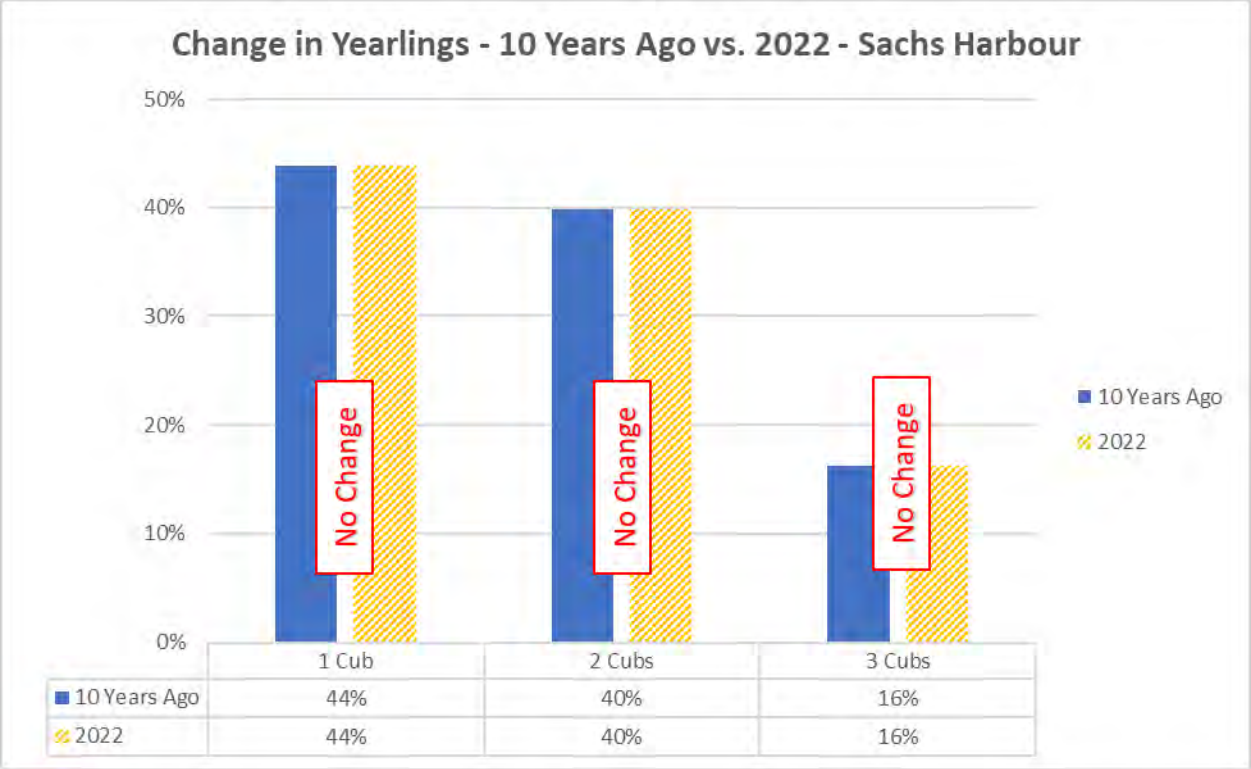


Figure C-23: Yearling Proportional Piling Exercise Results – Sachs Harbour

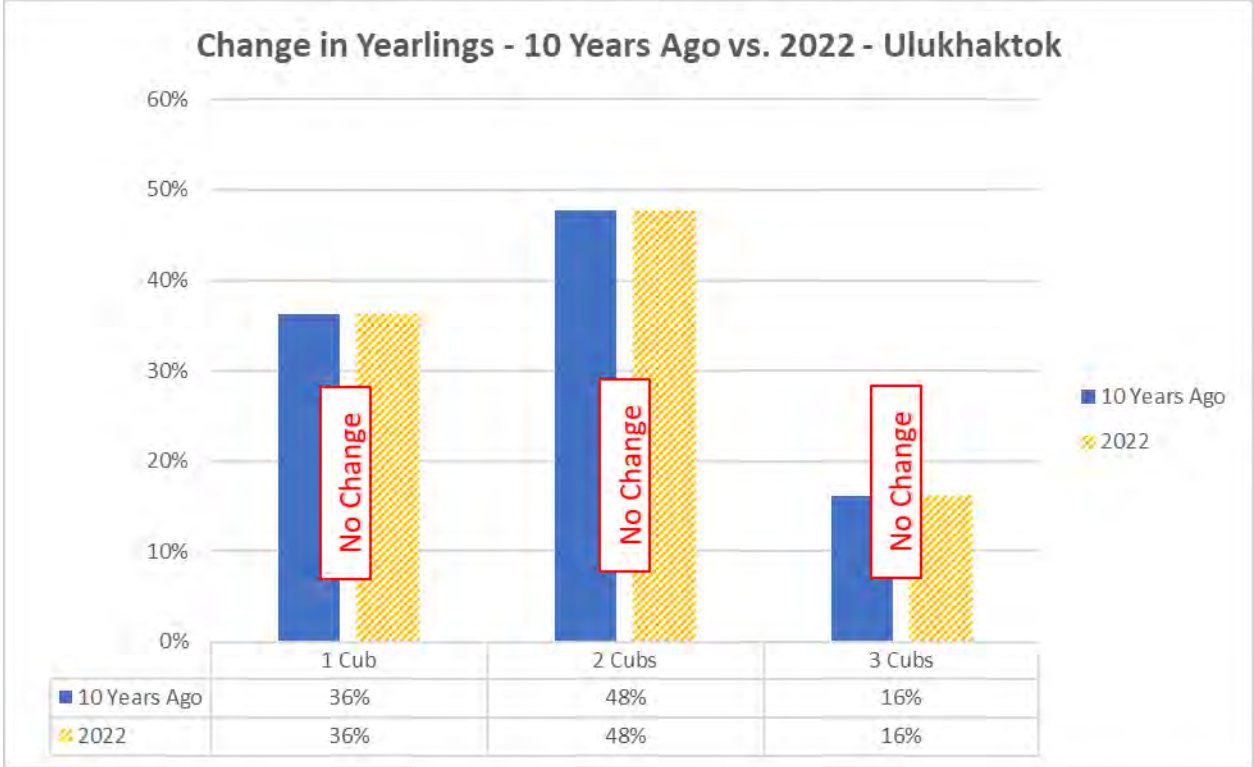


