Nanuuq:

Local and Traditional Ecological Knowledge of Polar Bears in the Bering and Chukchi Seas

Alaska Nanuuq Commission

2012

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Dedication

This report is dedicated to the memory of Charles "Charlie" Johnson.

Introduction

Approximately fifteen years ago, pioneering studies in Traditional Ecological Knowledge (TEK) about polar bears were conducted on both the Alaskan and Russian sides of the Chukchi and Northern Bering Seas (Kalxdorff, 1997; Kochnev et al, 2003). The Arctic has changed greatly since that time. September 16th, 2012 marked a new record low extent of summer sea ice since satellite images started being recorded in 1979 (NSIDC, 2012).

Traditional Knowledge holders constantly adapt to their environment and observe how other species are—or are not—adapting. With this report, Inupiaq and Siberian Yupik hunters have provided an updated account of how polar bears are faring amidst climate change and arctic warming. This information is a valuable contribution given the technical challenges to establishing baseline knowledge and collecting ongoing data about the condition and abundance of polar bears in the Bering and Chukchi Seas through field science. This contribution of traditional ecological knowledge (hereafter referred to as TEK) is timely, as summer ice in the Bering Sea is being lost particularly rapidly.

The interviews on which this report are based were conducted between 2011 and 2012 in the coastal and island communities of Gambell, Savoonga, Wales, Shishmaref, Point Hope, Point Lay, and the King Island community in Nome, all located in Northwest Alaska. Members of most of these communities identify themselves as Inupiaq, with the important exception of the Siberian Yupik communities of Gambell and Savoonga on Saint Lawrence Island. Despite continuities in geography and culture, as well as social bonds of subsistence sharing that tie people together across the region, there are also distinct local differences in how people in these communities live with and understand polar bears. Similarly, while all of these communities have witnessed dramatic unpredictable ice conditions, local changes in polar bears—their local abundance and distribution, condition, habitat use, and interactions with humans—have not tracked the this larger trend of sea ice loss in a straightforward way. With this report, we hope to provide a fine-grained view of what has been and is being observed "on the ground" (and ice).

The concept of TEK traces its origins to indigenous practices of politics and memory, as well as to a wider movement towards "sustainable development" that builds on, rather than working against, extant cultural practices. Indigenous knowledge has also been described as "Local Ecological Knowledge," (LEK), reflecting its local specificity,

adaptability, and continued relevance in a changing world. For the purpose of this report, these terms are considered interchangeable.

Previous studies of TEK/LEK about polar bears have been concerned with two main goals. The first of these has been to establish the depth of human-bear relationships in the Arctic— both in terms of time and in terms of the symbolic and everyday significance of bears in indigenous arctic cultures. Documenting and illustrating histories of bear subsistence has been important where the legitimacy of a particular community's claim to indigeneity and subsistence rights are questioned by the state. In this mode, Kochneva's (2003) report "*Polar Bear[s] in Material and Spiritual Culture of the Native Peoples of Chukotka*" combines historical literature and archaeological and artistic evidence with hunter interviews conducted between 1999 and 2000 to demonstrate the degree to which polar bears are embedded in local cosmology, identity, and material culture.

The second category of previous studies has worked to bring this history into the present. Studies on the U.S. and Russian sides of the Bering Strait conducted in the 1990s translated hunters' experiences of living on the land with bears into detailed maps portraying bear habitat use, effectively linking projects of wildlife conservation and indigenous recognition (Kalxdorff, 1997; Kochnev et al, 2003). Connecting past and present knowledge, recent documentation of *Inuit qaujimajatuqangit* (IQ) in Canada has sought to capture trends in polar bear abundance over time, and how unfolding processes of climate change are affecting these trends (Kotierk, 2010a; Kotierk, 2010b).

Wildlife managers are currently working towards effective ways of illustrating and communicating the value of polar bears in order to advocate for their conservation. Beyond the "intrinsic worth" of a unique species, this value can be described in terms of ecological function, and even in economic terms. The Canadian government has estimated that polar bear subsistence is worth the equivalent of $0.6 million to indigenous communities (ÉcoRessources, 2011). Yet most hunters would agree that the importance of polar bears to their communities far exceeds economic value. TEK studies have contributed to conservation efforts by showing that, in the Arctic, the value of polar bear conservation cannot be separated from values of continuity and empowerment.

Our own study builds on Kalxdorff's 1997 documentation of indigenous knowledge about polar bear habitat use, based on interviews with hunters in coastal communities in the Beaufort, Chukchi, and Bering Seas. This study was motivated by the need to develop a Habitat Conservation Strategy for Polar Bears at the federal level; as such, its focus is on mapping vital areas of feeding, denning, and seasonal movements. While our knowledge-gathering practices build on Kalxdorff's work, our project is more limited geographically—focusing on communities on the Chukchi and Bering Seas—and more inclusive of a wide array of ethnographic data from these communities.

This report focuses on documenting qualitative data about trends in bear abundance, body condition, as well as changing ice conditions and ecology. We have

included rich background information about the traditional importance of polar bears in the region in order to contextualize contemporary observations and practices. What developed out of our conversations with hunters is a picture of changing patterns of human-bear interaction in these communities, which is highly dynamic, unpredictable, and difficult to typify in broad sweeps. When we returned to the communities to verify our initial findings in the summer of 2012, we learned that the 2011-2012 polar bear season did not fit in with many of the trends in ice conditions and bear abundance previously reported by hunters. In our results, we have incorporated these exceptions while also preserving information gathered about previous hunting seasons. The contrast between the 2010-2011 and 2011-2012 polar bear seasons points towards the importance of ongoing documentation of hunters' observations through future research.

Methodology

Research instrument design

Key topics to be investigated through collection of TEK/LEK about polar bears were identified at an initial planning meeting between the social scientist staff members of the Alaska Nanuuq Commission (ANC) and polar bear biologists at the FWS in Anchorage in March 2011. In order to allow for comparison with data generated in an earlier study of polar bear knowledge in the region (Kalxdorff 1997), patterns of polar bear habitat use—including denning, feeding, and seasonal migrations—were identified as vital areas of investigation.

Recognizing the value of hunters' long-term observations of polar bears in the local environment, perceptions of overall trends in polar bear abundance, body condition, and diet were also identified as important subjects to broach in interviews. Last but not least, in designing this study ANC and FWS acknowledged that human and polar bear systems are inseparable in Alaska Native communities; therefore trends in the cultural and subsistence role of polar bears were prioritized for inclusion in the study.

The research instrument was developed from this list of key topics, and was refined through a test run and consultation with a local cultural expert in Nome. The interview style was tailored to fit the cultural milieu of Alaska Native subsistence communities, in that it drew on specific encounters with and stories about polar bears—both through hunting and observation—as a starting point for learning about polar bear habitat use writ large.

Permissions and Participants

Communities were selected for the study based on their history as significant sites of polar bear utilization. Initially, the study was limited to villages in the Bering Strait region: Gambell, Savoonga, Wales, Shishmaref, and the King Island Native Community in Nome. The study was subsequently expanded to include two villages in the North Slope region: Point Hope and Point Lay. Little Diomede was also selected as a key village but weather and logistics prevented us from visiting the island.

Prior to our travel contact was established with each tribal council regarding our interest in conducting TEK research on polar bears in each village. The ANC is endorsed by, and has a working relationship with, the village tribal councils. In our correspondence, we asked for the council's support and input in managing the logistics of our research, and requested the names and contact information of polar bear experts in the village.

While social scientists have attempted to make standard "snowball sampling"(requesting names of others) (Bernard 2006:192) identification of local experts more rigorous through ranking the frequency at which community members recommend other individuals as local experts (Davis and Wagner 2003), in practice, TEK research must be a collaborative endeavor that works through and respects extant social structures for recognizing experts. As leaders in their communities, tribal councils are well positioned to recommend the most knowledgeable members of the community (Ferguson and Messier 1997). Nonetheless, after we had pursued contacts recommended by the tribal council, further participants were recruited through snowball sampling. We did not employ the ranking method recommended by Davis and Wagner.

Because our study was designed to look at the current status, as well as ongoing trends, in polar bear habitat use, abundance, condition, and subsistence hunting practices, we asked that the tribal councils recommend both active and older hunters to interview. In this practice, our study departs somewhat from many TEK studies that have focused primarily on documenting and preserving the knowledge of Elders. We included interviews with younger hunters to meet the objectives of documenting current trends of polar bear.

After receiving contact information from village tribal councils, we contacted each potential participant through the phone and briefly explained our project and asked if they would be willing to be interviewed. Where possible, we contacted potential informants prior to our travel; in practice, it was often necessary to wait until we arrived in the village, were we could make contact with potential participants over the VHF radio or in person. We conducted an initial research trip to each village in 2011. The length of research visits depended on regional flight schedules, with a typical duration being three to four days.

The Interviews

We intended to conduct at least six interviews in each village; the number of interviews actually conducted ranged from six to ten. The number of interviews was ultimately limited by the length of our trips and the size of our budget. Nonetheless, we conducted enough interviews to report initial findings with confidence, as saturation (Corbin and Strauss, 2008) in the information collected began to occur after only three or four interview in all cases, reflecting the tight-knit nature of these communities and their knowledge-sharing practices.

The setting of our interviews varied based on the convenience of participant. Where possible, we visited participants in their homes. Village tribal council and city offices hosted many interviews; others were held at the local school. Interviews were held individually and were private, except for a few cases in which participants expressed a desire to be interviewed together. A translator was necessary only in a couple cases, when interviewing Elders. In these cases, the participants designated another community member as the translator, and the interviews were conducted both in English and in Inupiaq or Siberian Yupik. In all other cases, the interviews were conducted in English. An effort was made to note any culturally specific terms and concepts relating to polar bear habitat use when a direct English translation was not available.

Each interview was initiated with an explanation of our project goals. The importance and value of TEK in polar bear management was emphasized, given the logistical challenges and limits of biological research in the Arctic. The respective roles of FWS and ANC in the research were clarified. For those participants who were unfamiliar with ANC, we explained its mission statement: to represent Alaska Native communities in the sustainable management and subsistence harvest of polar bears. We showed the participants a copy of Kalxdorff's 1997 polar bear TEK report so that the interviewees could better understand how the information they provided would be presented in the final report. Interviews were conducted only after we had received verbal consent from the respondent.

We modified our methods for data collection which seemed to fit best for us as recorders and participants. We asked questions of the participant in a conversational style. We did not use typed questions or survey forms in the interview; instead, we memorized the essential aspects of our interview instrument, and wove these into the discussion as it progressed, asking follow-up questions where necessary (Huntington 1998).

Data Collection

The interviews were not digitally recorded. This decision was made based on the advice of social scientists with experience working in the region, who indicated that recording causes discomfort for many community members. As an alternative to digital recordings, we kept detailed "real time" typed notes on a laptop during each interview, with the explicit verbal consent of each participant at the beginning of the interview.

Because there were two investigators, one of us kept comprehensive written records of the interviews, while the other recorded geographical information. Written and mapped data were continuously linked through assignment of consecutive map feature identification numbers, which were indexed to narrative in the notes.

Our technique for mapping geographical information about polar bear habitat use and encounters is modeled on methods developed by Kalxdorff (1997), and adheres to the concept of "community clusters,"(Dowsley 2009) in which data is collected according to the boundaries of hunting territory, rather than according to the imposed boundaries of management units. We consulted with the Bureau of Land Management office in Nome to further develop our mapping protocol. For each village in the study, we used 1:250,000 scale USGS maps of the region. In some cases, hunting areas for villages extended across two maps, in which case both maps were used in the interview. The original maps were laminated, and large sheets of clear plastic mylar were cut to be placed over maps and record data during each interview. Each participant was assigned a unique ID number. This number was written on the participant's mylar sheet as well as in the typed notes in order to keep the participant's identity confidential. The identity of each participant was linked to the ID number in a separate, secure excel worksheet. The date and regional map being used was also noted on each mylar sheet. Consistent map reference points were marked on each sheet for orientation. Participants' data maps were not shared with other participants or community members at this stage of the research, except where, as previously noted, a few participants decided to conduct the interview jointly.

As each participant told us about specific encounters with polar bears, we assigned a corresponding map feature ID number to each encounter. Whereas Kalxdorff 1997 created separate map feature ID types for different categories of data, such as feeding and seasonal movements, we simplified this approach, using simply "E" for encounters to refer to any event in which a bear was observed. Thus, the first encounter reported in the first interview in a village was labeled "E1."

We maintained separate map feature IDs and numbers for dens (D) and tracks (T), because these two features represent evidence of past polar bear habitat use, rather than direct observation of bears in the environment. The directionality of tracks was noted, and linked to more general statements about seasonal movement. When a bear was observed in a den, the data point was assigned both a den and encounter ID number. Whenever a den was reported, we asked follow-up questions to ascertain whether it was a maternal den or temporary shelter, and this information was recorded in the notes. We marked encounters and dens with discrete points. If a "general feeding area" was reported, for example, we drew a circle around the indicated area on the map. Observations of specific movement and tracks were marked with arrows. Accounts of generalized seasonal movements were also recorded with arrows.

Consecutive numbering was used across participant maps within each village, but not between villages. For each encounter number, we recorded any associated behavior,

such as feeding, hunting, or movement, in our typed notes. The year (to the best of the participant's memory) was recorded. Each encounter was color coded on the map according to season. We asked the participants which month an encounter occurred. Corresponding to Kalxdorff's (1997) seasonal definitions, encounters between December and February (winter) were mapped in blue; between March and May (spring) in green; between June and August (summer) in red, and between September and November (fall) in purple. General field notes were recorded on the map in black. Besides the location, year, and month, we also noted information about the number of bears present, their condition, sex and approximate age (if known), as well as whether or not the bear was harvested.

In recognition of the socially shared nature of knowledge in Alaska Native communities, we recorded secondary (e.g. a hunter had heard of a bear sighting but had not witnessed it himself) as well as primary (e.g. observed directly by the hunter) accounts, but we distinguished between the two types of data in our notes. After the interview and while our memories were still fresh, we reviewed our data to make sure the narrative and maps corresponded and resolve any discrepancies.

In the case of Gambell and King Island Community of Nome, it was not possible for two investigators to be present to conduct the interviews. In these cases, a local research assistant was recruited and trained in our project goals and methodology.

The length of each interview depended on how much information (and patience) each participant had to share with us. The interviews ranged from 40 to 90 minutes; on average, they lasted slightly less than one hour. The time for each interview was limited somewhat by our budget and value of the honorarium.

At the end of the interview, we reminded the participants that their anonymity would be maintained unless they expressed a desire to be acknowledged by name in the final report. Each participant was presented with a small gift from ANC as well as the choice of either a $50 credit at the village store or for fuel/heating oil as compensation for his time[1].

Narrative Analysis

All analysis of the narrative portion of our data was conducted within Atlas.ti qualitative data analysis software (Friese 2012). Detailed typed notes from our interviews were uploaded into Atlas.ti as individual primary documents, and organized by "family" according to village location of interview.

Two parallel approaches for coding (or labeling according to topic) the primary documents were considered. First, the text was reviewed for information corresponding directly to questions from our research instrument. For example, whether or not a

[1] Because this study focused on polar bear hunters, almost all the interviews were conducted with men. However, there was one interview with a woman from King Island.

participant has observed dens in the vicinity of his village is a discrete piece of information that was coded according to pre-existing criteria. This is a "top-down" approach to coding based on themes previously identified by ANC and FWS in the initial stages of our research protocol development.

Next, we approached the data through the framework of Grounded Theory (Corbin and Strauss 2008). This is an inductive method of analysis in social science that builds on emergent themes in the data. For example, one emergent theme was that of "king bears." Hunters brought this theme up without prompting. An open coding approach allows for recognition of emergent information of this kind (Bernard 2006). There were two stages to the open coding: during the first stage we defined new codes, and during the second we used the resulting "code-book" to iteratively code the rest of the data.

Codes developed through both the "top-down" and "bottom-up" approaches were then grouped into families according to over-arching themes. Segments of text were then exported to Microsoft Word in groups according to their associated code, and incorporated into the narrative analysis.

Map Analysis:

Maps were compiled for fall/winter and spring/summer in each village, resulting in two final maps for each village visited. The fall/winter season encompassed September to February. The spring/summer season encompasses March to August.

Raw map data was in the form of data-enriched mylar map overlays, which are clear sheets with marks corresponding to polar bear encounters and habitat use as reported by individual participants. Each of these sheets corresponds to one participant. The documented points on mylar sheets include both primary and secondary information of general areas of polar bear sightings, sites of specific polar bear encounters, observations of feeding areas, denning areas, seasonal movements, and polar bear track sightings.

The materials used for the map compilation included the original blank USGS 1:250,000 maps used in the interviews, the data-enriched mylar overlays from individual interviews and one new, blank sheet of mylar for compilation. Each individual data-enriched mylar was lined up to corresponding reference points on the map; the seasonally relevant data on that sheet for fall/winter and spring/summer was then transferred to a fresh sheet of mylar overlay. Each individual mylar sheet was consecutively incorporated in this fashion. When areas of reported habitat use overlapped, the outer boundaries of all reported areas were connected. Types of habitat use were key-coded by pattern for easy identification in the final report. Once the maps were compiled, consecutively numbered polygons were assigned to each data point indicted on the map. After assigning numbers for each polygon for the fall/winter, spring/summer data points, a final review of the raw map data, narrative, and map compilation was completed to ensure all recorded data had

been represented on the maps. After a thorough review the maps were sent to a map expert for digitization.

Verification

Verification of initial research results is a vital component of community-based TEK research. We contacted the tribal councils to update them on the project and indicate our desire to make a return visit in order to conduct follow up interviews with the participants who initially participated in the interviews. Through correspondence with each council, return visits were scheduled. Rough drafts of the narrative reports and copies of village-specific maps were then mailed to the Alaska Nanuuq Commissioner in each village three weeks prior to our scheduled visit. The Commissioner then distributed the drafts to each hunter. Around the time that hunters received the draft report, we contacted each of them via telephone or Very High Frequency (VHF) radios, where possible, to invite them to attend our verification meeting.

For each village, we developed a list of specific follow-up questions for hunters. While initial data gathering interviews were held individually, at the verification stage, a focus group approach was used. This format allowed us to ensure a basic consensus on the findings, and to generate further data through discussion. For those hunters who were not able to attend, we held individual consultations following the main verification meeting.

New and corrected data from the verification meetings were incorporated into the draft report. Between our original and verification visits, another winter had passed, and where consensus emerged about the most recent polar bear season and ice conditions, we used this information to update the report. Changes to maps were sent to our contracting map expert for integration into the digital maps.

Villages

Figure 1. Study area for 2011-2012 Polar Bear TEK/LEK report.

Table 1. Travel schedule of village visits for 2011-2012 Polar Bear TEK/LEK report.

Village:	Initial Interviews:	Verification Interviews:
Shishmaref	April 2011 eight interviews	July 2012 eight interviews
Gambell	May 2011 eleven interviews	July 2012 seven interviews
Savoonga	May 2011 eight interviews	July 2012 eight interviews
Wales	June 2011 nine interviews	July 2012 four interviews
King Island	July 2011 seven interviews	September 2012 six interviews
Point Lay	September 2011 six interviews	September 2012 four interviews
Point Hope	September 2011 ten interviews	September 2012seven interviews

GAMBELL

POLAR BEAR CONDITION AND ABUNDANCE

ABUNDANCE

Locals reported that 2012 was the coldest year that Gambell has seen in almost twenty years. It was an abundant year for polar bears, some of which remained on the island late into the spring; the community's total harvest at the end of July 2012 was higher than the previous year's harvest. In contrast, in 2011 very few bears were seen around Gambell, compared to "three to four years" ago. One hunter recalled before the previous period, *"Every time I went out hunting I would see one."* The 1990s are also remembered as a time of abundant bears.

While the number of bears encountered on the west side of the island has varied from year to year, most hunters understand this variation as part of a normal cycle in the bear population, lasting approximately ten years: "*There is the same number of bears as there has always been. Some years there's a whole bunch, some years there's none."*

One Elder placed the current low number of bears in a longer historical context. Prior to the 1940s, there were few bears encountered around Gambell. From that decade to the present, bears have remained more abundant relative to the past. *"People are seeing more bears and now we're even seeing bears in the summer. Long time ago, only once in a while we would see a polar bear."*

Bear sightings are associated with years in which there is "good ice." The *Sikuupik*, or main pack ice and icebergs, brings bears to Gambell; when there is less pack ice, or the pack ice is "dirty," having accumulated layers of sand and gravel, fewer bears are observed. Hunters explained that when shorefast ice is thin, seals are not able to find a breeding platform; this impoverished icescape in turn supports fewer bears.

The persistent lack of "good ice" in recent years leading up to 2012 is understood as evidence of a new trend. One hunter conceded, *"Somehow I started believing in global warming."* This belief in global warming finds support in a consensus among hunters that freeze-up is now happening later. In the past, freeze-up occurred by October, now it does not occur until December.

CONDITION

During our interviews, a strong consensus emerged: this population of bears—both those harvested and those merely observed—has generally been in good condition within hunters' living memory, and currently appear to be fat, healthy, and large.

Hunters pay attention to bears' condition not only out of interest or hunting prospects; the condition of bears is an important indicator of the way they will behave around humans. Hunters recall learning from their Elders that "*Very fat bears can't turn their heads,*" making them less agile. Hunters say that these very fat bears will continue growing until they die if they have enough to eat.

In August 2010, a family of polar bears was observed on Saint Lawrence Island, about thirty-eight miles from Gambell. Even though it was an unusual time of year for the bears to be present, they appeared healthy. Bears that get "stranded" on the island over the summer also appear to remain in surprisingly good health during most years. Locals say that they eat salmon berries and crowberries during this time.

Only one hunter recalled seeing a severely malnourished bear, about twenty years ago: "*When I was young, I caught one in front of the northwest houses. It was super, super skinny. I was 16, and I have never seen a bear like that again.*"

DEAD AND INJURED BEARS

Of the five hunters asked about dead bears, four had seen a single bear that had died, presumably of natural causes, during their lifetimes. It is difficult to discern whether the four sightings represent different bears or different sightings of the same bear; two sightings are dated to 2005—one in spring, one in July—and into June of 2004. Hunters mentioned, the bear seen in 2005 was a young adult and it looked skinny.

One hunter told a story of a butchering an ailing bear:

"*By boat we got another one out on the north beach. Something was wrong with its leg... it had been staying in place for long time, until it healed. The bear was getting its first mukluk (bearded seal). With one shot we got the seal and the bear. The bear smelled bad. It had bad blubber. There was oil in its paw, which made it hard to move.*" [This event occurred during the spring, around the late 1990s].

A few days before being interviewed in May 2011, one hunter had encountered a young bear about thirty miles west of the village, probably a yearling, which was covered with fresh scratch marks. It's not known whether these injuries were from another bear, a walrus, or some other source.

DEMOGRAPHICS

Male and female bears are encountered in roughly equal proportions around Gambell. Distinguishing the difference between genders is often possible: "*Males are bulky*

around the head, rough looking. Females have longer skinnier snouts." Male bears commonly cross back and forth the island in winter. Encounters with family groups have occurred in winter, late spring, early summer, and during fall berry picking time. Sightings of mothers with one or two large cubs are not uncommon; occasionally there may be as many as three cubs observed in family groups. It was noted that sightings of females with cubs are now more common compared to fourteen to fifteen years ago.

Younger bears are more likely to get "stuck" on the island over the summer than older bears: "*They go up north, because of the ice conditions. The older males and females warn the younger ones. One got stranded...and it was a long swim home!"* In early July 2012, Gambell residents encountered two stranded young bears, which looked like a brother and sister, which they guessed to be four or five years old.

HABITAT USE

POLAR BEAR HABITAT

Hunters were divided in their interpretation of long-term trends in ice conditions. While some contextualized changing ice within the frame of long-term climate change, others believe that five to ten-year cycles in ice conditions are a typical part of Gambell's long-term ecology.

Young hunters like to say that old people *"don't believe in global warming yet."* Whether or not Elders contextualize changes within larger processes of climate change, we found a strong consensus among hunters that seasonal patterns in ice conditions have changed within their lifetimes:

"In April 1943, during my first trip to Nome on a tri-motor, the ice was all white, and there was an open lead. Lots of mukluk [bearded seal]. Then we came to another lead, closer to Nome, and the ice looked solid still. When we got to Nome, the ice was all solid...Now the ice condition is different, thin ice. It never freezes up, it's always open. It looks kind of dark, and thinner."

"I've noticed change [in the ice] *since around the year 2000. It's different from the way it used to be in the 60s and 80s"*

"A long time ago the ice got in earlier, back in the 70s or 80s."

"The first week of May we go out boating. I go out and it looks like the first week of June when I was young, it's melting faster and faster. I wasn't worried about it [at first], but now I am. [But] I haven't noticed any effects [on bears]." [At the time of the interview the respondent's age was 36].

"The ice is getting thinner. I started hunting thirteen or fourteen years ago. There was more ice then than there is today."

"There's hardly anymore shorefast ice on this side [the west coast] since 2006."

Most hunters believe that altered ice conditions have a direct influence on the presence and distribution of bears around Gambell. When there is thick, "good ice," seals have a good breeding platform and bears are plentiful; when ice is thin, bears follow the seals elsewhere, especially towards Russia. In the past, *Sikuupik*, pack ice, arrived in October, bringing polar bears and other game to Gambell; now the ice comes later and is "dirtier," containing more gravel. Although the problem of "dirty ice" was brought up more than once, the mechanism through which dirty ice might affect bears or other animals in the area was not clear.

Walrus season is used as an indicator of larger changes in the yearly ice-cycle: *"Walruses used to come for Thanksgiving dinner. Now [they come] around Christmas."* Ice in the immediate vicinity of Gambell is less predictable compared to the past. Shorefast ice doesn't remain in place for long and blows away according to the prevailing winds, which happened in February 2011. Due to the absence of thick ice around Gambell, bears are spending their time further away from the village.

Finally, hunters reported that some bears remain on the island all year round. In 2012, many bears remained on the island in the summer, but according to hunters, this "stranding" event was not correlated with rapidly receding ice, as in previous years. This phenomenon was brought up in the context of discussions about changing ice conditions.

Ice is not the only element of polar bear habitat subject to change. One hunter suggested that the general increase in machinery, noise, and development in the Bering Strait region has shortened the amount of time that bears spend in the area.

SEASONAL MOVEMENTS

Seasonal movements are not fixed but vary with the formation and dissolution of ice habitats, the timing of which, as described above, has changed in recent decades.

In general, however, bears come to Saint Lawrence Island from the east around November or December, gravitate towards the south side of the island, and then remain in that area until May. During this time they are often observed swimming along the west coast. Bears then move from the south part of the island to the north and west in February and March, and hunters observe them migrating overland and along the coast at this time. Bears are encountered out on the water during spring walrus season.

If ice recedes too quickly, bears may remain on the island in the summer, as happened to a large number of bears in 2003. Bears may also remain on the island longer in years of persistent ice, as in the summer of 2012. *"The ice didn't leave until June* [in 2012], *best year we've had for polar bear. You can just say that it all depends on how much the ice builds up."* In most "normal" years, relatively few bears spend the summer on the island. It was reported that when bears do get stranded, they may venture quite far inland, spending time in highland areas. Alternatively, some stranded bears gather on the south side of the island, perhaps due to the presence of seals there.

DENS

Dens are not very common around Gambell, but are occasionally seen on Gambell Mountain and cliffs in the area. Some dens and associated tracks are also found in snowdrifts on the southwest shore of Saint Lawrence Island. However, it is not clear whether these dens are reproductive dens or only temporary shelters. Dens are believed to have been more common in the 1940s or 1950s, from which time stories about hunters catching bears in dens on Saint Lawrence Island date.

OTHER SPECIES

Bearded and ringed seals are plentiful around Gambell, and their numbers have remained constant. During our interviews in early May, bearded seals had gathered on the ice about five miles from shore. Spotted and ribbon seals are associated with the last ice of the season, in June. "*When it's calm they stick around for a couple months.*"

POLAR BEAR DIET

FEEDING BEHAVIOR

Polar bears are said to be "like lions," in that they sleep during the day and actively hunt and scavenge at night. Gambell hunters have observed polar bears actively pursuing bearded seals, which are known to be the bears' favorite food, and eating ringed seals, spotted, and ribbon seals that arrive in June. They are known to prefer young seal pups. One hunter saw a bear pursuing a spotted seal near a river mouth in July 2000; in 2008,

another hunter directly observed a bear eating a spotted seal near the village. Several individuals have observed bears actively hunting walruses.

In the wintertime, bears feed several miles out on the ice, mostly on the west coast of the island, where they are known to search for seal holes. Grey whale carcasses wash up in the fall, freeze in the ice, and attract scavenging bears. One particularly heavy season of coastal scavenging by bears was observed in 2000.

Hunters suggest that biologists should not underestimate the plasticity and range of polar bears' diet, which includes diverse marine mammals as well as birds, fish, crowberries, salmonberries, roseroot, and reindeer. Polar bears are known to be opportunistic feeders; when they get stranded on Saint Lawrence Island in the summer, they eat fish, murre eggs, greens, and berries found between cliffs on the island.

BUTCHERING OBSERVATIONS

Seeing anything in the stomachs of bears during butchering is rare in Gambell because hunters there tend to avoid the intestines, and to cut around the stomach.

Hunters who have examined the intestines have observed that full-grown bears usually have only blubber in their stomachs. Gambell hunters reported that "b*ears usually just eat blubber of animals*." The stomachs of younger, inexperienced bears often contain seal meat, shredded skin, and bones.

HUNTING FOR POLAR BEARS

TIMING OF HARVEST

Most bear harvests around Gambell occur in April, because that is when bears are most frequently encountered. The bear hunting season may extend further in to the year in which bears become stranded on the island due to ice conditions.

LOCAL RULES FOR HUNTING

Local norms for hunting bears differ depending on whether a bear is encountered inside or beyond the village boundaries. Even though small bears are preferred for eating, several hunters reported a strong aversion to harvesting cubs, and prefer to harvest bears that are at least four feet long. Hunters prefer to hunt "loner" males over females where possible. As with any cultural community, however, adherence to these norms varies.

Elders expressed concern that meat is "left around" now (acting as an attractant), whereas this did not occur as much in the past. One hunter mentioned that in the past, if there was

"any extra meat, they [the hunters] wouldn't leave it [just] anywhere; they would throw it back in the ocean." This action was taken by the hunter out of respect for the harvest animal, and in the hope that animal would continue to return to the area.

HUNTING PRACTICES

Learning how to properly hunt and process bears occurs at a young age while out hunting with relatives. Until the 1960s, bears were harvested by dog teams, which have been replaced by boats and snowmachines. Today, it is not uncommon to hunt bears from a boat. Bears caught during group boating trips belong to a boat's captain, regardless of who shoots the bear. In other settings, the bear belongs to whoever saw the bear first, regardless of who harvested it.

HARVEST EFFORT

Traditionally, a hunter's first bear was something to be sought-out and celebrated: *"In our old days as soon as we catch a polar bear, that's jumping into manhood."* Although in recent years there is no formal celebration, nearly every hunter clearly remembers harvesting his first bear. Several Gambell hunters caught their first bear in their early twenties, after years of hunting for smaller game. Young men seeking their first bear adopt an active approach to hunting. However, once "*a man gets his first bear, then it doesn't matter if he gets another."* After getting his first bear, the hunter is more likely to approach bear hunting opportunistically.

In Gambell, polar bear encounters often occur while hunters are out boating during the spring walrus season. However, at this time, energy is focused primarily on harvesting walruses, and dealing with bears can be an unwelcome distraction; if bears are harvested in the water at this time, pulling them from the water poses technical challenges. As a result, opportunities to harvest bears are often passed over during spring hunting.

A hunters' skill is no guarantee of a successful bear hunt. Bears may choose to "give themselves" or not. It is important for hunters to maintain an attitude of humility in seeking bears; it is considered arrogant and dangerous to talk about actively going out in pursuit of bears and other game. In telling stories about their harvests, hunters inevitably talk about encountering bears unexpectedly—for example, while checking for foxes or simply "looking around." From a Western management viewpoint, this method of polar bear harvest implies that all bear harvests are opportunistic or even "accidental." Yet hunters do prepare themselves for possible polar bear harvests, and exercise choice in the type of bear they harvest. They prefer small bears; besides being good to eat, small bears are far easier to pull out of the water and to process.

During years like 2012, in which bears are particularly abundant around Gambell, hunters adopt a more active approach to bear hunting. Conversely, hunters are also less prepared to hunt bears in years when they are rare because they do not anticipate having "good luck."

In the event that bears become stranded on Saint Lawrence Island, as in 2012, the stranded animals tend to concentrate around Gambell. In 2003, *"All the bears got stranded. That was in July. The ice went out fast."* During these times hunters anticipate and prepare for frequent encounters with bears.

FACTORS AFFECTING HARVEST LEVELS

Depending on conditions and proximity to the village, hunting bears can be an expensive and fuel-intensive endeavor. Several individuals reported that fuel prices are now prohibitive for many. Not all hunters have access to snowmachines, or the resources to fix snowmachines that have broken down; this shortage of transportation can become a serious impediment to bear hunting.

Hunters stated that deteriorating shorefast ice conditions on the west coast of the island now prevent them from safely pursuing bears. *"The ice is more dangerous now than it used to be. A lot of it is just snow. We have to hunt and work on top of the ice. This affects hunting, cuts trips shorter."* Shorter trips translate into fewer opportunities to harvest bears. Because hunters must invest more fuel compared to the past and also face dangerous, unpredictable ice conditions, bear hunting outside the village is becoming a challenge.

Yet bear hunting *"[Is] still worth it...its traditional. It's just like catching a whale you know, it's like catching a big prize."* With obstacles to harvesting bears out on the ice, many hunters have adapted by harvesting bears encountered closer to town.

Some hunters do not hunt polar bears because they are listed as threatened under the Endangered Species Act. Hunters are concerned about unknown legal ramifications for hunting, and have not always received clear communication about their rights and duties as subsistence hunters when it comes to polar bears. In 2012, hunters were worried about going over a polar bear quota that has not yet been implemented.

LIFETIME HARVEST

Of the four hunters who discussed their lifetime harvests, one had taken nine bears, one six or seven, and another four bears. The fourth was not sure how to account for the bears he had harvested, because so many of the harvests were caught by, or shared with, family members.

POLAR BEAR TRADITIONS

HOW BEAR IS USED

Some Gambell residents still eat polar bear meat, which must be cooked for several hours before it is edible. Younger bears are preferred for food, as the meat of older bears becomes stiff and unpleasant-smelling. The ribs, hind quarters, and back of the neck are the best parts of the bear, while the liver is never eaten because it is "too rich"; hunters have observed that even foxes avoid scavenging polar bear liver.

Polar bear has a distinctive taste which some, but not all, relish. Elders in particular value polar bear meat, but many young people have not yet acquired a taste for it. Young hunters almost always share polar bear meat with Elders. Some people avoid eating bear altogether because it "*looks too much like human when you butcher it.*" Some have concerns about getting parasites from eating bear meat.

One hunter mentioned that a hunters' "*first [polar bear] hide is cut into strips right after it's caught, each strip is 12-13 inches*" and distributed out to people. Hunters share the bear hide with Elders and relatives who can use it to trim face masks, do carvings, and make parka ruffs and bags to hold whale bombs during whaling season. Minimally processed bear fur is ideal for protecting whaling gear, as the bear oil prevents the metal from rusting. Bear fat is also good for curing dry skin. Bear claws are used to make necklaces.

POLAR BEAR LEGENDS

Polar bears have long sustained Gambell residents in times of shortage:

"A long time ago they had sod houses, and they've found polar bear heads inside them. Nenglus, ancient. I've seen several of those polar bear heads. The heads have holes for getting the brain. Even in dog heads I've seen those holes. At that time there were too many people and not enough food. We are survivors. At one time on the island people died out. All that have survived have moved up to Gambell. Those old people never used guns; they used spears to go after the bears."

Yet polar bears are also remembered as a threat to human existence on the island:

"There used to be a polar bear hometown a long time ago, thousands of bears. There are trails down there, around Pugughileq Camp on the southwest cape. There was a big fog from polar bear breath. Four hundred years ago Quaaqa the hunter started building an igloo there. The bears kept falling into his home. He tried everything to keep them away. Finally he put some polar bear fat onto the fire that kept them away."

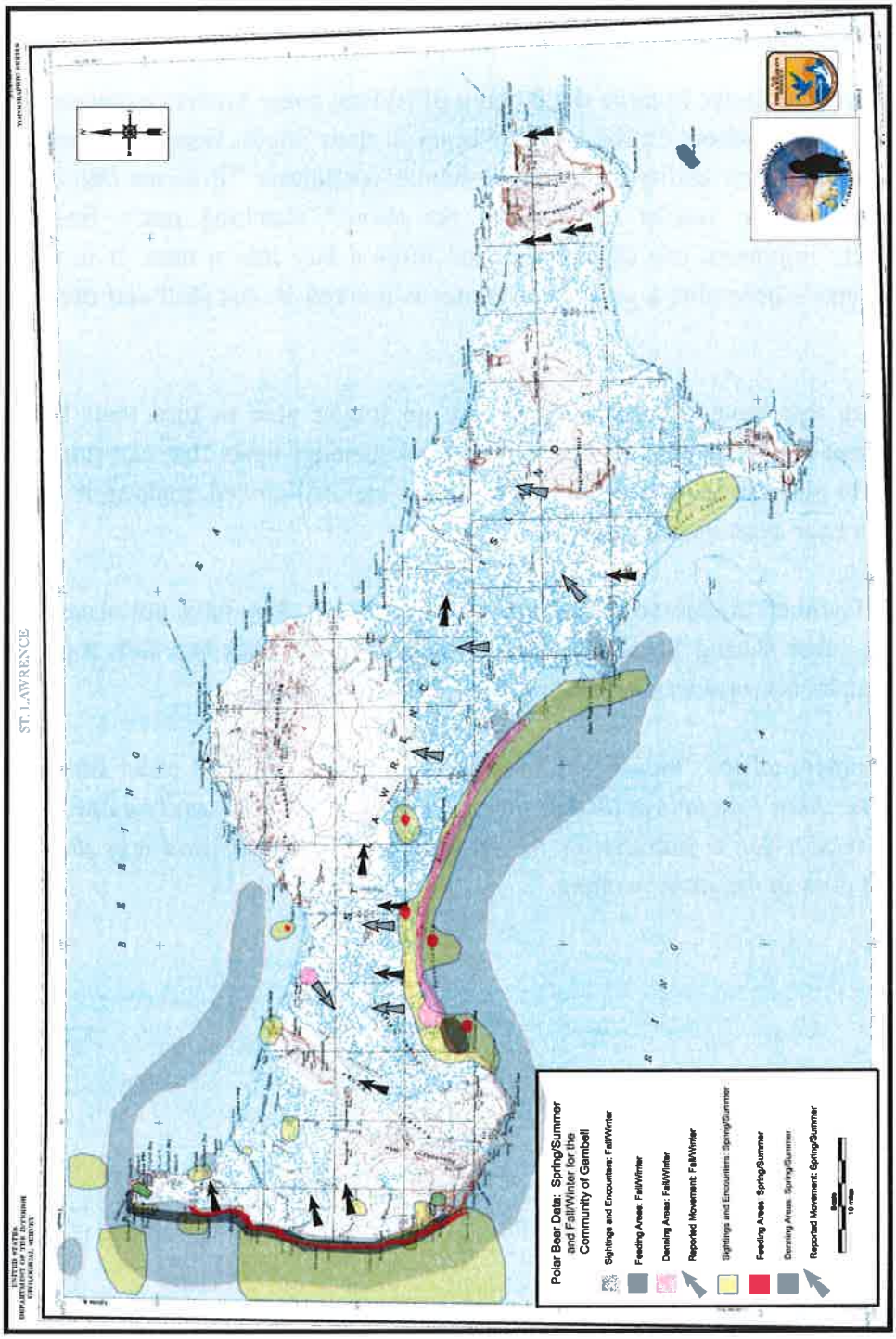
TRADITIONAL KNOWLEDGE AND BELIEFS ABOUT POLAR BEARS

Knowledge about polar bears is the domain of Elders; some hunters expressed regret for not being better listeners on the topic of bears in their youth. Bears are elusive animals that have an uncanny ability to anticipate human intentions: "*It seems like bears mostly come around when you're not looking for them.*" Catching one's first bear is a symbolically important rite of passage, and turns a boy into a man. It is important to know the bear's behavior; a good bear hunter is marked by his skill and observations of the bear.

Some bears that have become very fat are no longer able to turn their heads easily, making them slower to see and react to hunters. Smaller bears that can turn their heads from side to side are harder to hunt. Most bears are left-handed, making it dangerous to approach a bear from its left side.

Although Gambell hunters avoid eating polar bear livers, they have not observed, as have hunters in other Bering Strait villages, that touching the liver can turn a person's skin white, *"maybe because we use salt water to rinse our hands."*

Finally, hunters tell of "king bears," which belong to a different order than other polar bears. "*One thing I do believe is that there is a king polar bear, and no one in this world has ever seen it yet, a fourteen or fifteen foot bear, It's arms and legs don't grow fur because it goes in the snow walking.*"



SEASONAL POLAR BEAR HABITAT USE MAP FOR GAMBELL

The map represents seasonal polar bear habitat use data from 1965 to 2012 identified by eleven hunters from Gambell, Alaska. Gambell is located on St. Lawrence Island approximately 130 miles from Nome. This map does not include all possible locations of polar bear habitat use. The areas identified by participating hunters include both primary and secondary observations. Polar Bear's primary habitat is ice; thus, the areas identified should be considered as dynamic rather than fixed locations.

SAVOONGA

POLAR BEAR CONDITION AND ABUNDANCE

ABUNDANCE

Ice conditions greatly influence the seasonal abundance of bears in Savoonga: *"When we get good ice and Northwestern wind then we get lots of animals."* In 2012, there were many polar bears stranded on Saint Lawrence Island because the ice did not leave until almost June. Before the 1980s, Elders recall that polar bears were abundant in the area, both on the south side of the island and closer to Savoonga, as they migrated north in March.

However, the general consensus amongst hunters in Savoonga is that, overall, there are fewer bears around now compared to the past. While this trend extends back to the 1980s, and possibly as far back as the 1960s, in the last couple years the decline has become more noticeable. *"These days we have to wait a long time to see one. They're declining in the recent years."*

CONDITION

Hunters reported that all the bears they have caught were healthy and fat. Bears seen on Saint Lawrence Island in summertime are also observed to be in good condition; *"Maybe the north polar bears are the healthy ones. Some of them are skinny but not that skinny."* Some sightings of skinny bears were mentioned but the bears were not skinny enough that their ribs protruded. One exception was reported by an Elder who recalled an encounter with a *"Dangerous, skinny, mean polar bear"* in 1960. He barely escaped before shooting the bear. Hunters believe that, to some extent, there is a normal range of polar bear conditions: *"Polar bears are fat; some of them are skinny that's just polar bears."*

DEMOGRAPHICS

Female and male bears are seen in about equal proportion around Savoonga. However, hunters qualify this by saying that it is sometimes difficult to distinguish between male and female bears unless cubs are present. Single male bears are seen on the island in winter and especially in February and March as they move northwards. Many young, newly independent bears are also observed at this time. Family groups consisting of a mother and one or two cubs are seen frequently in January and later, during spring whaling and boating season. Family groups of three cubs are rarely seen.

MASS BEAR SIGHTINGS

One Elder remembers hearing stories about dozens of bears congregating at *Pugughileq* Camp in the 1800s and early 1900s. Several hunters remember seeing mass gatherings of bears on *Punguk* Island in the past; one hunter dated a specific occurrence to March in the 1970s. Nearly two hundred dead walruses attracted the bears during this time. Hunters from Savoonga harvested a limited number of the congregated bears. There have been an abundant number of polar bear sightings on the south side of the island as well.

HABITAT USE

POLAR BEAR HABITAT

Savoonga hunters say that, *"There are fewer bears coming now because of the ice."* In the past, the ice came in October, whereas now it comes in November. Until several decades ago, the walrus-hunting season, an index of ice conditions, lasted through the end of June, but now ends much sooner:

"[Ice is] coming in late and going out fast. In the late 1950s when we used skin boats, June was the very best for hunting for walrus. Four could go in the boat. We used to get them for meat for dogs and food and for boat skins. Now a lot of things change, things go fast."

The ice used to be "good" and thick. Multi-year ice used to come in from the north, but is now rarely seen: *"The blue ice used to come in, and bring everything [all the game]. Now there are fewer bears."*

The ice around Savoonga is now thin and fluctuates rapidly, blowing out with southeast winds from January to March. As a result, there are periods in the winter when open water surrounds the village, reducing the presence of bears. Some hunters have become discouraged by the conditions, and have stopped looking for bears altogether. Savoonga hunters say that people in Gambell see more bears, because of their location in relation to migration pathways and superior shorefast ice conditions to the west.

Overall, bear sightings have become less frequent in Savoonga in the last ten years, excluding 2012. Besides ice conditions, another explanation offered for this trend is the growing reindeer population around Savoonga, which may scare away polar bears.

LOCAL DISTRIBUTION

Bears are known to concentrate in the area behind *Kukulek* Mountain. Some bears spend time on the south side of the island after arriving, and one Elder remembers that tracks were very common on the south side of the island when he spent time there in the 1950s.

DENS

Hunters know how to read the clues that indicate whether or not a den is occupied: *"When tracks are hard the den is empty; when it's soft, the bears are in there. That's how my dad told me, if you're going to see a den, check the tracks first."*

Several of the hunters interviewed had seen dens in the area around Savoonga. However, the information gathered was not always clear whether these dens were reproductive or temporary resting dens. One hunter recalled an event in 2007; *"I saw a mother and cubs, in the month of March. I also saw a den...The cubs were like a year old...I tracked them...They made another den the next day."*

There are also several *secondary* accounts of hunters observing dens around Savoonga. One hunter reported that he had heard of several dens located five miles east of Savoonga, near *Kukulek,* which someone observed during one winter in the 1990s. Another hunter recalled: "*Long time ago, a guy got little cubs. [He] killed a bear in its den and pulled it out and when he pulled it out, three little cubs came out."*

SEASONAL MOVEMENTS

As evidenced by tracks and direct sightings, bears come to Saint Lawrence Island in early to mid-winter: *"In November when the ice starts forming, strong north winds push the ice down, and the bears come with it."* These winds push ice to the east and west sides of the island. Polar bears are known to spend some time on the south side of the island then head back north between December and March. Some bears spend part of the spring on the east side of the island before heading further north.

A few bears get stranded on the island in the summer, and are encountered while people are out picking greens. In 2003, hunters reported that the ice went out early, leaving some bears stranded. Testimony by hunters in 2012 suggests that when ice persists into the spring and early summer, bears sometimes remain on the island as June. This topic will need to be researched further in the future to learn exactly why bears are remaining on the island during the summer months.

OTHER SPECIES

Hunters in Savoonga encounter polar bears in the context of their wider environment, and observe many other species alongside bears. Walrus are known to have specialized "jobs"

that they do for the herd, based on the shape of their tusks. For example, walruses with tusks that go out to the side (as opposed to being straight or turning inwards) are good at breaking ice.

Hunters say that in the recent past, about forty tame reindeer came across the ice from Russia to Saint Lawrence Island. According to secondary accounts, a young grizzly bear was caught on the north side of Gambell about three years ago in the spring. One hunter reported seeing more killer whales in 2012 compared to the past.

ICE SEALS

Hunters asserted that the number of ice seals around Savoonga is not declining. Seals are especially abundant in the fall. The different kinds of seals seen near Savoonga include: "hair" *nasilik* (spotted seal), *quziguaq* (ringed seal), *nazighaq* (young ringed seal), *mukluk* (bearded seal), *teghigluk* (young bearded seal), and *kukupak* (ribbon); the general term for seals is *Neghsaq*. In 2012, several hunters mentioned that sick seals, with sores and patches of hair loss, have been observed and reported to proper authorities.