Figure C-24: Yearling Proportional Piling Exercise Results - Ulukhaktok

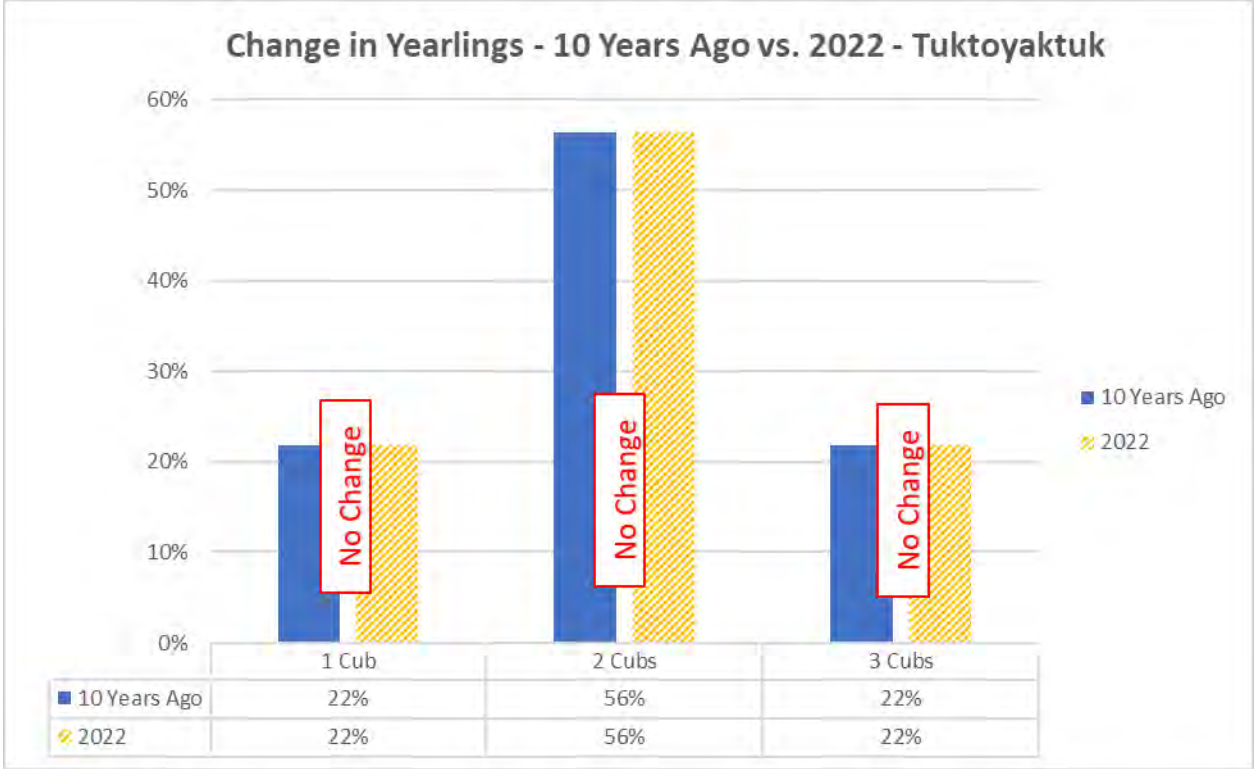