POLAR BEAR DIET

FEEDING BEHAVIOR

Most bear feeding behavior in the vicinity of Savoonga involves coastal scavenging. Bears are known to scavenge on walrus and whale carcasses in winter and spring, particularly on *Punguk* Island and along the coastline. *"This spring [2012] we saw a polar bear eating a whale carcass. It was a young bear. [That was] about two miles east of Stoby Rock."* Other sources, such as blubber that hunters use for fox bait, also attract scavenging polar bears. Coastal scavenging was probably more common in the 1970s and 1980s than it is today.

BUTCHERING OBSERVATIONS

In Savoonga it is uncommon for hunters to examine the bears' stomach content. However, one hunter reported that when you do open the stomach, *"It's always full of oil, because it eats seal."* Other forms of blubber have also been observed in the stomach: *"[I] cut up the stomach and found walrus blubber, maybe it ate dead walrus blubber or a dead whale carcass."* Another hunter recalled that a man harvested a bear with trash in its stomach, but the date of this incident is unknown.

HUNTING FOR POLAR BEARS

TIMING OF HARVEST

Although the main time for bear hunting in Savoonga is at the height of winter, in January or February, some people do harvest them in summertime. Summer harvests are often motivated by concerns about bears roaming while people are picking greens to the east of Savoonga. If a bear is harvested at this time, they can still be used as subsistence food, as they are generally in good condition.

LOCAL RULES FOR HUNTING

Most hunters avoid catching bears unless they are needed for subsistence. Unlike other villages, there is not a particularly strong cultural norm prohibiting people from hunting cubs or family groups in Savoonga. Because bears are caught for food, and cub meat is preferred, cubs are harvested "*unless they're smaller than a fox.*" Regardless of the age of the bear, hunters are taught to kill them quickly so that they do not suffer.

HUNTING PRACTICES

In the past, dogsleds were the most common form of transportation during polar bear hunting. The sled dogs would assist in a successful harvest by tiring out and slowing down the bear for the hunter. One hunter described releasing a single dog from the harness to help slow down the bear for the hunter.

Snowmachines and boats are the primary means of transportation during bear hunts. Hunters spend much of their time on the water; they go out hunting for walrus in the spring, and in winter they travel to the south side of the island in search of bearded seals. Although hunting bears from boats can be technically challenging it is not uncommon. Other times they wait for the bear to either climb on ice flows or come onshore before harvesting to avoid the challenging feat of dragging the bear into the boat from the water.

Consistent with practices in other villages in the region, whoever sees the bear first "owns it," regardless of whether the individual is a hunter or a non-hunter. During boating, however, harvested bears always belong to the captain of the boat's crew.

Hunters in Savoonga prefer to use small guns—either a .243 or .220. They are careful to shoot bears in the exact spot, in the neck, by the spine, so that they don't suffer, run away injured, or become angry and dangerous.

HARVEST EFFORTS

In Savoonga, youth is the time for the hard work of bear hunting. Young men in the village who aspire to become bear hunters travel on the landscape looking for bears. One older hunter expressed nostalgia for the joy of bear hunting, which ended in his forties.

For most men past middle age, polar bear hunting is simply "too much work." Harvest efforts also depend on the size of the bear; if the bear is over seven feet, hunters will likely avoid harvesting it.

OPPORTUNISTIC VS. ACTIVE HUNTING

Most often, bears are encountered during other subsistence activities such as seal, walrus and reindeer hunting, while preparation for whaling, and during whaling. Seeing a bear—or crossing fresh tracks and following them to the bear—is very much a matter of being present on the snow and ice day after day.

When a polar bear comes into the village of Savoonga, it will most likely be harvested. Perhaps more so than in other villages in the region, Savoonga hunters have developed a stance of "active opportunism" towards bear hunting. Bear sightings are considered quite rare, and men who are active bear hunters will harvest a bear if they see one.

Less avid hunters may weigh their need for the bear, and the immediate danger posed by the bear, against consideration of the amount of work involved in butchering. When family groups are hunted, the cubs and mother are usually harvested at the same time.

FACTORS AFFECTING HARVEST LEVELS

Rough ice often prevents harvests because it prevents hunters from chasing bears towards the ocean. When bears are encountered during boating season, hunters may avoid taking them if they are too far away from Savoonga, due to the difficulty of transporting the meat and hide back to the village.

POLAR BEAR TRADITIONS

HOW BEAR IS USED

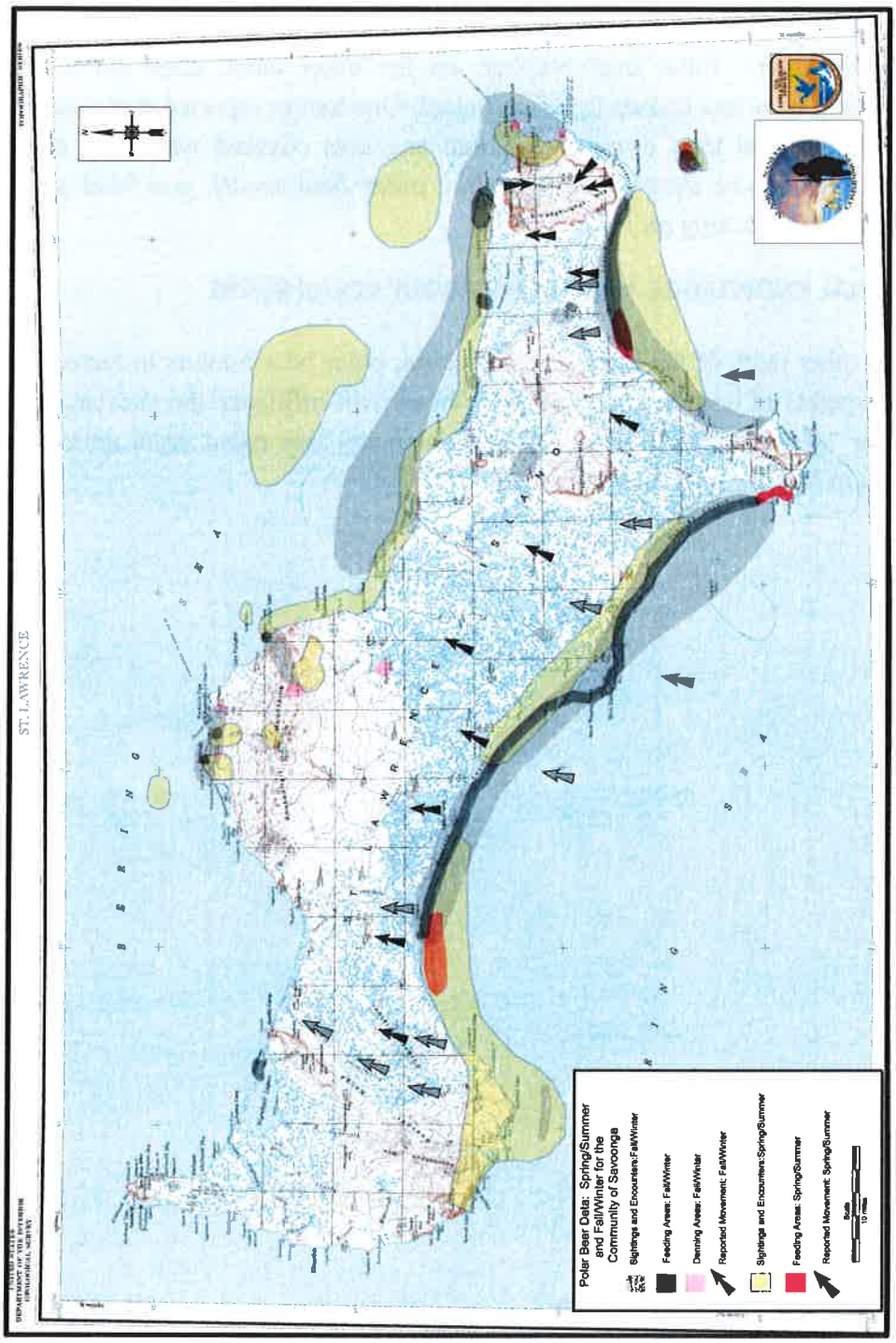
Residents of Savoonga use polar bear fur for making parka ruffs. Unlike many other furs, polar bear fur is especially suited to wicking moisture and preventing frostbite. Polar bear hide is also used to make boots, "Eskimo dancing coats," and camp bedding.

Polar bear meat is still shared and eaten in the village, although not everyone has a taste for it. The best parts of the bear are the hips, legs, ribs, and paws, which are especially valued by some and taste *"like well-done walrus flippers."* Cubs are better to eat because their meat is softer: *"[It's] better…because [it's] newer meat."* Hunters are taught by their Elders to cook polar bear meat very well in order to avoid getting sick with trichinosis.

When seal oil gets in small cuts during butchering, it is known to cause an infection called "seal finger." Polar bear blubber, on the other hand, does not lead to these infections, and is in fact known to be medicinal. One hunter reported that polar bear fat is traditionally used to treat eczema, and that any cuts covered with bear oil will heal quickly: *"After you're done cleaning it [the polar bear meat], you have young hands again, same with working on foxes."*

TRADITIONAL KNOWLEDGE AND BELIEFS ABOUT POLAR BEARS

Similar to other parts of the Bering Strait region, polar bear hunters in Savoonga believe that the thoughts of both hunters and polar bears will influence the success of a hunting expedition: *"If you aren't thinking about polar bears they come, right up to you. If they don't want to be seen, they won't be seen."*



SEASONAL POLAR BEAR HABITAT USE MAP FOR SAVOONGA

The map represents seasonal polar bear habitat use data from 1965 to 2012 identified by ten hunters from Savoonga, Alaska. Savoonga is located on St. Lawrence Island approximately 130 miles from Nome. This map does not include all possible locations of polar bear habitat use. The areas identified by participating hunters include both primary and secondary observations. Polar Bear's primary habitat is ice; thus, the areas identified should be considered as dynamic rather than fixed locations.

WALES

POLAR BEAR ABUNDANCE AND CONDITION

ABUNDANCE

There is a strong consensus that the number of "dangerous" juvenile bears coming directly into Wales has increased in recent years. For this reason, hunters are hesitant to say that the number of bears has declined across the board.

Encountering a bear during an expedition beyond the village has become increasingly rare, and requires a great amount of "luck." In the past, hunters would only need to go out once or twice to find a bear, but now several trips are required before they are successful.

Elders recall the 1960s as a decade of declining polar bear numbers, which is attributed to the impact of sport hunting. This was followed by a period of greater abundance, which allowed hunters to be more selective in deciding which bears to harvest during that time.

Some hunters suggested that the decrease in polar bear population is partially due to a reduced number of beached walrus carcasses in the area. These carcasses were once plentiful on the coastline around Wales, and served as a major food source for bears:

"There are definitely fewer bears now compared to the eighties. There really aren't a good number of tracks all along the shore like they used to be...We see fewer now because there aren't the walruses, so they are probably eating [more] seals now."

One hunter suggested that the 1992 U.S. Fish and Wildlife Service raid on Saint Lawrence Island walrus hunters, called "Operation Whiteout," substantially changed the local ecology. Prior to this event, walrus carcasses would wash up on the beach near Wales, supplying plenty of food for bears.

Most hunters have confidence in the long-term health of the polar bear population. One hunter stated: *"There are not too many now, but I know they're always up the coast; whenever one comes around, I always tell them that's not the only one, there are more."* Although local distributions may fluctuate, hunters believe that *"there are always bears out there somewhere."*

CONDITION

One experienced hunter recalled bears being healthy and physically fit in the early 1980s, a time when most family groups consisted of two cubs. In the 1970s, mother bears were

frequently seen with three cubs, suggesting that bears were finding more than enough food at that time.

Today, hunters report that the condition of polar bears has remained the same compared to the past. Although bears today sometimes have trash in their stomachs, they are said to be in good condition, with plenty of fat. However, one hunter departed from this consensus: *"There are skinner bears now and sometimes you can see their ribs. Maybe they didn't learn how to be good hunters or they were deserted too soon."* Another hunter reported that a bear harvested in 2012 appeared unhealthy: its fur was fragile, and could be easily pulled out of the hide.

DEAD BEARS

Of the nine hunters interviewed none had ever come across a dead or washed-up bear. However, one hunter recalled hearing a secondary report of dead bears washing up once, somewhere between Wales and Shishmaref.

MASS SIGHTINGS

In the 1970s and 1980s, hunters recall whale carcasses washing up and attracting a large number of bears in several different areas. One of these events occurred near Sinrazat around March or April, and hunters were able to harvest bears. Another event in the 1970s involved belugas becoming grounded and trapped by ice near Shishmaref. Soon afterwards, a large number of polar bears arrived at the site and feasted on the stranded belugas. At least one hunter was able to successfully harvest a polar bear during this event. Hunters reported seeing far fewer bears scavenging now compared to the past, especially in comparison to the 1980s, when up to fifty bears were seen feeding at one location.

DEMOGRAPHICS

Female bears first come to Wales in December, with the males following about two weeks later. Hunters say they come from the northwest on the Russian side. One hunter noted that bears seen in the area seem younger compared to the past. Young, single bears are known to enter the village and get into the dump, especially around March.

Sightings of family groups usually consist of one or two cubs, and rarely, three. This differs from the 1970's, when *"It used to be almost normal...to see females with three cubs."* Hunters in Wales reported that family groups are seen only once or twice a year.

HABITAT USE

POLAR BEAR HABITAT

The 1980s marked a change in ice conditions around Wales. Before the 1980s, the shorefast ice formed and pack ice arrived around November. Now the ice comes in December and January. Hunters recall the shorefast ice buckling and forming thick high-pressure ridges, which now rarely occurs. The ice is both thinner and less extensive: *"The ice used to freeze over in the [19]80s from here to Diomede."* The last ice used to melt in June; now it is gone weeks earlier.

Hunters associate abundant game with good ice conditions between Wales and Diomede, as well as with blue ice that comes from the north: *"The more pack ice the more bears. Pack ice is gone sooner too, there's not as much to the south."* In the past decade, deep blue icebergs (multiyear ice) have been notably absent from the water near Wales. Hunters remember chopping off sections of the icebergs in the past to use as drinking water. Now, the icebergs are no longer around and the ice that is accessible is "dirty." One hunter said, *"We've noticed more sand on the ice since the early 70s. Maybe it blows on the ice, or maybe it's from the tides."* Another hunter said *"There is more sand on the icebergs, more dirty ice, compared to what I saw when I was growing up.....Probably the ice has an effect on [the bears] and they are declining."*

As a result of these changing ice conditions, the start of the bear-hunting season has shifted from Thanksgiving to Christmas. The inlets that hunters use to navigate have also changed: *"This was the area of polar bear hunting back then, in the fall time, between the first inlet and Wales. Now it's between [Wales] and the third inlet. Now they're further out, on the shorefast ice. They try to stay on the ice."*

Paradoxically, although the absence of ice prevents some bears from traveling close to Wales, in may also bring bears into the village: "*As I've noticed, polar bears now are starting to get more and braver within the last four years, coming into the village more often, because of the water out there."* These village encounters usually occur in December and afterwards.

Hunters believe that younger bears are being driven out of the remaining ice habitat and into the village by older, more aggressive bears. As a precaution against bears in town, one man acts as a solitary, unofficial "bear patrol" in the mornings when children are going to school. Hunters have reported a few of the bears that venture onto land have become stranded there into the summer.

Overall, hunters are seeing fewer bears in the territory around Wales compared to ten years ago, and most attribute this to changing ice. However, one hunter offered an alternative explanation:

"The walrus used to be killed by hunters, so [the carcasses] would come ashore, and that was a staple of the bears' diet. After Operation Whiteout, people started getting more wary. [Hunters] are pretty lenient on the marine mammals since when I was a teenager. Beached walrus stopped coming ashore, and then there were fewer bears."

LOCAL DISTRIBUTION

Polar bears are commonly found scavenging along the shoreline between Wales and Shishmaref, especially from December to March. This area is packed with beached carcasses of walruses, belugas, bowheads, and grey whales. Sinrazat is a well-known scavenging area where bears sometimes make temporary "resting dens" while they stay to feed. However, one hunter reported seeing far fewer tracks now, along the coast between Wales and Shishmaref, compared to the past.

In the past, fall bear hunting took place between Lopp Lagoon and Wales. Now, local distribution of bears has shifted towards Mitletukeruk Inlet. Ikpek is a common end-point for hunters out hoping to find a bear. Bears tend to avoid Port Clarence and are rarely seen near Brevig Mission.

DENS

It is rare to see a polar bear den around Wales. However, hunters know from watching bears come and go in the area that they start denning around December and leave the dens in April. The bears are known to den in high snow banks that pile up with winds from the east. About four years ago, one bear denned behind the snow breaks that demarcate the village limits. In the winter of 2010-2011, the snow was not as thick as usual, and there were no dens near the village. During years of light snowfall, bears go deeper into valleys, along creek beds in order to find the snow they need for denning.

One hunter's story of finding a den by accident is well known in Wales:

"I went for a coffee break [while hunting], and fell right through a den, and fell right on top of a mother bear! I was trying to run off, and it was like running on a waterbed, I couldn't get anywhere. The only way I could get off the bear was that I finally threw myself forward and used my rifle like a pole vault...That was the only den that I've seen. It was like there were three rooms in the den, one was like a bathroom, and one was like a sleeping room. My dad said I lucked out and fell in the shallower part in the "emergency exit" part of the den!"

TRACKS

Hunters commonly find tracks inland during February, March and April. Hunters are able to estimate the size of a bear from its tracks: *"If you have a 9-inch paw then you have a 9-foot bear."* One hunter once saw tracks that were so large that he could fit inside them when sitting down; tracks of this size belong to "king bears." Male tracks are generally larger than female tracks. Several hunters reported seeing fewer coastal tracks now compared to the 1980s: *"There really aren't a good number of tracks all along the shore like they used to be."*

SEASONAL MOVEMENTS

Hunters report that bears arrive during *"That first cold snap of the winter, that's when they come."* It is known that *"Migration differs from year to year; it depends on abundance of food, which varies from year to year. The east wind blows the game over to Siberia in the wintertime."*

The first bears can still be expected to arrive from the northwest around December. Female bears arrive first, followed by large cubs and then male bears a few weeks later. The females historically arrived in early November with the old pack ice that is carried by the northwest winds. However, this old ice has not arrived in Wales for the last decade. The fall migration *"Seems to get later and later every year."*

Before arriving in Wales, the bears pass Diomede; hunters in Wales say that this gives Diomede residents the "first pick" of bears. From December to February, bears can be found on the shores between Wales and Shishmaref. The bear migration north starts between February and May. During this spring migration, bears come towards Wales from Saint Lawrence Island, and then move northward along the shorefast ice and lagoons on the mainland.

Bears are sometimes seen around Wales in summer and even early fall, although this is a quite rare. When a bear is seen in the summer, Elders say it is because the bear is lost.

CURRENTS

The ice path that bears and other game utilize near Wales is influenced by a particularly strong set of currents. According to several hunters, the currents act like an ocean "highway." *"There's a strong current between here and Diomede. It's a two-way current. There's usually an open lead around the date line. You can see both those waters meet and go like this [rotating past each other]."* The winter current, which usually carries the ice, flows from north to south but it is not very strong. In late April/early May, the current switches from south to north and gets much stronger.

OTHER SPECIES

Hunters emphasized that the condition of polar bears is linked to that of other marine mammals: *"When something goes wrong with polar bears, it affects the seal and whale."*

When walruses are orphaned before they learn to hunt, they exhibit behavior similar to that of orphaned polar bears. They can become a nuisance to humans and may even eat trash or seals: *"My dad used to say about walrus [that] when someone kills the mom of a male walrus, it starts eating anything."*

According to one hunter, there have been recent signs of wolverine in the area: *"There are lots of wolverines now, more than they used to be...they always wander all over those polar bear [tracks]."*

Reindeer herding was once a prominent part of Wales' subsistence cycle: *"My mom grew up on the coast, her dad was a reindeer herder, and she lived in a sod house. I think the reindeer are getting fewer, but one family still lives off them. Reindeer are very timid, they'll run. A bear will try to get one, [but] as soon as the reindeer see a bear they'll take off running."* A reindeer corral was located near Wales in the 1980s, which attracted polar bears to the area. Sometimes hunters harvested bears at the corral in late summer. Interestingly, more recent reindeer butchering events have attracted grizzly bears, rather than polar bears.

ICE SEALS

The polar bear's favorite food is ice seals. Ringed, ribbon, bearded, and spotted seals are present at different periods of the year around Wales:

"Ringed seals are out there all the time, then bearded seals, and then spotted seals about this time of year [late April to early June]. Even when I was young my dad would say that when ugruks [bearded seals] start sinking [when you shoot them] then you [will soon] see spotted seals."

The general consensus regarding the ice seal population is that it has remained high and stable over the last decade. *"This fall [2010] when we were hunting seals, I was surprised at how many seals there were, maybe there were more fish at that time when the ice was forming."* However, one hunter reported that he is seeing fewer spotted seals now compared to the past.

POLAR BEAR DIET

FEEDING BEHAVIOR

Ringed, "common," and spotted seals are the polar bears' preferred food.

"Bears like ugruks and all the seals. Maybe they prefer ugruks because they're bigger. Big bears just eat the fat; they'll leave the rest. You'll find sliced strips of fur in the stomach of the bear."

Occasionally, hunters observe bears hunting for seals out on the ice. Sometimes they jump on the ice, presumably to break it when they see a seal below. The way in which a bear is hunting tells people what seal species the bear is going after.

Polar bears are also known to hunt beluga whales. They linger by the water, with one arm raised, waiting to strike at the beluga:

"I watched one bear get a beluga whale. Those bears are strong, powerful. Imagine a polar bear seven or eight feet that jumped into a pod and pulled out a beluga whale just like that. It was great to watch a challenge like that in Mother Nature, I dreamt about it for two weeks." [The encounter happened around 2008].

An event in the 1970s involved belugas becoming grounded and trapped by ice near Shishmaref. Soon afterwards, a large number of polar bears arrived at the site and feasted on the stranded belugas. One hunter successfully harvested a polar bear during this event.

In early December, bears scavenge on walrus, *ugruk*, and whale carcasses (usually grey whales, but sometimes bowheads or belugas) that have frozen into the shorefast ice. Bears are sometimes observed attempting to dig and break through the ice to get the carcasses. Common areas to see these scavenging events include the Prince of Wales shoal beach, Sinrazat, and the entire coast between Wales and Shishmaref. However, these locations shift from year to year, depending on where and when carcasses wash up.

Hunters are seeing far fewer bears scavenging now compared to the past, especially in comparison to the 1980s, when up to fifty bears could be seen feeding at one location.

One hunter believes that fewer walrus carcasses are around now due to "Operation Whiteout," which made many walrus hunters in Wales cautious. Now that there are fewer carcasses available for scavenging, hunters suggest that the bears are probably relying more heavily on seals.

BUTCHERING OBSERVATIONS

Observing stomach contents in polar bears is quite common in Wales, whereas other villages choose to avoid opening up polar bears' stomachs altogether: *"We always check their stomachs. We've seen tin foil, grass...maybe in Diomede that bear went into a dump. It had an empty stomach [except for] a Capri thing in its stomach, and a bottle cap."* Experienced hunters say that harvested bears today are far more likely to have trash in their stomachs compared to the past.

CANNIBAL BEARS

Large male bears, particularly ones larger than ten feet, are suspected of being cannibals; this belief is supported by observations of intra-species aggression:

"I remember that one time, we were out trying to whale...and there was a male [polar bear] chasing the female and the one cub; the female had blood on her. They shot the male that was chasing the female and cub."