Figure C-25: Yearling Proportional Piling Exercise Results – Tuktoyaktuk

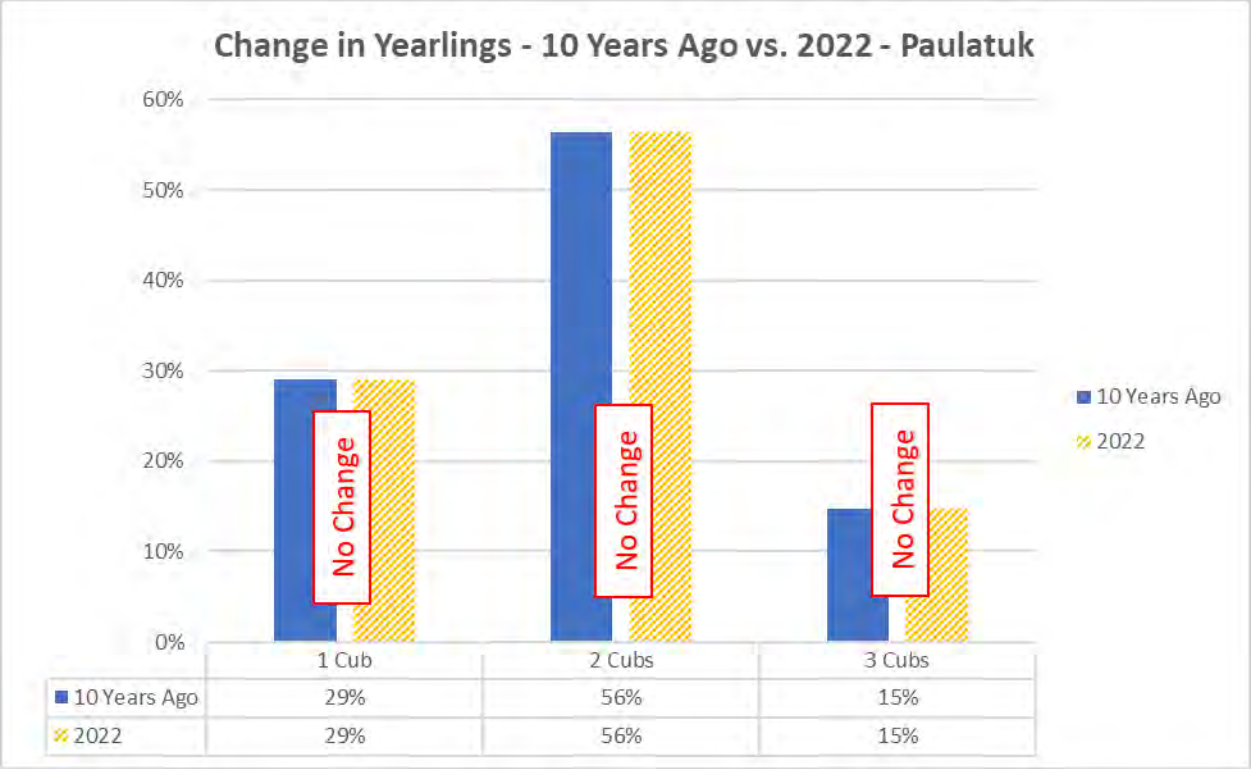


Figure C-26: Yearling Proportional