HUNTING FOR POLAR BEARS

FIRST BEAR

A hunter's first polar bear harvest marks a moment of happiness and pride. Although hunters harvest other game, only the first polar bear harvest symbolizes the transition into manhood. *"That's the legend: you become a man when you get a polar bear. My dad never got one and my mom [used to] teas[e] him."*

Elders and more experienced hunters teach the younger generation about hunting polar bears: *"It's not my own doing, it's what I learned, to hunt."* To show respect and appreciation, the first bear is traditionally given to an Elder. In the past, a formal celebration was held in the *Kasgiq* (men's house) when a man harvested his first bear:

"Whenever someone caught their first bear or the first bear of the winter, the men and boys would have a polar bear feast. The women would cook the meal, but only the men would eat. Afterwards there would be an Eskimo dance with just men and boys, and then the successful hunter would do his dance and tell the story of his bear hunt. And he would make fun of himself at the same time. It was kind of cool."

These celebrations marked respect for the bear's spirit, as well as for men's hunting skills. Elders are sad that the polar bear celebration no longer occurs:

"They quit doing the celebrations associated with bear hunting. Maybe that's one of the reasons people don't hunt as much."

"A long time ago people quit doing that and it seems like getting polar bears is less special than it used to be. Older hunters still remember it. We could tell them how special it was, with dancing and all."

Although there are no formal celebrations, the first bear still creates excitement and small less formal gatherings.

TIMING OF HARVEST

Hunters generally prefer to harvest bears in late fall and winter, when bears' coats are fuller and healthier. During that time processing the hide is made much easier with snow and ice, which is used to clean the hide. In the 1980s, the season's first bears were harvested in late November; now the first bear of the season is usually caught several weeks later:

"When I was a kid they'd start to get bears towards November. That hardly happens anymore. Cause we get ice so late now. They used to be caught around Thanksgiving. That's pretty rare, and getting rarer. They seem to pop up later in spring between March and May."

Harvest times are also determined by peoples' social lives and by trips around the region for other purposes. Wales residents occasionally harvest bears while traveling to or from Shishmaref in April for the spring carnival.

LOCAL RULES

Hunters in Wales do not hunt or eat polar bear cubs:

"We don't mess with the cubs. We want to see them grow so they can re-populate. If we go and hunt these little ones, definitely they're going to lose out further down the line."

"The traditional rule is to not hunt cubs here, because they have to grow and survive. People feel funny when they get a baby."

"I don't get females with cubs...they've got to be like 6 feet for me to get bears....Let 'em increase more."

Hunters in Wales actively avoid hunting mothers with cubs. This is because it is believed that orphaned bears do not learn how to fend for themselves and resort to eating trash,

which causes disruption in the village. Very young cubs are uniquely sensitive to losing their mother due to the amount of learning that polar bears need to survive.

Another hunting rule, passed down from men in the family to the younger generation in Wales is "*One must always eat what one hunts.*" One hunter recalled, *"My dad told me when I was very young: you have to feel privileged to hunt. He never let us do walrus hunting for ivory...He would make sure we took the meat as well as the ivory, and were loaded down. My older brother asked why, my dad said no, you guys know better. If you're going to hunt them, eat them."*

HUNTING PRACTICES

Bear hunting is usually a solitary endeavor. Hunters have their own regular hunting areas, and they avoid hunting in other nearby villages out of respect to others' territory. Occasionally, these territorial guidelines are dropped when a mass gathering of bears occurs.

When more than one person is involved in a bear hunt, two rules of ownership apply: *"We have passed on tradition, we never try to let it change: if someone sees a bear [first], that is their bear."* If a situation arises in which more than one hunter fired at a fallen bear, credit is given to the one who delivers the kill shot.

Wales hunters prefer to use a small rifle to kill polar bears: *"To hunt you need a sled, grub, hydration, sharp knives, compass or GPS, extra gas, rope, and knife sharpeners. Almost the same gear that need for a brown bear. I usually use a .223 for a small bear and a heavier rifle for bigger bears."* A successful kill shot with a small rifle requires significant skill. Hunters reported that the small bullet keeps more of the meat and hide intact. The back of the head, the ear, and the eye are targeted areas for an immediate kill.

Another harvest method employed in the past was "baleen balls": *"My mom told me they used to make baleen balls with blubber and let it freeze and throw it out for the bears to eat. When the blubber would melt the baleen would expand in the stomach [injuring the internal organs]. They would use dogs and spears to help harvest the wounded bear."*

In the past, a hunter did not leave his house until three days after he harvested a bear: *"It would be better if the hunter would stay home, instead of going visiting. My brothers used to do it too. Before 1950s other people honored that tradition. It was for wolverines too. It was because of taboo, if you hunt powerful animals."*

HARVEST EFFORT

Polar bear meat is never wasted in Wales; it is always shared and eaten. Most hunters will avoid harvesting bears if they know some of the meat will not be eaten. Ultimately, the decision to hunt polar bears is a matter of personal preference.

Due to the strenuous work and effort of harvesting bears, hunters generally retire in their early sixties, and sometimes sooner if health problems are present. Elder hunters are very concerned that younger men will not carry on the tradition of subsistence bear hunting. Television and video games deter youth from following their hunting traditions.

"Every now and then [younger people] do ptarmigan hunting. [But] it doesn't look as though they're falling into the category of wanting to do subsistence. It has changed dramatically since the year 2000, and I've watched it change...It's a saddening situation to see them go through this considerable change."

Elders are working hard to teach younger hunters about bears. Currently, there are approximately ten avid bear hunters in Wales.

Today it takes more time to find a bear compared to past. There are fewer women willing to do the arduous job of processing the hide, which is traditionally done by women: *"We were running out of people to work on the hides, I don't know why they say it's too much work."* Hunters are less likely to harvest a bear if they do not have help to process it.

OPPORTUNISTIC VS ACTIVE HUNTING

Traditionally, Wales hunters would actively go out looking for polar bears. In comparison, most other villages tend to have a more opportunistic approach, in which they harvest bears in town or while hunting for other game. However, active hunting is less common in Wales today than it was thirty years ago. Active hunting has become more difficult due to the changes in weather, which makes it more difficult to predict when the polar bears will be around.

FACTORS AFFECTING HARVEST LEVELS

The main obstacles polar bear hunters face in Wales include the high price of fuel and lack of both ammunition and snowmobile transportation.

"Prices of fuel have gone up. It hurts all the hunters, so that they don't really want to go out there. It costs so much for fuel, bullets. But me I don't care what price it is, because that's my lifestyle."

In addition, bears are migrating to the area later because of delayed shorefast ice formation. This climatic factor affects harvest levels by shortening the window for

hunting. When hunters push the limits of this window, they encounter unpredictable and dangerous ice and weather conditions.

LIFETIME HARVEST

For the seven hunters who discussed their lifetime harvests, their estimated total lifetime harvest for each ranged between two and fifteen bears.

POLAR BEAR TRADITIONS

TRADITIONAL KNOWLEDGE AND BELIEFS ABOUT POLAR BEARS

The very largest polar bears—measuring twelve feet and over—are known as "king bears." These bears are marked by black spots on their neck. King bears' jaws *"Sound like a rifle when the teeth close. That's how strong they are. They can open up frozen walrus just like a piece of paper."*

Whereas king bears are abundant in stories from the past, they are rarely seen today and their tracks are less commonly found as well. Some hunters do recall seeing some traces of the bears in recent years:

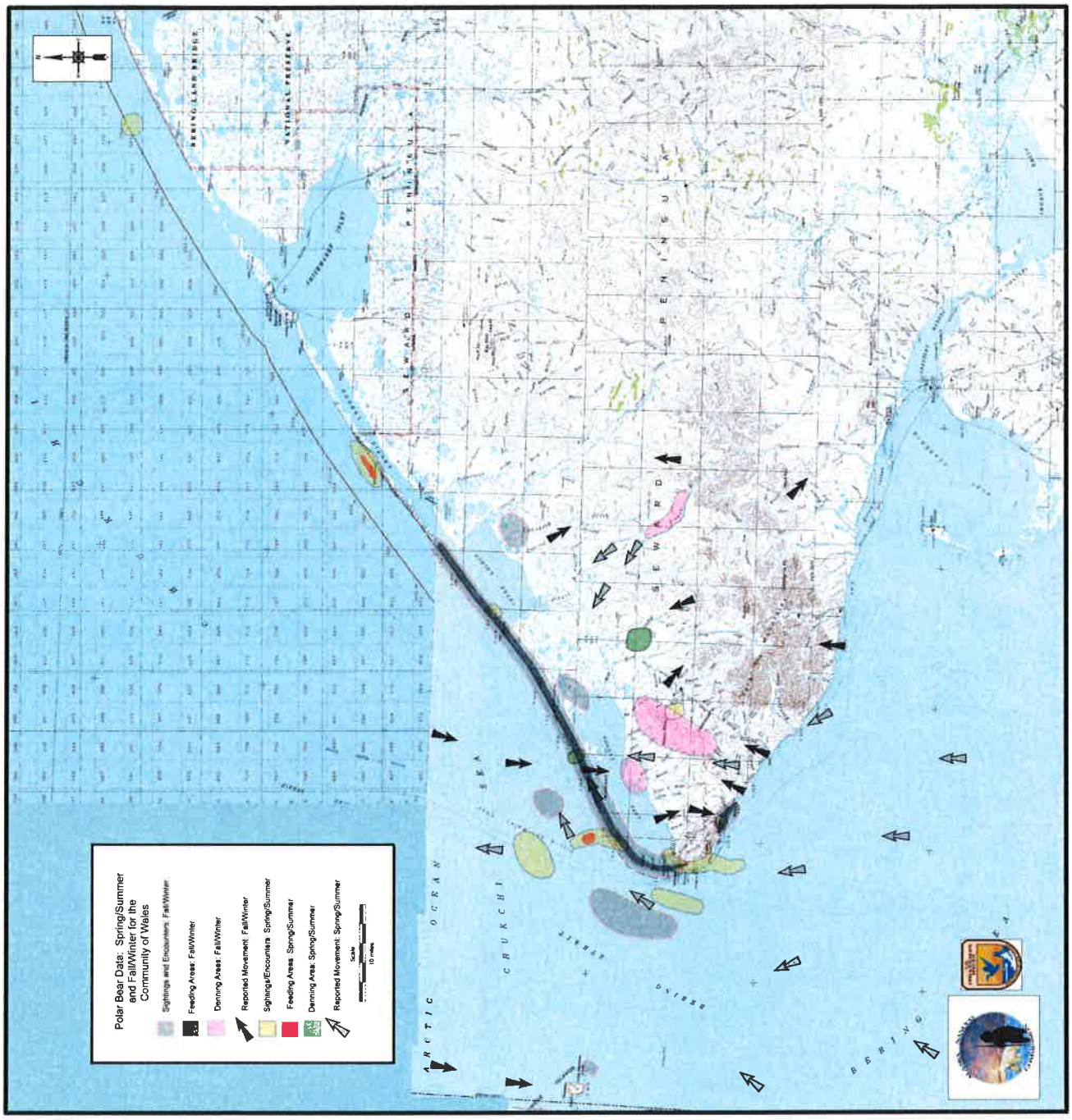
"We've seen bears that were bigger than the ones we've been catching. Imagine two and a half of your shoes, that's its paw. We call them king bears. King bears are very rare; we can't catch them. They're smarter, they [have] more manpower…I sat in one track, and still had room in the paw print. That was about four years ago. He came inland from up north and left tracks, in March. The king bears come from up north through inland, not so much on the ice."

In old stories, king bears were almost impossible to kill. Although hunters have traded their spears for guns, most would avoid the opportunity to harvest a king bear due to the bears' reputation in oral tradition.

Polar bears are very intelligent and the Elders say they have a "sixth sense" which makes them difficult to outsmart. Bears can sense fear, and seem to be able to read and respond to a hunter's thoughts. Early morning is the best time of day to hunt polar bears or other animals because they "act tame" and are easier to hunt.

Hunters do not eat polar bear liver because it is said to turn a man's hair white. They also avoid harvesting extremely yellow bears, which are believed to be unhealthy or contaminated due to their diet: *"A white bear is a healthy bear."*

There is an ancient trail that leads from Wales to the mountain behind the village. In the past, the skulls of bears that had been harvested were placed there, out of respect. When a hunter died, his boat and belongings were also placed on top of the mountain.



SEASONAL POLAR BEAR HABITAT USE MAP WALES

The map represents seasonal polar bear habitat use data from 1940 to 2012 identified by nine hunters from Wales, Alaska. This map does not include all possible locations of polar bear habitat use. The areas identified by participating hunters include both primary and secondary observations. Polar Bear's primary habitat is ice; thus, the areas identified should be considered as dynamic rather than fixed locations.

SHISHMAREF

POLAR BEAR CONDITIONS AND ABUNDANCE

ABUNDANCE

Shishmaref hunters often travel along the coast to collect driftwood. This event provides hunters the opportunity to encounter polar bears. Through these trips, they became familiar with the abundance and distribution of bears in the area. The general consensus on polar bear abundance is that there are fewer bears in the Shishmaref area today compared to twenty years ago, especially in the spring. Only one bear was seen close to the village in the winter and spring of 2011, compared to two or three bears per year in the past.

Elders take a long-term, historical perspective on bear abundance; they remember the 1940s-60s as a time of few bears. After sport hunting ended in the late 1960s, residents of Shishmaref began to encounter bears more frequently.

Although hunters are now seeing fewer bears, they do not believe that the overall population of bears has declined; rather, it is believed that bears have moved elsewhere to find good habitat. *"It's not that the bears are declining, it's that their habitat is changing."*

Hunters recall that strong winds from the north combined with eastward currents used to form strong, thick ice along Shishmaref's shore. Now, south winds carry away much of the ice that forms. In addition to the lack of shorefast ice habitat, bears now have fewer beached walrus carcasses on which to feed. As a result of these factors, hunters believe that the bears have moved "further out" to other locations seeking favorable habitat.

CONDITION

The majority of bears harvested by hunters in recent years have been fat and in good condition. In part, this may be a reflection of hunters' selection for healthy bears. The exception—bears in poor condition with a noticeable lack of fat—are usually those caught in the village.

DEAD BEARS

Sightings of dead bears in the Bering Strait communities are rare, but one hunter in Shishmaref recalls seeing one around 1984. While traveling between Diomede and Wales by helicopter, he saw a dead, "sunburned" bear floating in the water below, halfway between the two villages.

MASS SIGHTINGS

Mass sightings of polar bears occur where walrus or whale carcasses wash up on shore in the fall. These carcasses freeze into the ice and continue to attract bears during the winter.

The earliest event of this kind in the living memory of hunters occurred in the 1950s around March: *"Belugas were trapped in the ice twelve miles west of Shishmaref. Polar Bears had pulled several [belugas]—four or five—out of the water."*

Sinrazat, southwest of Shishmaref, also a known location as "Shelter Cabin," is a place where mass gatherings have often been seen over the years. More than twenty years ago, many bears were observed feeding on whale and walrus carcasses near Sinrazat in late fall:

"[They] looked around and said that there were 35 polar bears they could see, and that was not counting the ones behind hills and pressure ridges. Even before they counted them, they had seen huge polar bears run out. It gave them a scary feeling because there were so many."

During this particular sighting, some hunters harvested bears, while others took photos of the bears. The most recent mass gathering reported was about three or four years ago, also near Sinrazat. Bears had broken into the cabin and ripped up the mattress.

DEMOGRAPHICS

Male bears are more commonly encountered than female bears around Shishmaref. Mothers with one or two cubs are occasionally observed in winter and spring; family groups with three cubs are rare.

HABITAT USE

POLAR BEAR HABITAT

Hunters have observed a change in the seasonality of ocean ice. Ice is now thinner and less extensive than in the past. Before the 1990s, freeze-up and shorefast ice formation happened in early October or November; now it occurs in December or January. Unfavorable southern winds keep the water open around Shishmaref. The turning point of these changes in ice and wind conditions was in the year 2000, according to some hunters.

The presence of bears is directly related to presence of ice. "*There used to be ice twenty five miles out, but now there's no ice.*" Leads have started to form closer to shore, which

may bring bears closer to Shishmaref. Bears are more likely to be found feeding on seals far away from Shishmaref. One hunter stated; *"It's not that the bears are declining, it's that their habitat is changing."*

Elders recall strong north winds and an eastward current that once blew towards Shishmaref, forming thick ice and high-pressure ridges in front of the village. Twenty years ago those ice structures made an ideal habitat for bears. Carcasses also used to accumulate on these ice formations, further attracting bears.

Changing ice conditions also mean that hunters now have to depend more on boats than snowmobiles. Hunting from a boat is known to be difficult, especially if the bear is swimming in open water.

LOCAL DISTRIBUTION

Hunters from Shishmaref travel the whole coast, from Cape Espenberg, to the northeast, and down to Wales to the southwest. Polar bears are found along the coast in both directions during fall and winter. The distribution of game, including bears, shifts from year to year, depending on the formation of open leads.

The Ikpek Inlet, northwest of Shishmaref, is known as a place where many walrus carcasses wash up and attract scavenging polar bears. Bears are also seen further north along the coast, at Cowpack Inlet. However, when good shorefast ice fails to form along the coast, as in recent years, far fewer bears are found scavenging in these areas. During these times, they are said to be further out on the ice, feeding for seals.

There was one report of a big "king bear" swimming in the open water, close to hunters in June 2012. *"[We] just drove boat beside him and took pictures, didn't try to get him."*

DENS

Of the eight hunters interviewed none had ever encountered a den around Shishmaref. The hunters believed the local terrain is too flat, which prevents deep snow banks from building up. However, Shishmaref hunters did mentioned that Wales is known to be a more likely location for bear denning.

One hunter recalled coming across a temporary shelter that a bear had made for itself on the ice, about a mile from Shishmaref in the winter of 1995. The bear had carved out a bowl-shaped nest in the ice pressure ridges.

SEASONAL MOVEMENT AND HABITAT USE

In the past polar bears were known to arrive near the Shishmaref region in November. Now bears often arrive during the last two weeks of December, which is also when they are encountered in the village. Their arrival is associated with wind and current conditions from the north. The bears pass Shishmaref as they head south towards Saint Lawrence Island:

"There's a strong current. When it's calm, there will be a line showing the fast current. The ice on one side will be flat, on the other side heading east. The animals will come in when the current is more west to east. When its east to west, hunting is poor."

"They [polar bears] come in with the north wind, that's just the way they are. They come from North, towards Saint Lawrence Island."

A portion of the bears stay on the coastal ice until February or March. These are the months during which Shishmaref residents are most likely to encounter bears. In early spring, hunters observe bears in marginal areas of the sea ice and pressure ridges, where seals are abundant:

"The older people have always told us that there is a lot of pressure ridges right in front of Shishmaref. That's where the bears hang out. The Elders mentioned that if there are a lot of pressures ridges there are a lot of bears."

Polar bears are known to have a good sense of smell and to travel long distances for food: *"In the spring time we dig a hole and store walrus meat to ferment it and when its fall time we dig it up. The bears can smell that from far away and they will come, especially if they are down wind."*

Later in the spring, polar bears can be found around open leads, which have started to form closer to the shoreline in recent years. Bear sightings decrease as spring progresses.

In the past, bears were rarely seen on land in the summer around Shishmaref. However, as evidenced by hunters' observations in 2012, this may be changing: *"Now, there are more bears on land, even in the first part of August."*

OTHER SPECIES

One hunter gave a second-hand account of a brown bear and a polar bear "walking together" near Sinrazat in the fall of 2010.

ICE SEALS

The bearded seal, '*ugruk,*' hunting period has changed significantly over the last few decades. *Ugruk* season starts when leads open near Shishmaref, running towards Wales or Diomede. In the past, *ugruk* hunting occasionally lasted until June, but today the season usually ends in late May. The *ugruk* and walrus seasons were once distinct; now they occur at the same time, which forces hunters to intensify their work during a shorter period of time, and make difficult trade-offs. Due to ice loss, the location of *ugruk* hunting has shifted closer to shore: *"In the past we had to go out 25 miles to go ugruk hunting. That was about 25 years ago. But now, last spring, we hunted ugruk just three miles from our cabin."*

An Elder recalled a location down the coats that is known to be breeding grounds for seal pups. This area is considered to be prime habitat for the pups because of the way the currents push up the ice which form gaps between ice chunks that act as protection from predators and the winter elements. He mentioned that in the past the area was also a known place to hunt bears often feed on the seal pups in that exact location.

The Shishmaref Inlet, referred to the "lagoon" by locals, is another popular area for seals, where they can be found year-round. When there are many seals in the area, fish in the lagoon and tributary rivers decline, presumably because they are being eaten by the seals.

POLAR BEAR DIET

FEEDING BEHAVIOR

The blubber of ice seals, and especially baby seals, is the polar bear's favorite food:

"Polar bears go after baby seals inside the ice, under big snow. The polar bears always smell them and try to sometimes grab them. Seals are born in January, and then they stay under the snow, and the polar bears smell them."

Bears prefer to eat seal blubber and usually leave the meat, unless they are very hungry. One hunter recalled opening a bear's stomach and finding it completely filled with seal oil.

Walrus carcasses are another important food source for polar bears. Many hunters in Shishmaref have observed bears in the act of scavenging walrus "floaters" that freeze in the ice along the coast. Some hunters reported that there are now far fewer walrus carcasses washing up compared to the past. Grey whale carcasses occasionally wash up, and are also targets for polar bear scavenging.

BUTCHERING OBSERVATIONS

Examining the stomach contents of bears during butchering is not a regular practice in Shishmaref. Some individual hunters do examine the stomach contents, but only out of curiosity. Of the eight hunters interviewed, none had reported seeing anything indicative of disease or unusual diet. One hunter said that most of his bears' stomachs had been empty, but some were filled with pure seal oil. Another recalled harvesting a bear that was very skinny, which made it hard to flesh the hide: *"There was no blubber between the two layers of skin [so] it was really hard to clean."*

HUNTING FOR POLAR BEARS

FIRST BEAR

Hunters always remember their first polar bear harvest. Many caught their first bear with their father. The hunters reported their first bear hunt tests what a young man has learned from watching and listening to Elders:

"My Dad was happy for it, when I got the first one. He taught me verbally how to catch bears. I watched him skin one bear, and that's how I learned. When I got that first bear, I knew exactly where to cut, where all the joints are. I knew where to skin it and how to take out the paws."

An Elder recalled that a time, long ago, when a hunter caught their first bear, the hunter would host a feast at his home. The community would celebrate and Eskimo dance. The hunter who had harvested the bear would be expected to participate in the dance. It was said that this celebration also ensured the future success of the hunter.

For some hunters, their first bear will be their only bear, often by choice. In this case, the bear takes on a special significance as a milestone of life and tradition. It is important to be able to tell one's children and grandchildren that their Elder caught a bear.

TIMING OF HARVEST

A north wind signals the coming of bear season for Shishmaref hunters. The months between December and March are the ideal time for harvesting polar bears. At this time the fur is long and white, whereas later in the spring, it becomes yellow and shorter, and also considered to be less desirable.

However, the timing of harvesting bears has become delayed due to climatic factors. In the past, most bear hunting was done in mid-December, ending the week before

Christmas. Bear hunting wrapped up just as the community began to prepare for a week of traditional races and games. Now, however, younger hunters are still busy with bear hunting during Christmas week, and no longer participate in these traditional activities as much. Now the bear season continues into January and February.

LOCAL RULES

There are a strong set of local rules and ethical codes that have been passed down through the generations that surround polar bear hunting in Shishmaref. These rules include: "*Never shoot young cubs, never 'play' with game, and don't take anything you don't need.*"

HUNTING PRACTICES

Polar bear hunting is usually a solitary endeavor. The exception is when one man is teaching another how to bear hunt; these joint expeditions are important for passing hunting knowledge to another generation:

"I usually go alone to hunt. When I started hunting, I went on my own, and with my Dad and uncles. I started as soon as I was old enough to use a .22 rifle. I've been hunting for a long time, I love it."

Shishmaref hunters tend to harvest small bears because of the strenuous workload involved in processing a large bear, especially for a lone hunter. When bear hunts include two or more hunters, the one who sees the bear first keeps it, regardless of who kills it. However, in practice, the bear is usually shared between the hunters.

A strong local rule which is still practiced in Shishmaref is *"Don't let [the bears] suffer, shoot them the good way so that other animals will come to you."* Each village and family applies different techniques for an effective harvest, but most try for a quick and clean kill. Shishmaref hunters aim for the neck or heart. Hunters watch the bear from the side, and shoot when the bear's front leg is stepping forward.

"My Dad taught me how to hunt polar bears. The first thing he taught me was...where to shoot them. He spotted them with binoculars. He'd hand me his rifle after getting it ready. He'd tell me: "These polar bears, when they're big you don't shoot them on their head or shoulders because their bone and hide are thick. When they're big when they're walking, you get them right under here, under the heart."

For polar bear hunting, most Shishmaref hunters use caliber rifles that range from .22 to .308. Avid polar bear hunters tend to use smaller rifles compared to hunters who take

bears more opportunistically. Once harvested, the cleaning procedure begins by de-fleshing the paws and chest. Bears are hauled back to the village or camp by rope and/or sled.

In the past, polar bear hunting was done by the use of dog sleds:

"In the old days we used dog teams, that's how we hunted. In the past people would go out specifically to look for polar bears. If there was good, smooth ice, you could go after them with a dog team. Polar bears are not that fast at running." The dogs assisted in the hunt in ways that exceeded their role as transportation. One hunter recalled a friend's experience: "*He had a good dog team that would lead him to bears. They would be quiet. Last time he went hunting was in the eighties."*

HARVEST EFFORT

Polar bear hunting efforts in Shishmaref have declined in the past several decades. There are a few reasons for this trend:

"Many people stopped hunting polar bears with the federal regulation that says they can't sell the hides. They won't sell it or eat it... Now you can sell them but you have to cut them up, [to] make ruffs, [and] mukluks."

"Not a lot of people eat polar bear meat now. Long time ago it was a part of the main diet and now the Elders are primarily the ones who eat it, when a hunters gives them meat."

However, many hunters in Shishmaref still maintain a strong desire to harvest bears for subsistence purposes. Greatest effort is put into bear hunting during late fall and early winter, primarily because the bears' fur is in better condition during this time.

Today, hunters have less latitude to choose when they will hunt polar bear compared to the past, due to deteriorating ice conditions that shorten the fall and winter hunting season. Hunters' efforts are frequently thwarted, both by reduced abundance of bears in the area, and by unstable ice conditions, which makes hunting hazardous. These obstacles are of concern not just because they prevent hunters from getting bears in the short term, but because it interrupts the transmission of knowledge and skills about bear hunting between generations: *"My son would like to learn* [to hunt]*, but there aren't bears anymore."*

There is a widespread perception that bears have become scarce around Shishmaref, hunters feel that it is not usually worth actively seeking them out. Rather than continually traveling further to look for bears, some hunters have stopped looking for them altogether.

Hunting other species, such as seals and caribou, fills in time once devoted to bear hunting. If bears are encountered at the height of seal or *ugruk* (bearded seal) season, harvesting enough seals generally takes priority over hunting a bear. While bear hunting is a culturally important endeavor, seal and *ugruk* hunting is seen as more essential to meeting the nutritional needs of the community.

The amount of effort put into bear hunting varies by age. Some older hunters say that bear hunting is for young men, because of the great amount of labor involved in taking care of a polar bear after it is harvested.

Amongst the younger generation, there is a split in terms of interest in bear hunting. Some are eager: *"Young people are going out looking for polar bears....the younger people are hunting during Christmas week. I always see them take off and try to get animals up and down the coast."*

However, Elders fear that the younger generation, as a whole, has lost interest in bear hunting. Reasons given for this include the distractions of modern technology and restrictions on use and sale of bear hides.

OPPORTUNISTIC VS ACTIVE HUNTING

Active bear hunting involves going out with a specific intent to hunt bears. This type of hunting is commonly practiced in winter by middle-aged to older hunters in Shishmaref, more so than by hunters in other Bering Strait villages. Older hunters recall going out to pursue bears along the coast between Shishmaref and Teller around Christmas time.

In the spring, bear hunting shifts to a more opportunistic mode, as hunters spend time out on the ice engaged in *ugruk* and walrus hunting. Several hunters reported occasionally harvesting bears while out *ugruk* hunting. Hunters also harvest bears opportunistically while they are performing outdoor chores, such as hauling ice or collecting driftwood.

FACTORS AFFECTING HARVEST LEVELS

Dynamic ice conditions are affecting the outcome of polar bear hunts. When hunters pursue polar bears, the bears tend to run towards the ocean ice. If the bear crosses young ice, "rough ice," or pressure ridges, hunters is not be able to pursue it because of the dangerous conditions.

For the last ten-fifteen years, rapidly melting ice has shortened the hunting season for polar bears, *ugruk*, and walrus. With later freeze-ups, hunters are losing bears to poor ice conditions more frequently. Ideal ice conditions no longer coincide with the seasonal movements and prime condition for harvesting polar bear.

Hunters use the timing of walrus hunting as a gauge of changing ice conditions over the decades: *"We used to hunt walrus around July 4th, but now it's during the last week in June."* As ice conditions have changed, so have hunters' modes of transportation. *"Now you can't use snowmachines as much, you have to use boats on open water. Everyone hunts by small boats."* Changing ice conditions have multiple and unexpected effects on hunters' ability to harvest bears, both directly and indirectly.

LIFETIME HARVEST

The three hunters who reported their lifetime harvests caught five, ten, and seventeen bears. These totals are considered high compared to the new generations' harvests. Two brothers recalled that their deceased father took over seventy bears in his lifetime. The skills of the older generation are greatly respected.

POLAR BEAR TRADITIONS

POLAR BEAR LEGENDS

One hunter recalled a story, told by an Elder, about the origins of brown bears and polar bears:

"There was a lady a long time ago, maybe two hundred years ago, a nice looking human lady camping with her parents. She didn't want to get married, [or] to find a man. Men would always go and try to ask her to be their wife. She said no way. Everyone she turned down. So one time her dad scolded her. It's been going on a long time, years that you have said you won't get married. Ok, we've got a dog. Why don't you get that dog for your husband. Sure enough that dog fell in love with that lady and they bore four little bears, two white and two brown. So they raised them. The parents couldn't take care of them when they grew up; the bears hurt some kids in the community so [the bears] were told to go away. So the two white ones went on the ice, and the two brown ones went on the land."

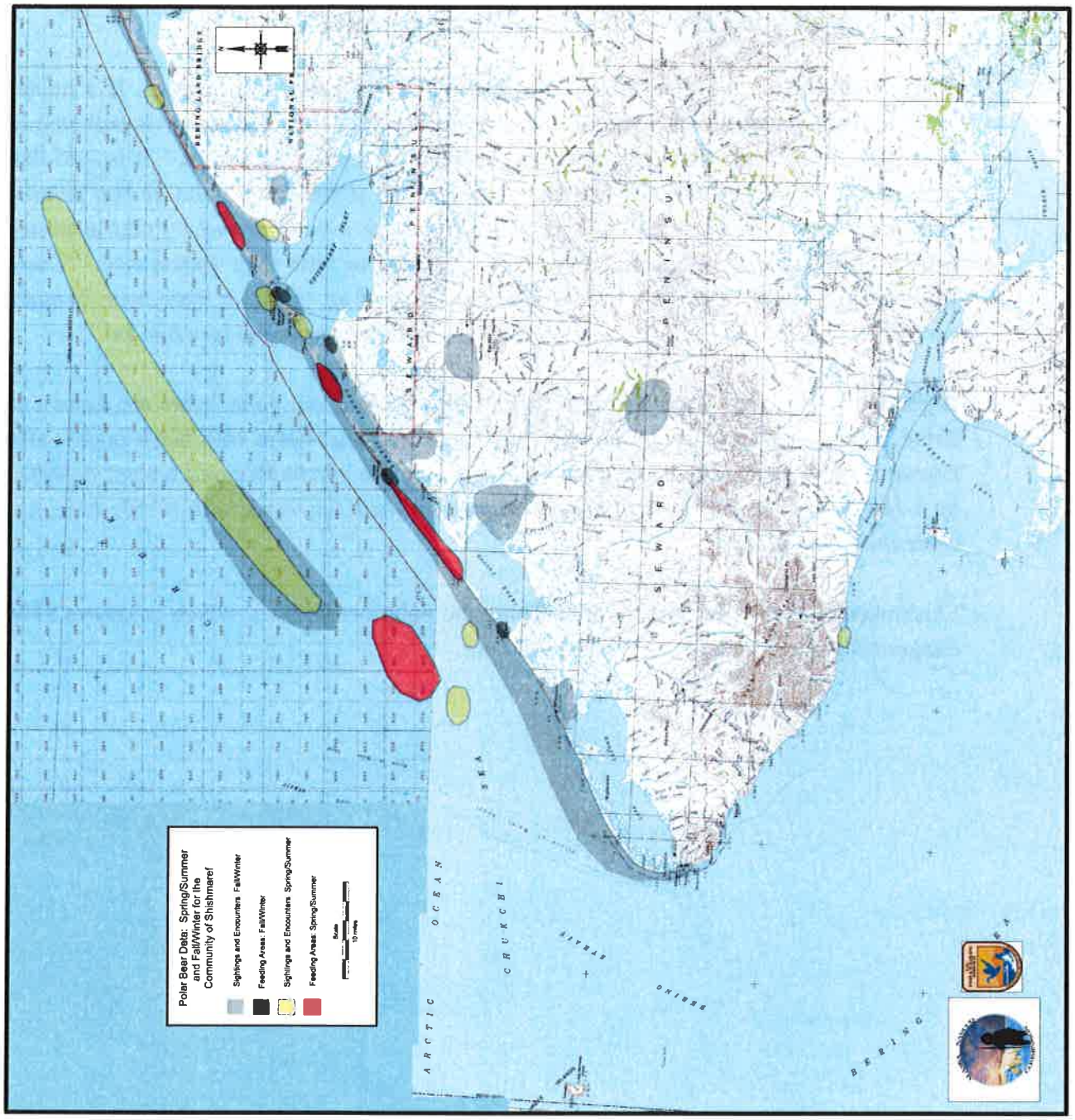
Another Shishmaref hunter stated that *"Bears are very knowledgeable; they hear what you are saying about them; don't talk badly about the bears, [because then] you won't see them come around."* A hunter should never say, "*I'm going out polar bear hunting* [because] *it was believed that by saying that bears won't be around, that you won't see one if you say it."*

TRADITIONAL KNOWLEDGE AND BELIEFS ABOUT POLAR BEARS

There is said to be a special connection between polar bears and humans. If a hunter successfully pursues a bear, without the bear seeing him, then the hunter is believed to have *"power over the bear, making it travel in the direction he wishes."* It is said that bears also have power over the hunter. *"They can tell if you are a good or bad person. That polar bear will sense you and get you [if you are a bad person]."* Polar bears are known to play tricks on humans; they may play dead or alter their appearance: *"Those four bears, he went to check on them. The bear flipped up; it was a huge bear, it made each of its legs looked like four bears eating. The bear was trying to lure him in!"*

Hunters always avoid approaching a bear's left side because polar bears are known to strike with the left paw first. They are "left-handed." Large bears with black marks, also known as king bears, are also avoided because they are "*invincible and cannot be killed by a human hunter; bullets will simply bounce off their fur, especially if they have just come out of the water."*

Shishmaref hunters avoid eating or touching the polar bear's liver, which is known to be dangerous, and will cause one's hair to fall out.



SEASONAL POLAR BEAR HABITAT USE MAP FOR SHISHMAREF

The map represents seasonal polar bear habitat use data from 1940 to 2012 identified by eight hunters from Shishmaref, Alaska. This map does not include all possible locations of polar bear habitat use. The areas identified by participating hunters include both primary and secondary observations. Polar Bear's primary habitat is ice; thus, the areas identified should be considered as dynamic rather than fixed locations.

POINT HOPE

POLAR BEAR CONDITION AND ABUNDANCE

ABUNDANCE

"For a while it seemed like the bears were going away, but now the last year they all came back."

Whether there are more or fewer bears now compared to the past in Point Hope depends on the time frame of comparison. Hunters who take a long-term perspective report that there is the same number of bears as always. In the short-term, however, there was a noticeable lack of bears in the area until approximately 2006, when the trend reversed and local abundance increased. In the last two years [2011 and 2012], this trend has intensified. More bears are seen in the area around Point Hope compared to the recent past, and more bears are also coming directly into the village.

In addition to the increase in bear sightings around Point Hope, more bears are venturing inside the village boundaries. Bears were "*bolder [in 2012], even laying down over here on the beach, and right here on the snow fence."* There were a particularly high number of bears harvested during whaling season in 2012. Based on the hunters observations the average number of polar bears that have entered the village in recent years is between one and three, although it is not unusual for as many as six bears to come into the village. Hunters attribute yearly fluctuations in bear sightings to the success of failure of the whale harvest.

CONDITION

According to hunters, polar bears around Point Hope have remained in generally good condition and have so over the years. Most bears appear to be healthy and fat. Extremely large bears have been observed around Point Hope going back to the 1960s. One bear seen in 2012 was approximately twelve feet long.

Polar bears arrive around Point Hope during the fall and winter months. During the coldest part of winter young male bares appear skinnier than any other time of the year. Skinny male bears sometimes travel into the village of Point Hope and its outskirts. One hunter reported seeing "*some sickly ones in town, when they're young and its cold and there's no open water, then they can't hunt the seals."* Hunters in Point Hope also reported that males encountered during spring whaling season are often in the worst condition: *"A lot of times during whaling season we see bears with bones sticking out, and we let them go because most people don't catch them just for the fur."*

All the bears observed in 2012 were reportedly in good condition except for one, which was reported skinny, the ribs were obvious. However, some hunters suggested that the bears seemed hungrier in 2012 than in other recent years.

DEAD BEARS

Of the ten hunters interviewed none had ever come across a dead bear.

DEMOGRAPHICS

The demographics of bears seen near Point Hope vary according to the time of year. Since 2006, females with cubs have been regularly observed around the village. Family groups with two cubs are most common, although occasionally groups with three cubs are seen. Mothers and cubs in the area are reported to be in good condition.

Lone male bears are most often seen in the winter and during spring whaling in May. In the spring of 2012, more male bears were seen than usual. In general, more male than female bears are harvested. This may be due to hunter preference and/or abundance of that gender in the area and should be researched further. One hunter believed that most bears harvested in Point Hope are at least three years old.

HABITAT USE

POLAR BEAR HABITAT

Point Hope residents began noticing the sea ice changing in the 1970s and 1980s. In the past, shorefast ice formed in October, whereas now it forms in December. One of the major changes in the ice is its thickness; in the past it would form to be over ten feet thick, now it is forms to approximately three feet thick.

These changes directly affect when bears arrive, and how they are distributed in the area. Now, bears are often not seen until January. One hunter shared his observations from flying between Point Hope and Kotzebue in recent years: *"The ice is darker than before; you can tell that that ice is thin. One time when we flew from Point Hope to Kotzebue we saw about 16 polar bears. Now the ice doesn't get very thick until about January or February and that's when bears come around."*

Thinner ice is more dangerous and has forced hunters to relocate their whaling camp closer to Point Hope:

"Usually we go out two or three miles on the ice. It used to be thirteen or fourteen miles out back in the [19]60s and hunters used to go more south of Point Hope. It used to be

south of Point Hope for whaling, but now it's more to the west because of the changing ice conditions."

In the past, whales could be pulled up on the ice easily, but now the thinner ice limits where a whale can be hauled out. It is possible that as the whaling camp-as well as leads in the ice-have moved closer to Point Hope, polar bears are being drawn closer to the village, making ventures into the village more likely. It is clear that whaling serves as a major attractant to bears in the area. Point Hope residents are far less likely to see bears in the area in years when there is no whale harvest.

Hunters emphasized that, although they have noticed clear trends in the timing and composition of ice over the years, ice conditions are dynamic and vary from year to year.

LOCAL DISTRIBUTION

Residents of Point Hope do not have to travel far to encounter polar bears. A common place for harvesting bears is "on the point" near town, as well as on a sandbar just to the north of the village. Bears are commonly found along the beaches both to the north and south of Point Hope because *"lots of old food washes up from Shishmaref."* One hunter gave a secondary account of bears being seen in Kukpuk camp, far inland. However, in general, it is rare to encounter a bear inland from the village. In the spring, the local distribution of bears out on the ice depends on the location of open leads.

DENS

Dens are very scarce in the vicinity of Point Hope. One den was located on a hill near the village about ten years ago, but no other permanent dens have been reported since. Denning females prefer sites where snow piles up, so they can dig into the drift. Areas known for dens include Cape Dire, Cape Lisbourne, and Cape Thompson, which is a common site for female bear sightings. Sometimes it is not clear whether a den was used for reproductive purposes or was only a temporary shelter. Point Hope residents do sometimes stumble upon temporary den sites while out hunting.

SEASONAL MOVEMENTS

Polar bears pass through the Point Hope area on their journey south in winter and north in summer. They currently arrive in the Point Hope area in December or January, depending on ice conditions. Polar bear tracks are mostly found in January from Nuvuglak Point to Point Hope. In February, hunters must watch out for polar bears while they are out on the ice fishing for tom-cods. During February and March some bears continue to travel through town. One hunter estimated that four to five bears usually come directly into

town each year; in 2011 and 2012 the number of bears seen close to the village was unusually high compared to the past.

Whaling captains start cleaning out their ice cellars around March in preparation for the start of the new whaling season. The smell of fermented meat from the cellars often attracts bears to the point where the ice cellars are located. In March, it is common to see bears out on the ice, especially on the south side of town; ice conditions are thinner on the north side of the village, making the area less suitable for bears. Polar bears start migrating north again in April, coinciding with whaling season. During this time, they are usually out on the ice, rather than near town.

Bears are rarely seen in summer and early fall in the Point Hope area. Some hunters have noticed that summer sightings are becoming more common, especially on the coast and occasionally inland:

"I have seen bears crossing north through the land area. The past three or four years there hasn't been much ice. We saw them crossing the land around June. Some of the Elders were telling us that the bears were taking an ancient route that they used to take."

OTHER SPECIES

Hunters have observed polar bears being "teased" by ravens and arctic foxes. Fox tracks are often associated with polar bear tracks and sightings because the foxes follow bears and eat their scraps.

Polar bears have been known to lead hunters to whales that have been struck by a harpoon, but later lost under the ice. Polar bears sometimes congregate on the surface above a dead whale, leading hunters to the carcass. In one incident:

"About thirty bears were trying to get to this whale out of the water; this was about four to six miles out in front of Point Hope. What you do is fill a few whiskey bottles with black powder and blow up the ice, and that's how they get the whale out."

Even after several days, some of the meat and blubber can usually be salvaged.

In summer, brown bears come to scavenge *ugruk*, seal, and walrus carcasses that wash up on the coast. In fall and winter, polar bears replace them. However, in 2011 and 2012 there was "*more than the usual number of grizzlies in the area.*" especially in 2012. *"This year was the most brown bears we've seen."* It was suggested that gray and minke whale carcasses near Pinguaheak were the cause for the increase of brown bear sightings.

Brown bear hunting is not common in Point Hope. None of the hunters has seen a brown bear interacting directly with a polar bear.

One hunter reported secondary sightings of other species that are not commonly encountered in the Point Hope area: *"My cousin caught a sea lion once, fifteen or twenty years ago. There's a warm current that will come and reach our point, [and] we will get these surprises. An Elder found a shark and took it to the school. One of my buddies who is a hunter, he saw an elephant seal!"*

Other species seen around Point Hope include; murres, minke whales, musk ox, orcas, wolves and tom-cod. A wolf was harvested in August 2012 near the snow fence in the village. Occasionally Pacific Right whales are seen in May. In 2012, reports of dead murres washed up on the beach, and residents made sure to notify the Alaska Department of Fish and Game.

January and February are known as good months for catching tom-cods, but residents have recently seen a decrease in their numbers: *"[The] last few years [2011 &2012] we've been having trouble finding tomcods, maybe it's because of the seismic activity. We used to get them by the sacks and sacks."*

ICE SEALS

Hunters say that the numbers of polar bears in the area changes according to how many seals are present, both seasonally and from year to year. The overall condition and abundance of seals around Point Hope has remained constant over the years. Hunters encountered several sick ringed seals in 2011. In 2012, only one report of a sick bearded seal was mentioned: *"It was a bearded seal. There was hair molting under the armpits and the blubber was kind of yellow."* It was not clear whether the seal was sick or merely old, as yellow blubber is said to be typical of older seals.

Bearded seals (*ugruk)* and ringed seals are the most common seals found in the Point Hope area. The ringed seal hunting season, for both humans and polar bears, is in December and January; exact timing depends on the formation of open leads. *Ugruk* hunting occurs in the spring. Ribbon seals are occasionally seen, but rarely caught. Just before whaling season, crewmembers often harvest seals and use their oil to run stoves at the whaling camp.

POLAR BEAR DIET

FEEDING BEHAVIOR

After their arrival in early winter, bears are seen scavenging on walrus and whale carcasses on the shores near Point Hope. Some bears have the capacity to pull entire carcasses out of the ice, as illustrated by the story below, one of several told by hunters:

"In 1994, there was a lead that had just opened up, and there were lots of belugas. I noticed a bear coming. It looked like a 10-footer. When we watched it he laid down on the edge of the ice, and watched the beluga, then he jumped on its back and took it down under the water. The bear went down for fifteen minutes, and when it came up the beluga had drowned; the bear dragged it up on the ice by the tail."

Bears are often observed hunting for seals. *"I saw a bear hunting; it was waiting above a seal hole and never moved... [This was] right before whaling time, around March."* The blubber of both seals and belugas is generally the only part eaten by bears; the rest is left behind, which provides scavenging opportunities to younger bears, other animals, and even people. *"They* [polar bears] *always leave the meat, unless they're real hungry, then they'll munch on it."*

BUTCHERING OBSERVATIONS

Point Hope hunters rarely examine a bear's stomach contents during butchering. Elders teach hunters to avoid handling the bear's internal organs, warning that touching a bear's liver can turn a person's skin permanently white. As an extra precaution, hunters remove internal organs and keep them away from the rest of the polar bear meat. Hunters who have investigated the stomach contents found only blubber and pieces of seal skin, reflecting the bear's preferred diet: *"They always leave the meat, unless they're real hungry, then they'll munch on it."*

One hunter harvested a bear on the lagoon in January 2011 that was "old and sick." Its blubber was an unusual brown color, and the meat was inedible. A secondary account was given of a diseased bear caught by another hunter*: "I heard of one sick polar bear... it had a bunch of white bubbles inside the skin, and green, right under the skin. The meat was softer than usual. That was a couple years ago."*

HUNTING FOR POLAR BEARS

FIRST BEAR

Many people still adhere to the tradition of sharing one's first bear with Elders, *"just for luck."* Bears are sometimes given to women who do not have a hunter in the family to provide for them: *"I was taught that what you get you give away."* The skin of the first polar bear is also given away.

Gifting bears continues to be a strong traditional practice that revolves around a hunters' newly established ability to share those harvests with others. When a young man becomes a successful hunter or has their first harvests of other animals a smaller celebratory gathering among family members still occur. In addition, new avenues of celebration and communication are being created. One young hunter recently announced his first bear harvest on Facebook.

Most hunters begin hunting at a very young age. They go out on trips with their fathers or other family members and learn to hunt. The age range at which hunters harvest their first polar bear varies between the late teens and mid-thirties. Experienced polar bear hunters help the younger generation harvest their first bear: *"It's always good to let someone get their first bear. I haven't gotten any in a long time [because] I know how it feels to get a polar bear."* Spring whaling camp often provides an opportunity for young men to harvest their first polar bear. However, some bears are in poor condition at this time, and are not harvested, as it would inappropriate to present an unhealthy bear to the Elders.

TIMING OF HARVEST

The timing of polar bear harvests in Point Hope is determined by ice conditions and the condition of bears. The best time of year to harvest bears is when they are fat and healthy, between December and February. Most bears caught in December are found "out on the point." Occasionally polar bears are harvested as late as June or July.