Piling Exercise Results - Paulatuk

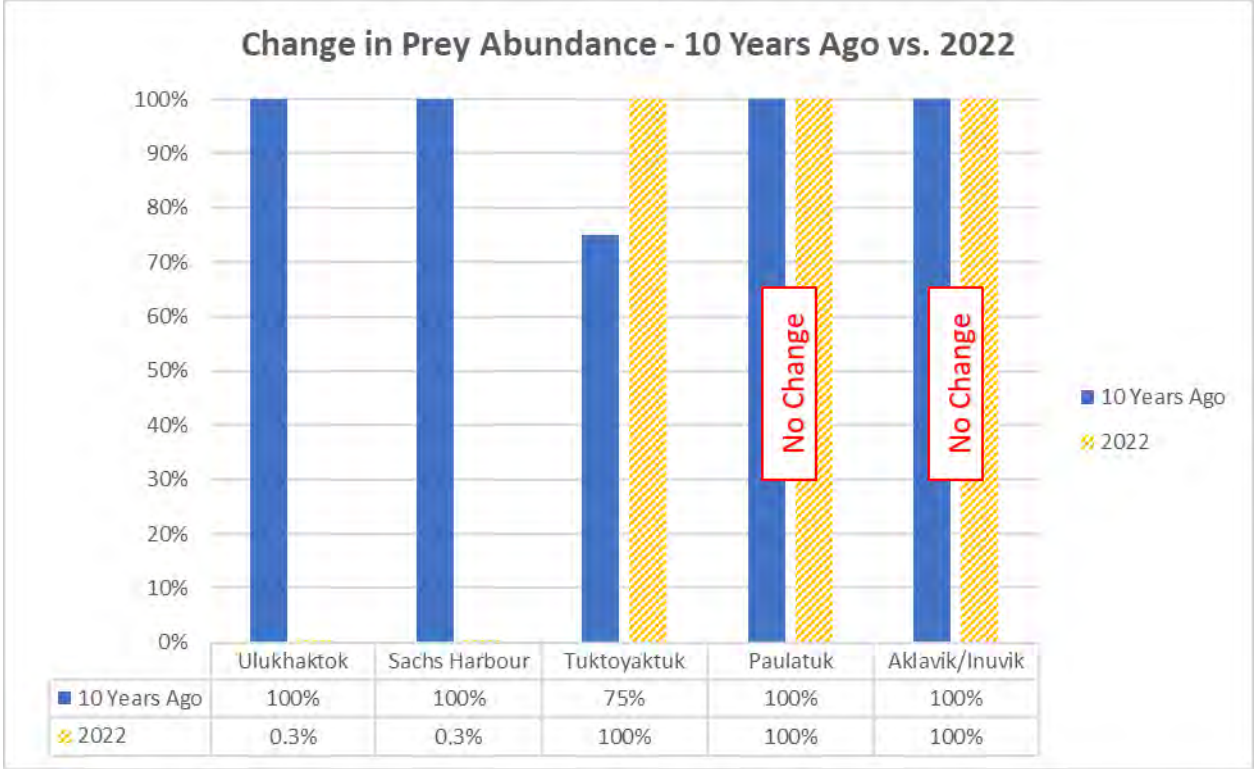


Figure C-27: Prey Abundance Proportional Piling Exercise Results