Seal hunting in the spring coincides with opportunistic bear hunting. By whaling season in late March and early April, however, the bears are usually skinnier. Point Hope hunters are preoccupied with whaling season, but hunters from other villages sometimes come to harvest bears opportunistically during the whaling season:

"During whaling camp, we get a lot of Eskimos from other areas. When they come around they want to get a polar bear, and they want to take the skin home with them. In Point Hope the bears are hunted in the same area but earlier in the year. When we're whaling it's too busy to get bears."

Self-defense and opportunistic hunting blend together during this time of year. Because bears are hungry, they can be very persistent and aggressive in their efforts to scavenge whale carcasses.

LOCAL RULES

Although there are no formalized village ordinances prohibiting the hunting of cubs, an informal code of ethics prevents most from doing so. *"We don't hunt cubs; we want to*

give them a chance to grow, same with whales." Older hunters teach younger hunters to scare cubs away, rather than shoot them, and will confront those who do harvest very young bears. Hunting bears of the proper age maintains the hunter's integrity and pride, and that of the wider community. One hunter described a traditional rule pertaining to hunting territory:

"Back when I was growing up I was taught that when something passed the point, it belonged up north, to the hunting communities up north, so I wasn't taught to go looking for animals on the north side."

Finally, young hunters in Point Hope are taught to take and use everything that is harvested. Hunting an animal is a weighty decision, and must be based on the hunter's ability to fully utilize and transport the harvest back to the village. A hunter must always go fully prepared with survival gear, including his *unaaq*, *niksik*, Coleman stove, needle and thread, and food.

HUNTING PRACTICES

Success in polar bear hunting is determined by the amount of "luck" a hunter has. In the past, hunters had to watch and wait patiently for bears, which required tools that are still used today:

"When they'd go out they'd have the 'unaaq,' the walking stick that checks the ice. They made little stools for survival, so you could sit there and stay from getting wet on the ice, and you could use it for a paddle by putting it on your unaaq if you got stuck."

An *unaaq* is a long stick with a hook at one end and an ice pick at the other, which can be used for many purposes, and is important for hunting safety: *"Some people don't let others hunter with them if they don't have an unaaq because that's dangerous, you need to have a way to check the ice... [I] always drilled into my son's head: if you ever go hunting out on the ice, you bring your unaaq."* One hunter recalled pulling his friend out of the water with his *unaaq* as recently as 2011. Another useful tool is a *niksik*; a piece of wood with hooks in it that is used to retrieve floating seals or to maneuver small icebergs.

One Elder expressed his concern that today's fast hunting pace prevents polar bears from being able to "give themselves" properly to the hunter. As a result, hunters may lose their gratitude and humility towards polar bears.

Today, hunters use snowmachines rather than dog teams, which cut the duration of hunting trips in half. *"In the old days we didn't chase the animals, we waited patiently, and they came to us. We live in such a fast society now."*

Ice conditions also play a key role in the duration and outcome of hunting trips. Until about fifteen years ago, substantial ice allowed hunters to travel further north and south than they can today. Good ice conditions facilitated hunting trips as long as three weeks, but now these trips can be as short as a couple hours.

Point Hope hunters prefer to harvest small bears, but try to avoid taking cubs or mothers with cubs. However, mother bears have been accidentally harvested: *"When we know they have cubs, we don't hunt them, but sometimes you don't know."* Hunters also prefer to harvest bears with a white coat rather than yellow. The color reflects the bear's diet, which fluctuates according to the season.

The kind of rifle that a hunter uses may vary depend on the time of year, and what other species are being harvested at that time. Hunters use an array of different rifles to harvest polar bears, varying from smaller caliber rifles such as a .22 hornet to larger caliber rifles like the .7mm.

The smaller calibers are generally used for small game and the larger caliber rifles are preferred for large game. For example, one hunter mentioned that he carries a .243 in the spring for *ugruk* hunting. The same hunter who uses a .243 explained: "*I always try to get it [polar bear] behind the ear, so we don't have to waste the meat or the fur.*" When hunting polar bear with small caliber rifles other targeted kill shots include the neck and the ear: *"I use 220s, and shoot from about 50 yards. They're walking by, I'm upwind from them, they smell me, and I shoot them in the ear."* Another kill shot location is underneath the front arm.

HARVEST EFFORT

Point Hope hunters are hesitant to take bears due to the amount of labor involved in processing, both for the hunter and for family members. The burden of processing can result in social pressure to avoid taking bears: *"Back then I was younger, and it was women doing the hard work. My mom told me after a while, don't catch any more bears!"*

The best time to go bear hunting is on very cold days, but the cold makes hands cold and stiff, making processing the bear a challenge. Young hunters are less deterred by the workload and cold, especially if they have never caught a bear before. Young hunters try to harvest bears that come near town or the whaling camp instead of actively pursuing them far away from the village.

Hunters will harvest a bear if an Elder requests the meat. Historically, Elders have asked for polar bear meat when caribou meat is in short supply. Hunters prefer catching smaller

bears because they require less work to process, and the tender meat is preferred by Elders.

In 2011, there were only two or three active young bear hunters in Point Hope. Some hunters do not take polar bears due to personal taste, as the flavor of bear meat is quite distinctive. However, because of a recent increase in local availability of polar bears, more residents of Point Hope are developing a taste for polar bear meat, thus renewing interest in polar bear subsistence. "*Before it was just the Elders [but] lately all the young guys have been trying to use them.*"

Few men continue to actively hunt polar bears after middle age, often stopping in their forties and fifties *"because it gets to be too much work."* However, they continue to help and encourage younger bear hunters. One hunter who has given up harvesting bears continues to observe them out in the landscape, saying: *"Now I harvest them with my camera."*

Occasionally, bears are harvested in honor of the birth of a baby boy in the community, to ensure that he will become a successful hunter.

OPPORTUNISTIC VS ACTIVE HUNTING

Point Hope residents consider themselves to be seal hunters and whalers first and polar bear hunters second. Bear hunting is usually done opportunistically in the winter and spring, during sealing, while cleaning out the ice cellars, or at spring whaling camp. However, circumstances sometimes lead to more active hunting: *"If you're hungry and you have to feed your family then you'll get a polar bear because you want to get the meat, you don't want to get that meat from the store."*

Hunters opportunistically harvest bears that are encountered in the village or at whaling camp, especially if those bears are considered dangerous. When young hunters are looking to harvest their first bear, they approach the task more actively. Elders recalled that active, purposeful bear hunting was more common in the past than it is today. Traditionally, if a polar bear is purposefully hunted in honor of a new baby boy, the baby will grow up to be a good hunter.

FACTORS AFFECTING HARVEST LEVELS

Although fuel prices have gone up, this is not a major limiting factor in bear hunting. Most hunters are able to manage costs by pooling resources and using more efficient motors. Of all factors, ice conditions have the most significant impact on the success of polar bear hunting outside the village:

"[In the past] Elders would go out hunting on the north side [of town]; sometimes they'd go way south. Because of ice conditions, people stay closer to town. Now it's dangerous to go that far, but back 10 or 15 years ago [the ice] was a lot thicker."

Hunters take the challenge of hauling a heavy polar bear carcass and hide into account when they encounter a large bear far away from the village; *"The long ride limits how far away people might want to take bears."*

LIFETIME HARVEST

Of the nine hunters interviewed, the lifetime harvests range from one to almost forty bears. This reflects different hunting skills and interests. Whereas for some, catching one or two bears for their cultural and social significance is enough, for others, bear hunting becomes a passion, resulting in a larger number of harvests.

POLAR BEAR TRADITIONS

HOW BEAR IS USED

The technique for processing the polar bear hide has been passed down through generations. One hunter shared what his father has taught him: *"My dad taught me, and my grandfather. I grew up in old town site. After we brought it [polar bear] home, my mother had one of her friends over and they scraped the blubber off the skin, then they go hang it up, clean it too. You dig a hole in the ice, wash the skin in sea water, and then drag it out on some soft snow, use your feet to clean all the mud off. That's similar to what they do now- it never changes. The fur is for mukluks, fur ruffs. The claws are used to make necklaces. Fisherman need hair for their lures, it makes them real buoyant."*

Another hunter had shared with us other ways to use the hide *"When it's [polar bear hide] dry, if you want to make mukluks or boots you clean the skin out real good, and that's good."*

Polar bear meat is eaten mostly by Elders in Point Hope. However, because of the recent increase in local bear abundance, more young people are having the opportunity to try polar bear meat. Some members of the younger generation are developing a taste for polar bears: "*Before it was just the Elders [but] lately all the young guys have been trying to use them."*

POLAR BEAR LEGENDS

One legend we heard during our interviews with Point Hope hunters was the legend of the ten-legged polar bear and is attributed to the village of Point Lay. The legend states, there was once a man who was a talented polar bear hunter. Although he was short, he was a fast runner, and would catch up to bears and kill them with a spear. In his journeys on the ice, he roamed all over, and during these travels, he saw the ten-legged polar bear.

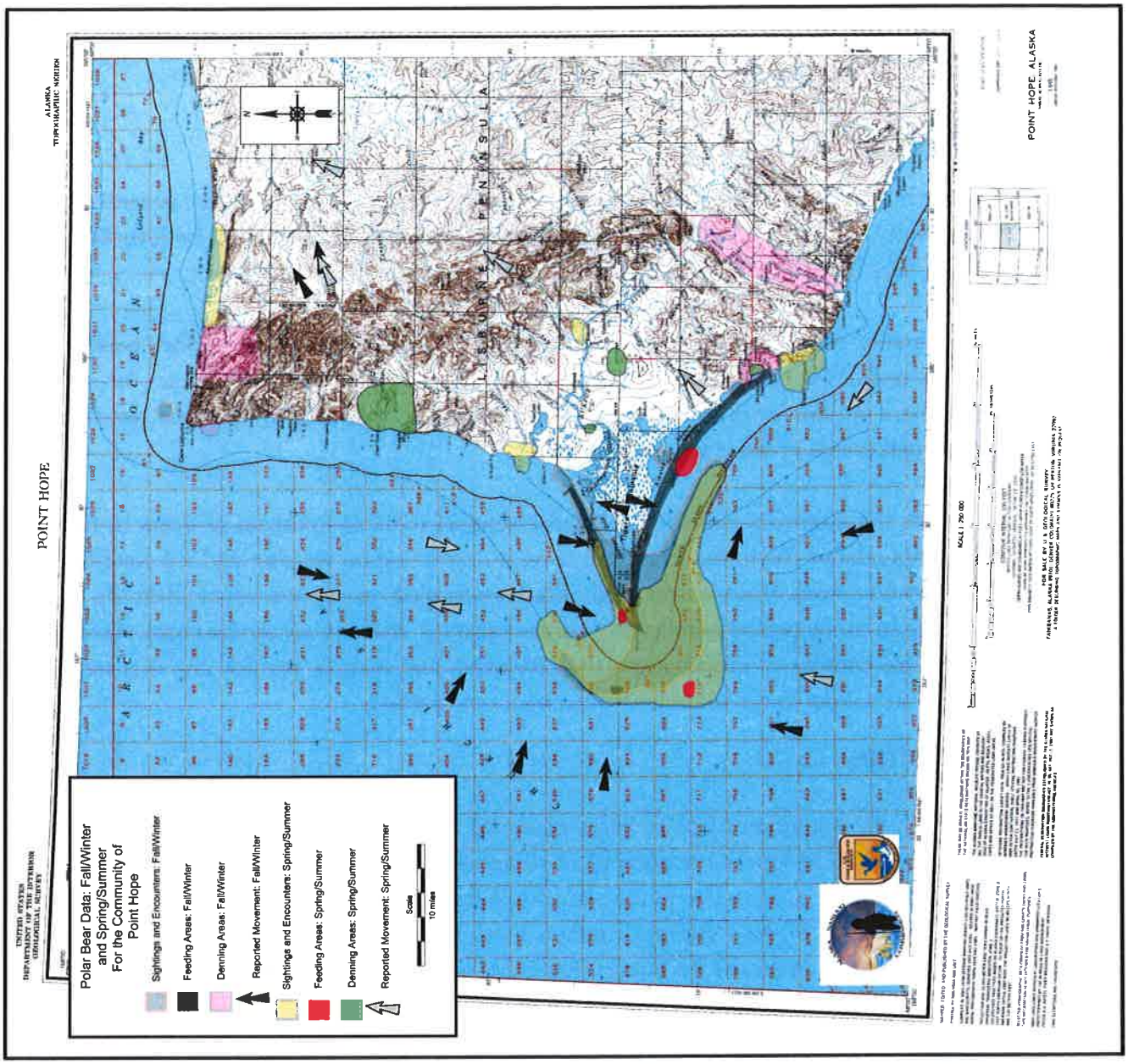
A story told in Point Hope is of a man who had an ivory carving of a polar bear; with this object in his possession, he could predict when the bears would arrive and where they would be.

TRADITIONAL KNOWLEDGE AND BELIEFS ABOUT POLAR BEARS

Polar bears are said to be left-handed; Elders teach young hunters to avoid getting near a bear's left paw, which are quick and agile.

The largest bears of all are distinguished not only by their size, but also by black marks that appear on their shoulders. These are the toughest bears of all, and hunters usually leave them alone.

A story is told in Point Hope about an old man who touched the liver of a polar bear. His hair immediately turned white. Some people say that the liver also turns hands white. Because of this knowledge, hunters have learned to avoid the bear's liver, as well as other internal organs.



SEASONAL POLAR BEAR HABITAT USE MAP FOR POINT HOPE

The map represents seasonal polar bear habitat use data from 1970 to 2012 identified by ten hunters from Point Hope, Alaska. This map does not include all possible locations of polar bear habitat use. The areas identified by participating hunters include both primary and secondary observations. Polar Bear's primary habitat is ice; thus, the areas identified should be considered as dynamic rather than fixed locations.

POINT LAY

POLAR BEAR CONDITION AND ABUNDANCE

ABUNDANCE

Older hunters have noticed fewer polar bears around Point Lay in the last several decades, especially since the 1980s. This was also the case for 2012. Hunters believe that polar bears *"are starting to have a hard time"* due to changing ice conditions.

One hunter recalled a relative who was an avid polar bear photographer between the 1960s and 1980s. Based on this photographer's history of observing bears, he reported that there are far fewer bears around Point Lay now compared to this time period, when mass gatherings of bears were common.

Despite the dominance of this long-term trend of reduced numbers of bears in the area, local abundance fluctuates from year to year depending on weather and ice conditions. In the last few years, large walrus haul-outs have formed on a barrier island near the village, leading to an increased number of walrus carcasses washing up on the coast. As a result, bears are coming to scavenge on the carcasses, and hunters predict that this trend will continue as long as the seasonal walrus haul-outs persist.

CONDITION

Overall, the condition of polar bears observed by Point Lay hunters remains good. One bear observed swimming in June of 2010 appeared to be fat and healthy, despite having remained in the area so late in the year. Most bears that approach people in the Point Lay area are said to be "curious" rather than hungry. Skinny bears are occasionally encountered, but none of the hunters has come across obviously diseased bears.

Hunters have noticed that some swimming bears appear fatigued by the time they reach the coastline:

"We did see one swimming last fall [2010], coming up about this time of year [late September]; the bear was so tired it didn't try to run, it just went up on the barrier island. It went and laid down on the beach. People left it alone. It was getting dark so we didn't bother it; we let everyone know."

DEAD BEARS

Of the six hunters interviewed, none had ever come across a polar bear that died from natural causes.

DEMOGRAPHICS

Point Lay hunters are sometimes able to distinguish between male and female bears by the way they walk: "*You can tell from afar if they're a male or female. When they walk, the females walk pigeon-toed.*" Females also have a smaller hump on their back and a smaller, narrower head compared to males.

Hunters primarily see lone male bears. In 2011, groups of mothers and cubs around Point Lay were occasionally seen: *"We don't see very many cubs around here. Hardly see them nowadays, only when we go down south in June looking for belugas."* When family groups are seen, it is usually around March. Family groups rely on pack ice for feeding habitats. Consequently, with the ice reduction, family groups are thought to be traveling elsewhere for food.

In 2012, one hunter reported seeing about 15-20 bears on the coast while out boating from Icy Cape down 50 miles towards Point Lay in August and September: "*About half of them were cubs with their mothers. Most of them had 2 cubs. Didn't harvest because we were looking bowhead whales, were bowhead whaling.*" Another hunter reported that one mother with two cubs was seen in the Point Lay area. *"I saw a mother with two cubs about two and a half feet [long] this past spring [April 2012]. [The mother bear] was a good hunter; it was catching seals every day. [That was] nine miles out in front of the spit, when we were whaling."*

HABITAT USE

POLAR BEAR HABITAT

Over the last thirty years, hunters have watched the extent and thickness of ice around Point Lay decline. In decades past, the ice was seven to eight feet thick; now it is forms to approximately four feet thick. Hunters reported open leads form approximately nine miles away from town, whereas until the late 1990s they formed fifteen miles out. *"Back in the 70s the ice was way out but now it is closer to town, and that brings the bears closer to town."*

Point Lay hunters reported that shorefast ice melts sooner than it has in the past, and is completely gone by the end of June. Bears occasionally get trapped on barrier islands and land due to rapidly melting shorefast ice; occasionally they remain through the summer.

Hunters have seen bears swimming near Point Lay. One hunter had reported *"one swimming last fall, coming up about this time of year (late September 2012); the bear was so tired it didn't try to run, it just went up on the barrier island. It went and laid down on the beach. People left it alone. It was getting dark so we didn't bother it, we let everyone know."*

LOCAL DISTRIBUTION

Point Lay hunters commonly encounter polar bears at the old village site throughout much of the year, and often while breaking trail out to whaling camps. In winter, bears are seen along the spit and barrier island between Point Lay and Omalik Creek, located south of the village.

On their migration back north, polar bears are encountered along the coast and as far north as Wainwright. Hunters travel inland during expeditions, and report that it is rare to see polar bears inland in this area and are rarely seen around Point Lay.

DENS

Dens have been observed around Point Lay in February and March where high snow drifts pile up against bluffs and riverbanks. Within the last decade, reproductive dens have been observed in an inlet about ten miles north of Point Lay.

Other denning areas include: the north side of Tungak Creek, between Cape Beaufort and Kasegaluk Lagoon, and south of Utokok River, near a shelter cabin about twenty-five miles from Point Lay. The bluffs along Icy Cape are also acknowledged as a denning area because hunters sometimes see den openings there, as well as the occasional cub. One hunter recalled coming across dens between Icy Cape and Wainwright several decades ago.

SEASONAL MOVEMENT

Polar bear seasonal movement through Point Lay begins in late fall or early winter. Historically, November had been the time bears first arrived in Point Lay, but now polar bears arrive as late as December. Hunters reported this change is due to delayed freeze-up and ice formation.

Bears are known to come from the north and south, whichever direction is downwind at the time. Upon arrival, bears spend time on the barrier islands off the coast. Hunters commonly see bears within an eighty-mile radius of Point Lay between late fall and spring.

Females den while the males travel further inland, where they are said to rest in "temporary dens." In the spring, females with cubs are occasionally seen. Bears that have traveled to the south pass through Point Lay again in March on their migration back north.

Bears usually remain on the "main ice" in the summer, which is located away from Point Lay. However, occasionally hunters have observed polar bears in the summertime, especially along the coast in July and August. One of these sightings dates back to the 1980s, most hunter observations were within the last decade. These summer sightings occurred both in the water, when hunters were boating, and further inland, during caribou hunting trips. One old bear was seen in late spring about five years ago nearly thirty miles inland, which was considered a very unusual phenomenon. Most bears seen inland during the summer appeared to be healthy, while those encountered in the water seemed fatigued.

SUBSISTENCE CALENDAR

Spring hunting season is typically April to May. The focus of the spring time hunting is for bearded seal *(ugruk)*.

End of June to through the first week of July also includes *ugruk* hunting and Beluga, *"The whole village participates with putting away the muktuk meat."*

In the past four years, September is when Point Lay hunters primarily focus on hunting bowhead.

"We have a lot of celebrations going on, Eskimo dances [and] games, but the main celebration we have is for the bowhead whale. We have a big Eskimo dance, and community feast."

Typically, in August to September, Point Lay hunters also hunt Caribou.

"I hunt caribou in the fall. Females can be harvested until mid-October. Bulls are in rut so we don't like to get them in September."

OTHER SPECIES

Hunters do not need to travel far due to the rich subsistence environment around Point Lay. When polar bears are scarce, caribou are often present, as well as ducks and geese that pass directly by the village on their migratory routes.

More recently uncommon large carnivores, such as brown bears and wolves, have increased in the area. Brown bears are seen around Point Lay and Icy Cape beginning as early as the spring, but usually between July and September. The brown bears are often

seen scavenging marine mammals along the coast. The "no bear hunting zone," was made for brown bears as well as polar bears. In fact, brown bears are considered to be a nuisance around Point Lay rather than polar bears.

Hunters are able to distinguish between brown bear and polar bear tracks, and can therefore learn of the recent presence of either species indirectly. Occasionally brown bears and polar bears overlap in their habitat use. How these interactions play out depends on the setting: *"Brown bears are scared of polar bears on ice, and when polar bears come to land then they're scared of brown bears."*

However, hunters suggest that brown bears may be the dominant party in many of these encounters:

"I think the polar bear is just as scared of the brown bears or even more scared than brown bears. Say ten bears are eating off a carcass and a brown bear comes up, then all the polar bears will leave and the brown bear will be the only one eating off the carcass."

Walruses are important for subsistence hunting in Point Lay because of their meat and the sweet clams found in their stomachs. The habitat use and seasonal arrival of walruses acts as a "gauge" of changing conditions around Point Lay:

"Ice conditions have changed during my lifetime. Back in the [19]70s walrus would be hanging out in spring time, 200-300 yards from shore, thousands, but not anymore. We're starting to see them in the fall time now."

With the recent absence of spring ice, Point Lay hunters have observed that the last two to three years, thousands of walruses have been hauling out on barrier islands about four miles north of the village:

"That's their migration stop; in fall time there's no ice for them to come back to, they go right onto the coast. They have a lot of food out here: clams, mussels, and invertebrates. They'll rest for a while."

Point Lay residents have worked together to protect the walrus haul-out herd from human disturbances, which cause stampedes that leave many smaller walruses dead. Even without human disturbances, more walrus carcasses are now found washed up on nearby coastlines.

Other fauna, such as moose, squirrels, caribou, porcupines, wolverines, porpoise, gray whales, and belugas are found around Point lay as well. *"Moose came around here once*

about four or five years ago. Sometimes even porcupines too. Maybe it's getting too warm in the interior."

ICE SEALS

Several different seal species are present year-round in Point Lay:

"The majority of the seals around Point Lay are fur seals, bearded seals, and ringed seals that live under the ice, dwellers of ice; where there's ice you'll find those. You see the same seals nowadays [compared to the past]."

The hunting season for bearded seal, or *ugruk*, is usually in May. Polar bears and other seal species are occasionally encountered during *ugruk* hunting trips.

In 2011 and 2012, hunters have noticed more dead and diseased seals washing ashore. However, there were fewer accounts of sick and lethargic seals in 2012 than in 2011. Hunters have also noticed that seals seem to be spending a lot of time on the shore. Nonetheless, they say that the number of seals has remained stable compared to the past.

POLAR BEAR DIET

BUTCHERING OBSERVATIONS

Elders in Point Lay advise hunters to examine a bear's liver for spots, which indicate that the bear is unhealthy and should not be eaten. Of the six hunters interviewed, none had reported harvesting a bear in poor or unhealthy condition. However, one hunter did harvest a bear in the village in 1995 which had an empty stomach and worn-down teeth which may be a sign of old age. Hunters in Point Lay do not commonly inspect polar bears' stomachs, but when they do, they almost always find seal oil.

FEEDING BEHAVIOR

Although ice seals make up the staple diet of polar bears, hunters have observed evidence of other feeding behaviors. One harvested polar bear had a squirrel in its stomach, and another was seen feeding on a caribou in April in the recent past. Bears are also known to hunt walruses and belugas in the area.

In late summer and autumn, Point Lay residents observe polar bears scavenging on the carcasses of seals, walruses, and beluga whales. These carcasses wash up on the barrier island in the summer and subsequently freeze into the ice in the winter. Carcasses can occasionally attract up to a dozen bears at once:

"We saw about four bears, when we were butchering...a whale, [they were] trying to come and eat the whale. So we had to move some of the blubber away. It seems like they're bunching up more together to eat."

One hunter suggested that *"The bears are adapting by scavenging, they're becoming more opportunistic in their feeding, like on carcasses."*

North of the old village site is another area where bears can be seen scavenging. During fall scavenging, bears are able to escape out to the open ocean when hunters pursue them. If the fall walrus haul-outs persist near Point Lay, hunters anticipate that bears will continue to come for the carcasses left behind.

HUNTING FOR POLAR BEARS

FIRST BEAR

Most hunters hope to get at least one bear in their lifetime. *"Traditionally it was a big deal when you got a bear. You have to give the first animal to your Elders."* Today, a hunter's first bear is still acknowledged as a joyous event:

"We eat. We feed everyone, feed all the Elders. If we get a fat bear we feed everyone, the first thing they'll ask is 'is it fat?' Every Elder always asks for the feet and paws, it's a delicacy."

However, when skinny bears are harvested, there is little to celebrate, because those bears have no fat and are too tough to cook. Unfortunately, many hunters end up harvesting skinny bears that are attracted to whale carcasses during spring whaling.

TIMING OF HARVEST

Point Lay hunters prefer to harvest polar bears during the late fall and winter, and usually avoid getting them in the summer:

"We don't go after bears in the summer time, they're skinny and don't smell too good, because they get into all that old meat. Somebody got one a few years ago in the summer, they didn't like it; the person didn't know any better I guess."

LOCAL RULES

Avoidance is the main rule when encountering bears in Point Lay, as evidenced by the establishment of a "no-hunting zone" around the village. Residents believe that bears

should be left in peace in their own domain, away from people. Polar bears with cubs are particularly avoided because they are known to be more fearless than lone bears.

Although Elders enjoy eating small bears, most hunters try to avoid harvesting cubs because they are still learning from their mothers: *"We don't hunt cubs. We don't [go out to] hunt polar bears, we get them only when they're a threat to the people or village."*

Point Lay hunters are conservative in their polar bear hunting efforts. *"We have great respect for the animals; we always prefer to hunt for food purposes only, not just for sport ... we don't do it any other way except for subsistence lifestyle, no more, no less."*

Point Lay hunters tend to wait until killing a bear is necessary, either due to self-defense or when an Elder requests polar bear meat.

HUNTING PRACTICES

When a bear is harvested for subsistence purposes, hunters often aim for the neck; however, when keeping the hide intact is particularly important, they avoid shooting in the neck or head.

In the past, hunters would shoot a bear and chase it down with their dog team. Today, snowmobiles enable hunters to catch bears quickly. Sometimes bears are hunted while they are waiting over holes in the ice to catch seals. Bears are also hunted in seal denning areas, where they are known to linger in the spring: *"You know where the seals have their pups [the bears will] be zigzagging back and forth looking for those [seal] denning areas."*

Small bears are preferred for harvest because their meat is soft, and they taste better than older and larger bears. Elders especially appreciate the meat of young bears. Smaller bears are also usually easier to catch: *"The big ones you have to chase and the smaller ones will come right to you."*

HARVEST EFFORT

Elders in Point Lay are concerned about declining interest in bear hunting, which they have especially noticed in the last few years. The main cause for this decline is attributed to the change in lifestyle that keeps young hunters indoors. Out of the six hunters interviewed, only one was an active hunter in his early twenties.

Bear hunting is strenuous work and the sheer amount of labor required to find, shoot, skin, and process a bear acts as a deterrent. Therefore, hunters prefer to harvest smaller bears to reduce the amount of butchering work required; bears over six feet in size are less

likely to be actively pursued for subsistence purposes. Elders enjoy eating polar bear meat, but many younger people do not. Today, self-defense and defense of whale carcasses is often a motivating factor leading to the harvest of bears.

OPPORTUNISTIC VS ACTIVE HUNTING

Reflecting the village ethos of respecting bears' domain and avoiding them whenever possible, Point Lay hunters usually take bears incidentally, when they pose as a threat.

When hunting polar bear, Point Lay hunters often engage in opportunistic hunting as oppose to active hunting. *"I think a lot of bears we take are opportunistic, because a lot of people don't go out looking to get a bear; it just depends on their luck."* One reason given for this is that polar bear meat is often not the first choice of food for most people in Point Lay. They prefer fish, berries, and seals.

FACTORS AFFECTING HARVEST LEVELS

One factor affecting harvest efforts is the establishment of "buffer zones" for polar bear hunting around Point Lay. This buffer zone, or "no hunt zone" was created two to three years ago, and prohibits people from hunting within in the immediate vicinity of Point Lay, "*six miles inland and out*." One hunter mentioned; *"I wanted to get my first polar bear but most of the bears I saw were in the no hunt zone, next to the old village area."*

POLAR BEAR TRADITIONS

LEGENDS

One legend initially recorded from hunters in Point Hope and later confirmed with hunters in Point Lay during verification was the legend of a ten-legged polar bear. There was once a man in Point Lay who was a talented polar bear hunter. Although he was short, he was a fast runner, and would catch up to bears and kill them with a spear. In his journeys on the ice, he roamed all over, and during these travels, he saw the ten-legged polar bear.

Another story told in Point Lay is about a man who *"had an ivory carving of a polar bear; that man used to know when the polar bears would come and where they would be."*

TRADITIONAL KNOWLEDGE AND BELIEFS ABOUT POLAR BEARS

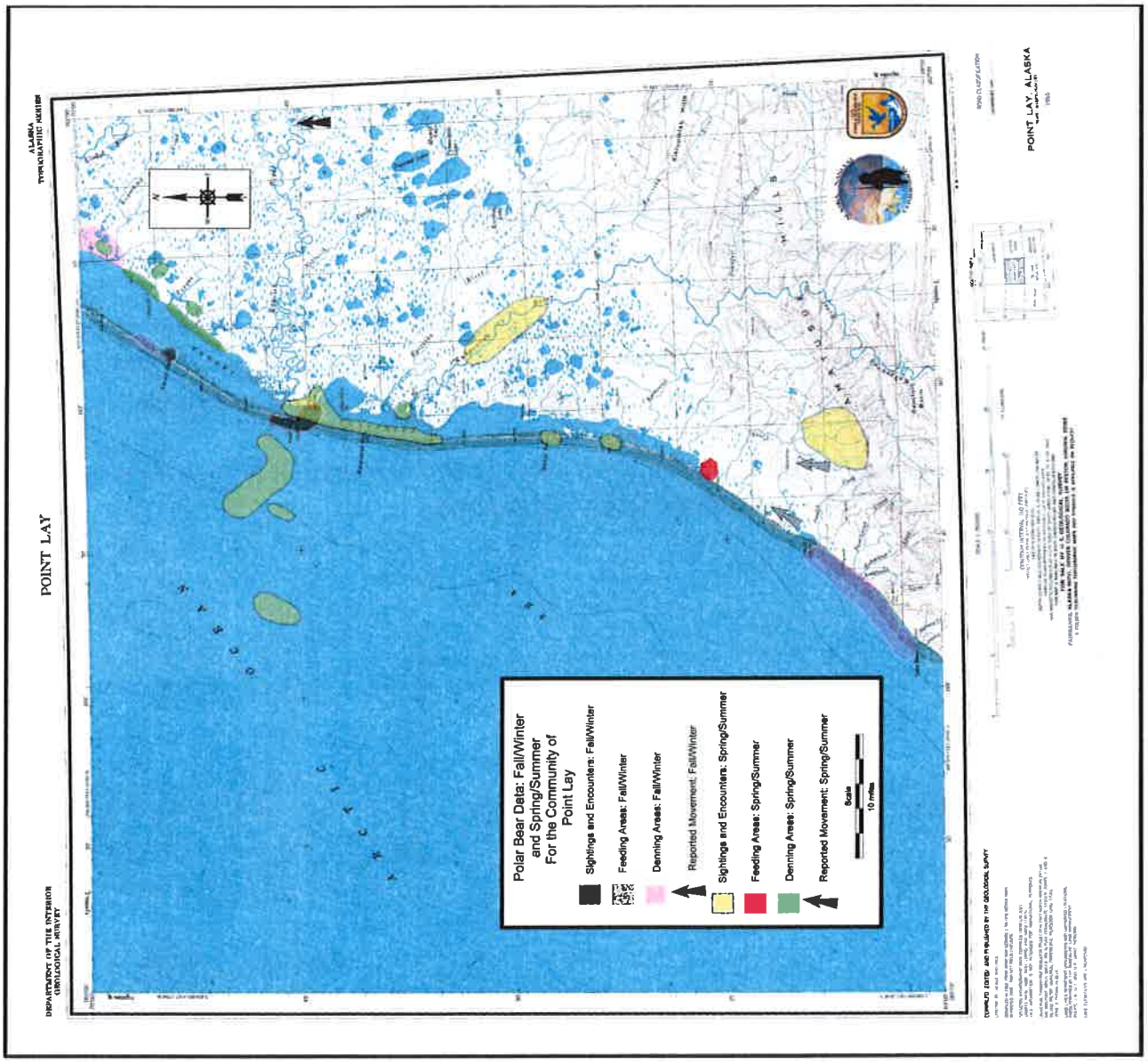
Hunters avoid shooting a polar bear that has just emerged from the water because the wet fur makes it "bulletproof," deflecting shots. This phenomenon can be hazardous during whaling season, when bears are going in and out of the water constantly, and hunters sometimes need to shoot bears in self-defense:

"It was more of a safety take; [the bear] was coming towards us, heading towards the water. And when it's wet, the skin is like iron steel, almost bulletproof. I took it down before it got wet."

Wolverines, wolves, and brown bears are also known to be harder to kill after their fur becomes saturated with water.

Hunters study bear tracks and can distinguish how old the tracks are by their depth, detail, and the condition of the snow around them. A hunter can accurately predict how large the bear is from the size of the track. The largest tracks belong to older male bears.

Point Lay hunters mentioned that when a sick bear is harvested, it is tradition to sever the head from the spine and sink the entire bear carcass.



SEASONAL POLAR BEAR HABITAT USE MAP FOR POINT LAY

The map represents seasonal polar bear habitat use data from 1970 to 2012 identified by six hunters from Point Lay, Alaska. This map does not include all possible locations of polar bear habitat use. The areas identified by participating hunters include both primary and secondary observations. Polar Bear's primary habitat is ice; thus, the areas identified should be considered as dynamic rather than fixed locations.

KING ISLAND

RELOCATION

The experience of King Islanders and their interactions with polar bears differs from that of other communities included in this study. Polar bears were historically encountered on King Island; however, residents relocated to Nome in 1959, shortly after the island's school closed down. This village report documents the Traditional Ecological Knowledge of human-polar bear interactions during past occupation on King Island, as well as current knowledge of polar bears in the Nome area. The island has been uninhabited since the 1970s but is still used seasonally by some hunters.

Today, King Islanders live and hunt in the Nome area. King Island hunters consider the Nome area as the southern outskirts of polar bear seasonal migration routes. As a result, King Island residents are less likely to observe polar bear on a regular basis since relocation.

As one hunter explained, *"Hunting from King Island is totally different than hunting on the main land because of the ice conditions constantly moving all year around...Life on King Island was tough and hard and the best place to grow up on. We loved the island, but unfortunately we don't live there anymore. "*

Nonetheless, King Islanders' knowledge provides an important contribution to understanding the "baseline" presence of polar bears and the history of polar bear hunting in Bering Strait Region. Furthermore, their experience of loss illustrates how much is at stake in conserving bears and subsistence culture in other villages in the region.

The majority of King Island community hunters interviewed were Elders. All of which reported their approximately age of 12-20 years was the time of relocation, and remember growing up on King Island. The information that they shared recalls the lifestyle and conditions of living on King Island, as well as a glimpses of short subsistence trips made from Nome to the island in the more recent past.

VISITS BACK TO KING ISLAND

Traveling to King Island during any time of year is fully dependent on the conditions of the weather, currents, and ice formation. Most King Island community members travel by boat, which is often an eighty-five to ninety mile one way trip. One hunter stated, *"If we go from Nome we usually travel [up] the coast and head to the island at Cape Douglas or Point Spencer, there's a better current from those places. They [currents] are fairly strong and depending on the tide they go in different directions."*

Some members continue to make trips to their home island for subsistence purposes to this day[2], depending on weather conditions: *"The last time I went to King Island I got weathered in for two weeks...we were there for about thirty minutes one time and we left, the weather got bad."* Most trips to King Island last about two weeks, and are made during spring walrus hunting and egg collection season, in May and June. King Island hunters say that by this time it is usually too late to see polar bears around the island.

The ice is increasingly unpredictable, which makes it difficult to travel by snowmobile to King Island. King Island hunters have reported seeing an abundance of "rotten ice" around June. *"The ice forms later and rots sooner these days."* The early melt reduces the subsistence trips to King Island. It also forces hunters to travel earlier in the year: "*When I was growing up we were still walrus hunting in July now it's first part of June."* One hunter reported that his boat had made two trips out to King Island in 2011 and one trip in 2012, both of which were cut short due to weather and ice conditions.

Along with the weather and ice conditions, King Island hunters mentioned other factors affecting their chances to visit King Island; *"For about two or three years, there haven't been too many trips to the island. Everybody is too tied down with work and life on the mainland. There aren't many chances to get out there. You have to work to afford the boat and the gas, and you can't get the time to go out there if you work."*

POLAR BEAR CONDITION AND ABUNDANCE

ABUNDANCE

The consensus among King Island hunters is that, to the best of their knowledge, the polar bear population has remained the same around King Island and the Nome area compared to the past.

One hunter remembered that in the past on King Island, "[In] *January and February...as many as five to six polar bear were taken every year, maybe more, maybe less than ten.*" He went on to say, *"The migration path is not here in Nome so that's why we don't see them too much around Nome. The best people to ask are the people along the migration route, like Little Diomede, and St. Lawrence Island. If we were still living on the island we would probably have a better answer for you but we don't go there enough these days."*

[2] http://www.kingislandnative.com/about-us

DEAD BEARS

There was one sighting of a polar bear carcass reported, which occurred approximately twenty years ago in the springtime. The carcass was observed in the Bering Sea; the specific location and cause of death is unknown.

HABITAT USE

POLAR BEAR HABITAT

Of the seven King Island hunters interviewed, the general consensus is that the weather started to change in the 1970s. Ice conditions were better in the past because it was thicker and colder, and hunters were able to hunt on moving ice. One hunter mentioned past ice conditions, "*Way back the conditions of the ice [were] good and thick, not like today's ice.*" King Island hunters use springtime walrus hunting as an indicator for change. *"The ice would block us so we can't get out to go get walrus for [the past] two or three years. The ice pack was real close together."*

Since the relocation, King Island hunters have traveled north to Shishmaref along the coast in search of polar bears. One hunter said that the ice was best thirty to forty years ago; since then the ice has slowly gotten worse: *"Good weather [held] for a week or two at a time, now we are very lucky for an eight or twelve hour window to go hunting."*

Those who have traveled out to King Island in recent years have noticed other climate changes. One hunter mentioned there is more algae on rocks around the island and on the waterline compared to the past. *"Now there is lots [of algae], I finally figured it out why there is so much."*

LOCAL DISTRIBUTION

The King Island hunters have three subsistence hunting use areas. One location is out on King Island and its surrounding area. The second location is Cape Woolley, which is a location on the main land that is directly across the ocean from King Island. The third King Island subsistence use area is the Nome area. Areas around Nome include, Sledge Island and Swanberg Dredge. Sledge Island is located approximately twenty-two miles southwest of Nome. Swanberg Dredge is located approximately one mile east of Nome.

King Island hunters often travel to and from Cape Woolley along the coast for their subsistence hunting needs. One hunter from King Island shared a story about hunting for polar bears at Cape Woolley:

There were three other hunters *"and myself. It was the first time I saw polar bears. I didn't grow up on King Island; I was born here in Nome. [There was] one female and two cub that were just about to leave their mother. They were just walking towards us. All of us shot them, we told each other who was going to shoot what, and we all shot at the same time. We brought the polar bears back to Nome from Cape Woolley hole to butcher them. All the old people butchered the polar bears, because it had been a long time since somebody from King Island had killed a polar bear. They worked on them skinned them; there were a lot of people there."*

King Island hunters have reported seeing tracks in the springtime by Sledge Island, which is located approximately twenty-two miles southwest of Nome. One King Island hunter noted, *"Every once in a while they will go down the coast, and to Nome."*

Swanberg Dredge is in close proximity to Nome. One King Island hunter told us of a time when a single polar bear walked up the beach towards town. *"I saw a polar bear in front of Swanberg Dredge, a long time ago, summer time when the ice was going away."*

DENS

Of the seven King Island hunters interviewed, none had ever seen a den in the Nome or King Island areas.

SEASONAL MOVEMENT

In the past, *"Polar bears c[a]me around to the island around January and February, and that's when they would kill them. Ice is always moving around the island."* The ice floats north in the spring and south in the fall. Today however, in the areas around Nome, ice does not form until December. The ice is known to bring the game. With the shorter period of ice means shorter hunting seasons.

In March, bears would also be sighted near Sledge Island. When they lived on the island, hunters sometimes encountered swimming polar bears in the summer.

OTHER SPECIES

One King Island hunter shared some past knowledge of the conditions out on King Island. He mentioned, "*The walrus started using King Island as a haul out. When the hunters [on the island] found out, they started hunting them there, then after a while the walrus don't use it as a haul out."*

Overall, however, King Island hunters reported that the seal and walrus populations around Nome and King Island area have remained stable and in good condition. "*Some days there will be 10,000 walrus, [and] there will be 10,000 more in the water. They [wildlife managers] don't count the ones in the water. They say [walruses] are getting fewer, [but] they were in the water eating clams when they were counting.*" One Elder stated, "*No matter how many walrus we catch there's always going to be more.*" Another hunter had a similar comment about seals: "*Seal population never changes, there are always seals.*"

King Island hunters have seen a decrease in the amount of walrus carcasses around the Nome and King Island area. One hunter expressed his concern and mentioned, "*There used to be lots of walrus carcasses.*"

In reference to the Nome area, residents have seen the timing of the walrus migration change in recent years, from starting at the end of July to early June. "*The hunting conditions really suck today because of global warming it has a great effect on the hunting of marine mammals. When I was growing up we were still walrus hunting in July now it's first part of June.*"

Polar bear meat never made up the bulk of King Islanders diets. One hunter stated, "*On King Island the dependence on polar bear was maybe 2%, because we are really heavy seal eaters, and fish and crab. We would crab [and] fish close to the Shore of King Island. When food would get scarce they would chop a whole 10-12 feet thick to start fishing for crab with hand lines.*"

The butchering of *ugruk*, other seals, and other game is known to attract polar bears. "*We were going out for ugruk. We were butchering them and [my friend] saw polar bears and you could tell that they smelled them so we tried to hurry up.*"

HUNTING FOR POLAR BEARS

FIRST BEAR

Today, polar bear sightings are rare and King Island hunters are interested in harvesting polar bears if the opportunity presents. However, in the past, on King Island, young men started to hunt for polar bears by going out with their fathers in their early twenties. When they caught their first bear, the custom was to share it with Elders and the wider community. One hunter stated, "*The first polar bear a young man harvests is distributed throughout the village.*" Gifting the meat and hide was believed to be particularly crucial when a hunter got his first bear. "*After you get your first catch you have to give it away, otherwise you will get nothing else after.*"

Every polar bear harvest had a big celebration for one day with Eskimo dancing and gifts. The hindquarters and other sections of meat would be cooked thoroughly and given out. Because the meat of one bear was distributed to the entire village, approximately 200 people, each portion was small, and the meat was considered a special treat. In the past, hunters would hunt seals and bearded seals *(ugruks)* for the polar bear celebration in order to have more meat for the feast.

In the recent past, one hunter in his twenties got his first polar bear near Shishmaref and the community celebrated for one full day. Everyone brought food for the celebration and they cut up the hide into strips and give them away, in keeping with past tradition: *"There's a certain way to divide it between the people who gets there first. The first polar bear catch the Elders cut up the strips of polar bear hide and give it away."*

TIMING OF HARVEST

In the past, out on King Island, *"Polar bears [would] come around to the island around January and February, and that's when they would kill them...as many as five to six polar bear were taken every year."* Another hunter followed up with a similar comment, stating, *"On King Island, to my estimation the middle part of January to middle part of February is when we'd start seeing the polar bear."*

LOCAL RULES

In the past, on King Island, if a hunter brought home a polar bear, the ensuing celebration was postponed. The celebration was delayed for five days if the bear was female and for four days if the bear was male. While this was a traditional practice, it was also a practical necessity: *"They [hunters] have to wait a few days after they kill the polar bear for the celebration because they have to go hunting to get enough [meat] to give away, seals and ugruks."* Polar bear meat ran out fast for the King Island community so when one was caught, other game would also be harvested for the celebration so no household would be left out.

Other local rules were followed on King Island to ensure future successful subsistence harvest. For example, *"To make sure the polar bears come back, they would have the celebrations to let their spirits go, they would give the polar bear head water. They would wear new clothes to the celebration for the polar bear spirit. They would treat them good so they would come back."*

In terms of the kinds of polar bears harvested in the past, "*it was okay to get males, females, or cubs."*

HUNTING PRACTICES

When discussing hunting practices used by King Island hunters, it is important to consider the location of King Island and the Island's living conditions. *"Hunting from King Island is totally different than hunting on the main land because of the ice conditions constantly moving all year around."*

In the past, hunters had to learn a different set of skills to hunt and survive. Sleds, kayaks, dogs, and walking were the main modes of transportation to hunt on King Island. On foot, "*hunters used to walk on the ice following the current until they found walrus or seal or polar bear.*" When using dogs, *"the men would walk out from the village with the dogs and hunt.* "One hunter mentioned, *"My brother-in-law taught me how to walk on the moving ice, to look for seals. Ice is always moving around the island."* The wife of a well-known deceased polar bear hunter from King Island mentioned; *"When the men went hunting they would only take their dogs, and just walk. They wouldn't take a sled, just a kayak."*

It was rare to harvest polar bears in the summer, but once in a while this did happen. "*Sometimes they would get swimmers (polar bears hunted from the water using kayaks).*" One technique for attracting a bear was to 'fool' it by floating a hunting bag on the water so that the bear would think it was a seal.

Hunters remember that in the past, *"The way they found the polar bear, was look for the seal water hole, and find their tracks and follow them."* King Island hunters used dogs to help 'slow down' the polar bear. *"The hunters had to run to catch the polar bear, and the dog would help run them down."* The dogs also helped haul the meat back to the village. The hunting dogs *"didn't [even] have to be trained, they already knew how to hunt.*" The best polar bear hunters had the best dogs. One hunter quit hunting altogether because he lost his dogs.

This old way of hunting still holds appeal for some King Islanders: "*If I were to hunt polar bear I would do it the old fashioned way with a lance. You can run down a polar bear. You can run all day and tire the bear out."*

One hunter gave an account of extracting a bear from the water: *"We were going out for ugruk. My brother shot one with a 22 hornet, it turned around and we shot it and it turned around and slid into the water. We got [retrieved] it with a seal hook."*

The weather conditions affected how much meat hunters could bring home. One hunter recalled that some hunters returned with only the head of a polar bear because moving ice had taken the rest of the meat *"in the pressure ridges."*

HUNTING PRACTICES AROUND NOME

The distance between the hunter and polar bear determines where the kill shot should be; *"If you are closer you can aim for the neck."*

The majority of Kind Island Elder hunters do not hunt anymore because of health and age. *"The last time I went hunting was 1988, because my shooting eye couldn't see anymore. I tried to use my other eye, but I couldn't hit anything so I got rid of all my guns, and never went hunting again."*

Another hunter recalled a past harvest: *"We brought the polar bears back to Nome from Cape Woolley hole to butcher them. There was a celebration about a week after at the old King Island Hall. All the old people butchered the polar bears, because it had been a long time since somebody from King Island had killed a polar bear."*

HARVEST EFFORT

The practice of hunting polar bears is now less popular with the younger generations due to the village's relocation to Nome. Even in the past, when residents still lived on King Island, they relied more on seal, fish, and crab for their meat source and *"maybe 2% polar bears."*

One Elder remembered, "*There were probably six guys that would always get polar bears, [they were] good polar bear hunters."* Another hunter mentioned, *"My father doesn't write, but he drew how many he caught and I counted twenty-three on his papers."* Another hunter shared a fond memory of a well-known polar bear hunter, *"he came home with a female and two cubs all by himself, and he found out his son was born that day. He got approximately one every year for twenty years."* For one hunter, on the other hand, one lifetime harvest of a polar bear sufficed:

"*That was my first and last one. If I see one again, I won't shoot it. When I was real small I went hunting with my dad to Wales. The last time I went on a skin boat, big umiak, was about 1980. The first and last time I ate polar bear was when I killed one."*

OPPORTUNISTIC VS. ACTIVE HUNTING

Both in the past on King Island and today on the Seward Peninsula, hunters from the King Island community usually hunt opportunistically, rather than actively pursuing polar bears. "*If a polar bear presents itself to me I will get it, but I'm not too enthused to go after them."* When hunters did pursue bears in the past, they would track them by seal

holes. *"The way they found the polar bear was [to] look for the seal water hole, and find their tracks and follow them."*

Hunters needed to be flexible in their subsistence strategy: *"Just like moose hunting, you bring back ptarmigan because they were no moose."* In other words, if hunters go out looking for a moose (or polar bear) and "expect" to get one, then they will end up with a ptarmigan (or seal). Thus, one should be open to luck appreciate whatever game is caught.

FACTORS AFFECTING HARVEST LEVELS

Besides the obvious impact of relocation to Nome on harvest levels, bear hunting has become difficult and uncertain *"because the game is different than the way it was in the past."* Climate change has made ice conditions unpredictable. When the ice is packed together, it is too dangerous and cannot support snowmachines. In this situation, it is best to walk, but not many are eager to do so. *"Way back the conditions of the ice [used to] be good and thick, not like today's ice."*

LIFETIME HARVEST

Of the seven hunters interviewed, three reported their lifetime harvests. Two hunters had harvested one bear each. A widow, whose husband was a well-known polar bear hunter out on King Island, estimated that her late husband had hunted about twenty-three polar bears in his lifetime. The third hunter reported getting four bears, three of which—a mother and two cubs—were caught at once in 1953.

POLAR BEAR TRADTIONS

HOW BEAR IS USED

Some King Islanders, mostly of the older generation, love to eat polar bear meat: "*It has a taste all its own, it's good.*" In the past, when a polar bear was harvested, the meat and blubber were a treat to the entire community. One Elder stated that he had never seen a live polar bear, but he had eaten the meat of polar bears that other hunters had caught. "*When I was growing up we ate polar bear.*"

Other Elders recalled how polar bears were prepared for eating. It was the women's job to take the blubber off the hide, with a sharp *ulu*. However, the blubber was kept in the men's house, where it would be cooked: *They would render the blubber then cook it. They say that polar bear blubber is better than seal or ugruk."* Sometimes, the blubber would be fermented:

"They would ferment the [polar bear] blubber, and when it gets rich we would boil it and eat it. It's the best fat you can get [out on King Island] they would hardly dry the meat of a polar bear, because not too many polar bear are brought home they would share the meat with everybody, and everything went so quick there was no meat to dry."

As for the meat, *"They would hardly dry the meat of a polar bear, because not too many polar bear are brought home they would share the meat with everybody, and everything went so quick there was not meat to dry."*

The polar bear hide was cleaned and tanned: "*After the women took the blubber off the polar bear hide, the men would soak the fur in the salt water, then after five days, the kids would try to dry out the fur by sliding with them."* The hide was used to make parka ruffs, or used by hunters while they waited for seals to come up out of the ice hole.

The entire process from hunting to butchering and distributing a polar bear is a strenuous process which may require many people to help out:

After they take all the blubber off they take the hide to the ice and cut a big hole in the ice, and put a long stick and let the hide sink in the water, so the sea lice (qumaġayua) can eat the rest of the blubber. They check on the hide every day to see if it's ready. They do the same thing for seal hides, if they're going to make pants out of them. After the blubber is taken off they hang them so that they can get freeze-dried.

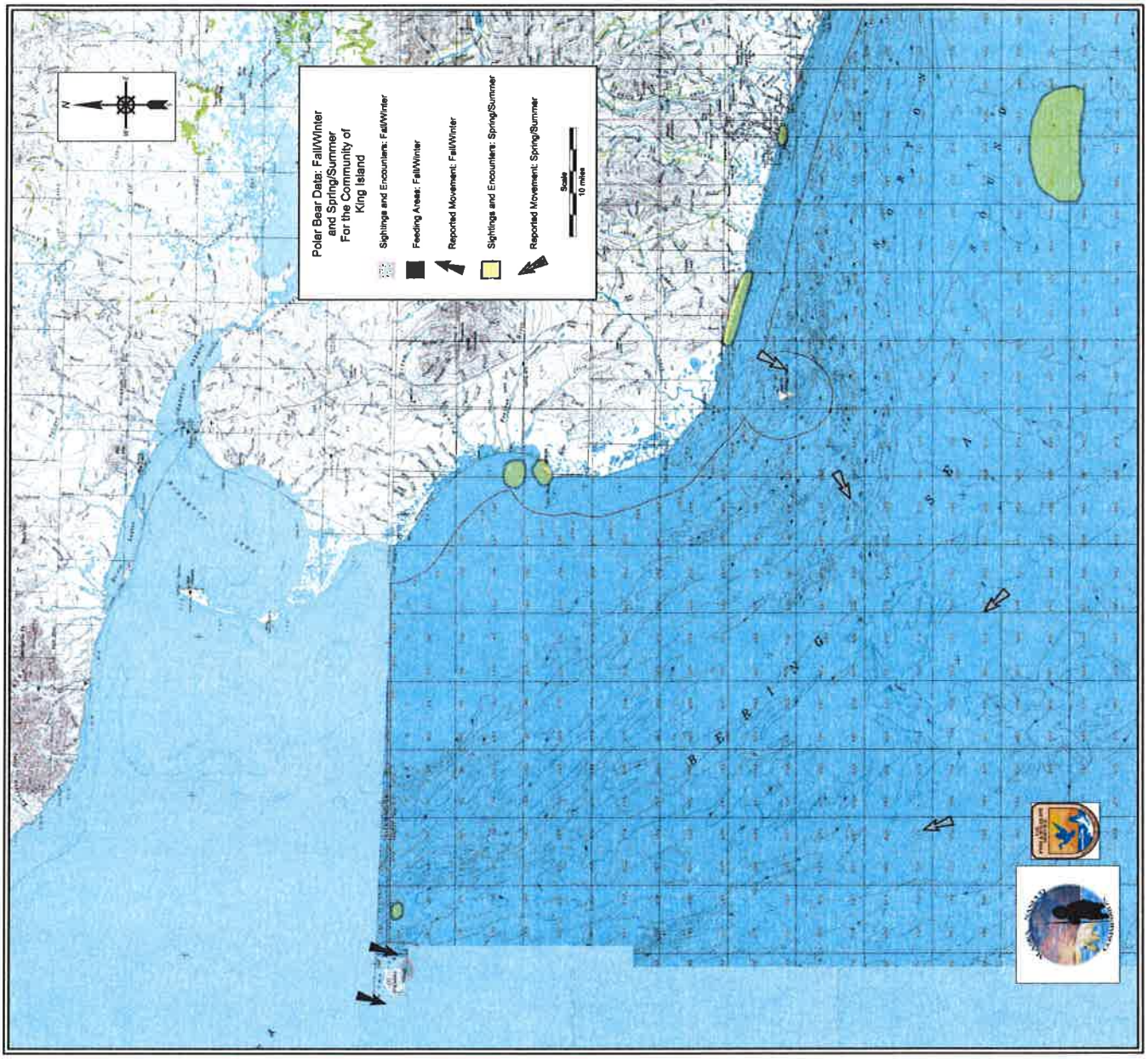
TRADITIONAL KNOWLEDGE AND BELIEFS ABOUT POLAR BEARS

When a polar bear was harvested the whole King Island community would gather food and gifts to share, and they would dance and sing. New polar bear songs were composed each time one was killed; every polar bear harvest was celebrated. *"The hunter who got the polar bear and close relatives danced the most. There's lots of cooked food, every kind of Eskimo food, the best of what the family has."*

One recollection illustrated traditional respect towards the bear's spirit: *"To make sure the polar bears come back, they would have the celebrations to let their spirits go, they would give the polar bear head water. They would wear new clothes to the celebration for the polar bear spirit. They would treat them good so they would come back."* The ceremonies were held in men's houses, or "club houses": *"There were three different club houses on the island. In the middle of the village there was the biggest one the one."*

There's a story told of a brave hunter who killed a polar bear with a knife. He stabbed it on the neck, and when the bear turned he stabbed him on the other side of its neck.

Lastly, one King Island hunter shared a legend: *"There was once a bear that was so huge it couldn't even hold its own weight."*



SEASONAL POLAR BEAR HABITAT USE MAP FOR KING ISLAND

The map represents seasonal polar bear habitat use data from 1953 to 2012 identified by seven King Island Community members. This map does not include all possible locations of polar bear habitat use. The areas identified by King Island Community members include both primary and secondary observations. Polar Bear's primary habitat is ice; the areas identified should be considered as dynamic rather than fixed locations.

COMPARISON OF RESULTS WITH KALXDORFF (1997)

GAMBELL AND SAVOONGA:

Polar bears arrive on Saint Lawrence Island in the late fall around the same time now compared to the past: beginning in November. As in the past, bears are said to come with the north wind. However, whereas Kalxdorff found that the arrival of bears was associated with pack ice from the north, now this is far less often the case, as true pack ice from the north has become rare. In both reports, bears were found to "occasionally" summer on the island; this appears to be a long-running phenomenon, and there was no direct testimony suggesting that the incidence of bears becoming stranded has increased over the years, although it is clear that the there is a great deal of variability in the number of bears that remain on the island over the summer from year to year.

In both reports, bears were found to have diverse and opportunistic diets on Saint Lawrence Island, and to actively hunt walruses around Saint Lawrence Island, a feeding behavior that is less often reported by hunters from other villages.

Dens are not common on Saint Lawrence Island. Although more dens were referenced in our report, it was not always clear whether these dens were for reproductive or shelter purposes. Therefore, it cannot be determined whether or not denning has increased on the island, although this appears to be a possibility. One particular area, the Kookooligit Mountains, has consistently been reported as a denning area over the years.

WALES AND SHISHMAREF

The arrival of bears in Shishmaref and Wales in late fall and early winter appears to be delayed by several weeks compared to the timing noted in Kalxdorff's report. Whereas bears were seen in Wales in November, now they are usually seen in December. In Shishmaref, bears also used to arrive in November, while today people do not expect to see them until the last two weeks of December. Although the bears still come in with the north wind, they are not associated pack ice to the same degree; now, they are said to frequently parallel the shoreline on their seasonal migrations. It appears that bears are moving back north again slightly earlier compared to the past. Some bears still migrate overland when heading north.

Polar bear feeding habits do not appear to have changed substantially around Shishmaref since the time of Kalxdorff's report. It appears that scavenging may be slightly less common, and perhaps limited to a shorter period of time around Wales compared to the past. Dens in this area were rare during the time leading up to the 1997 report, and continue to be rare today, although hunters from Shishmaref very occasionally encounter shelter dens.

POINT HOPE AND POINT LAY

Whereas Kalxdorff found that bears used to arrive in Point Hope beginning in November, our report shows that they now appear to be arriving slightly later, beginning in December. In Point Lay, there is still a time period between this arrival and the early spring when bears are rarely seen, whereas bears are still seen on the coast around Point Hope during much of the winter. The major modes of feeding are scavenging in the late fall and early winter, and seal hunting in the spring; this pattern does not appear to have changed significantly since 1997.

Kalxdorff reported a number of denning sites around Point Lay; denning sites continue to be abundant here relative to the other villages included in this study. Cape Beaufort, for example, was named as a common denning area in both reports. Another common denning area noted in both reports is located north of Point Lay approximately three miles north of Akunik Pass.

Common Themes

ADAPTING

Over their lifetime, hunters have observed a shift in the ice environment around their respected village. This shift has had an impact on the seasonal movements of bears in and out of the region. Many hunters believe that bears are not under any immediate threat due to habitat loss. They feel that biologists may have underestimated polar bears' ability to adapt to changing conditions.

Hunters have observed that polar bears have a flexible diet:

"Bears don't only eat seal, they also eat birds, caribou, and reindeer; they are adapting to changing situations. They eat fish and spotted seals, even though biologists don't believe that."

"They're real smart animals. They belong out there. [The ocean] doesn't have to be frozen. Like I tell you, they feed on greens. I don't think they're going to drown or die out."

Hunters have great faith in polar bears' ability to travel great distances to reach the resources they need:

"They know what to do; they can swim a long way."

"Our wind direction goes pretty much everywhere, the bears come from miles and miles away. They can swim for hundreds of miles, they're nomads."

"One time we ran into a bear that was maybe fifty miles out north from here swimming north. [It was] chasing the ice, it looked strong and healthy, really peddling away." [May, 4 years ago].

Bears are a symbol of arctic survival for hunters. As one hunter said, *"their life is one big survival."* They embody the essence of opportunism, flexibility, cleverness, and toughness that are required to survive in the Chukchi and Bering Sea region. *"Polar bears aren't going to go extinct, they'll adapt eventually."* Hunters are skeptical that bears should be listed as threatened under the Endangered Species Act at this point.

Not everyone interviewed feels this way; in light of ice loss and bears being stranded inland during the summer, they express concern about the future of polar bears. Hunters also say that when bears spend too much time in the water because of ice loss, they lose their hair from swimming for a long time. Ultimately, some say, *"Cold climate bears are cold climate bears, they have to change or start breeding with brown bears."*

SIMILARITIES BETWEEN BEARS AND PEOPLE

In comparison to other animals, polar bears are "like people" in many ways. In a basic physical sense, they stand up like humans. Hunters say that bears act like humans in the way they die, and some people avoid eating bears because their carcasses look almost human-like.

Polar bears, like Inupiaq and Siberian Yupik people, are true hunters. Polar bears use their bodies in creative ways as humans would use tools for hunting, for example, by breaking the ice with their paws.

"In the old days that's how our ancestors used to hunt seals too. They'd find a feather and put it in the hole, so they can see when the animal is breathing. Now they hunt them in the open water with a seal hook. When they started using rifles, they started using seal hooks."

"I always thought that they have their own power- they live on the ice and they're hunters like we are. I've always had a lot of respect- they live in our country during the winter like we do, and they live off seals and ugruks like we do. "

Polar bears are often described as "magnificent," and "sacred." They inhabit a realm that is different from other animals—one that is physical and symbolic.

LUCK

"Luck" is a powerful element of success in polar bear hunting. Hunters are careful to avoid attributing their success or failure on any expedition to their own skills or desires. When a hunter decides that he would like to hunt a bear, he maintains an attitude of humble opportunism, rather than actively pursuing bears or other subsistence game. Arrogance and expectation are sure to deter bears from "giving themselves" to the hunter.

Harvesting a bear is a matter of luck that often comes when hunters least expect it, while checking traps, hunting for another species, or just "looking around." Likewise, when a hunter sees others catching bears but is unable to do so himself, he attributes it to being unlucky.

"Seems like every time I see a polar bear, they're out of reach where I can't get them, then two days later I hear of someone shooting one. Everyone else was catching one, lots of polar bear harvest, and I wanted to be a part of it, and I was unlucky."

"I tried for years to get a bear. I could have gotten some before but they were in dangerous situations. Like on fresh ice. I lucked out with just two."

OBSERVING BEARS

Before hunting their first bear, experienced hunters recall observing bears. From this experience, they developed great respect for polar bears. When they are not hunting, some continue to enjoy watching bears:

"Often times I love to just watch them in the environment; it wasn't always about hunting."

"He [the speaker's father] liked the way [polar bears] do things; he watched them out in the environment. One time in the morning he went out with dogs and spotted a couple polar bears sliding down an iceberg, throwing pieces of ice. They were middle aged bears, just playing."

Sometimes bears can be heard "calling" before they are seen. Hunters exercise caution when observing bears. They avoid approaching them while they are eating, as this is likely to result in a confrontation and forced harvest. One experienced hunter advised, "*You got to be alert, wary and cautious. And never walk up to a bear with an unloaded gun, even if it's down.*"

Among arctic animals, bears are almost unique in the amount of respect afforded to them by hunters. Part of this respect for bears comes from the elusiveness and mystery that still surround them, for hunters as well as biologists: *"There are a lot of things nobody knows*

about those bears." Elders try to pass this respect on to younger hunters: *"Everyone seemed to respect bears. Like Orcas. Some people still respect bears; my generation still does, and maybe the younger generation."*

PROCESSING

Hunters learn how to process bears by observing Elders. Whereas approaches to hunting bears have changed with technology, butchering techniques have largely stayed the same. One hunter in Point Hope summarized his early experience of processing a bear:

"My dad taught me, and my grandfather. After we brought it home, my mother had one of her friends over and they scraped the blubber off the skin, then they go hang it up, clean it too. You dig a hole in the ice, wash the skin in seawater, and then drag it out on some soft snow, use your feet to clean all the mud off. That's similar to what they do now- it never changes."

Ideally, first bear harvest may be within close proximity to the village, or be transported to the village for butchering so that Elders can give the young hunter advice as he processes the bear. This also protects the hunter from other bears that may be attracted by the carcass.

"I watch someone else cut something up to see how they do it. On a couple of occasions I watched someone bring home a whole polar bear. Sometimes they feel safer butchering in the community rather than out on the ice."

If a bear is harvested far away from the village or is too heavy to bring back—as it often is—the hunter will do basic butchering on-site. Although bear hunting itself is usually a solitary activity, sometimes a relative will come to check on and assist the hunter while he processes the polar bear carcass.

A community's shared knowledge of how to properly "take care" of polar bear meat and hides is a matter of pride. In Wales, for instance, one hunter told us, *"They still know how to flesh polar bears here."* There is a correct and incorrect way to butcher polar bears, and it is important to Elders that young hunters learn the proper way:

"I think there are few [hunters] that can [butcher] the correct way. Usually we would start in the middle of the paw, and then hit the elbow across the chest. That's how my dad taught me- to cut it where the hair comes to a point."

Polar bear skin is extremely tough and oily, and requires adequate tools. The butchering process can last many hours, depending on the size of the bear and toughness of the skin,

which increases with the bear's age. Young, smaller bear hides are the easiest to work on. Because of the amount of handiwork required to flesh a bear, hunters prefer to get them on warmer days during fall and early winter, rather than the coldest days of mid-winter and early spring, when hunters' hands are prone to exposure.

After checking the liver and meat for signs of "spots" or other abnormalities, hunters bring back the meat, the hide, and the skull. In the past, some village placed the polar bear skull facing north on a high ridge or mountain. Now polar bear skulls are brought to a local tagger of the U.S. Fish and Wildlife Service for tagging under their Marking, Tagging, and Reporting Program which is required by the Marine Mammal Protection Act of 1972.

Men butcher the polar bear once it has been harvested and remove the claws; women have traditionally been in charge of the later stages of processing a polar bear hide. Virtually every hunter we interviewed emphasized the great amount of work that goes into processing a polar bear. Men may avoid hunting a bear if they have no female relatives willing to help them take care of it; on the other hand, one man described taking several bears because his wife was very talented at taking care of and using bear hides. Several female relatives of the hunter may be involved in taking care of a single hide. The majority of hunters we interviewed were male; only one interview in this study was with a female. Future research should consult more women, as they deal with bears directly and see their physical condition first-hand.

Some men suggested that fewer women are able or willing to process polar bear hides now compared to the past; as a result, some of the processing work is now shifting back towards men. Whether or not this is a common trend is unknown. The reasons behind it would be an interesting subject for future research, especially considering the continued cultural importance of a hunter's first bear in marking manhood. *"We were running out of people to work on the hides, I don't know why they say it's too much work."*

CLEANING

Methods of cleaning the hide reflect local traditions specific to each village. In general, women first scrape all the blubber off the skin, and wash it several times to get the blood out of the fur. Snow and ice are used to clean the hide. One method was simply to rub snow directly on to the hide. In another, "*After the women took the blubber off the polar bear hide the men would soak the fur in the salt water, then after five days, the kids would try to dry out the fur by sliding with them."* Today, bear hides are cleaned by dragging them behind snow machines.

In Wales, hunters leave hides to soak in openings in the ocean ice. A hole is made in the ice, and then the hides are secured by ropes tied to the paws and submerged for three days to two weeks. The hide is cleaned by the combined action of the seawater and *gingooks*.

"You put weight on [the hides] so that they go in the ocean, for three days. You check it every day. People would lose their hides 'cause they never tie it right. Little animals clean it off."

"After they take all the blubber off they take the hide to the ice and cut a big hole in the ice, and put a long stick and let the hide sink in the water, so the sea lice (qumaġayua) can eat the rest of the blubber. They check on the hide every day to see if it's ready. They do the same thing for seal hides, if they're going to make pants out of them. After the blubber is taken off they hang them so that they can get freeze-dried."

Occasionally, the hide drifts away or gets stuck under the ice. To avoid this risk and prevent the hide from getting brittle in seawater, today the hide is sometimes left to soak in freshwater in a bathtub instead.

In Point Hope the hide is initially hung up and subjected to the elements, and then soaked and cleaned, as in Wales. After soaking, the bearskin is rubbed in soft snow to soak up the salt water and then dragged behind a snowmachine as in other villages. This practice of dragging the skin on the ground even after it is clean softens the hide, and was more common before commercial tanning became available.

Because of the need for snow to process the hide, it is considered preferable to harvest a bear in fall and wintertime, when there is significant snow on the ground. Ocean currents are also relatively calm during this time of year, which prevents soaking hides from being dragged out to sea.

STRETCHING

After cleaning, the hide is hung up, fur side out, to dry, freeze, and stretch under its own weight. Today, when stretcher frames are not available, the hide is secured by a rope through the nose and hung from a pole or "*atiuk*," a boat rack. The stretching process can last several months.

SEWING

If hides are not to be left intact, sewing is the next and final stage of processing. The intended use of the fur dictates how the hide is cleaned at earlier stages. For example, "*If*

you want to make mukluks or boots you clean the skin out real good." The oilier the fur remains, the more waterproof it will be when it is finished:

"This year I'm going to have someone make me hip boots from polar bear fur. Oil saturates into the hair, stays in there, and makes it waterproof. When the women clean them we tell them not to go to the tannery, because it will take the waterproof away, will make the skin thin and it won't last that long."

Many older hunters perceive a loss in women's knowledge of how to work and sew hides from polar bears and other subsistence animals. One hunter from Wales said, *"There are no more seamstresses. Women used to split the [walrus] skin, but now there's no one working on walrus anymore. It's a long process. That caused the switch to aluminum boats [boats used to be made from walrus hide]."*

SLED DOGS

In Point Hope, Point Lay, and Shishmaref, Elders remember a time when dogs, rather than snowmobiles and boats, were used for polar bear hunts. The best polar bear hunters had the best dogs. One hunter quit hunting altogether because he lost his dogs. *"When the men went hunting they would only take their dogs, and just walk."* Different teams of dogs had different "specialties":

"Dogs were trained specially for hunting bears, and others for herding reindeer, others were ordinary work dogs. Big husky dogs were trained to pull heavy loads, with whaling. Then if you were an Iditarod musher, you got to travel faster, long distances, and you got to have a trim type of dog. There are other dogs that could smell the game, hear the game. When I was herding reindeer, we found out that collies were the best adapted for herding reindeer. When you have your dog team, you have to lean on experience to know how to breed and maintain them for the purposes of getting food and hunting, trapping, and fishing."

One 55-year old hunter recalled that his grandparents raised about sixty dogs for hunting, although he recalls that the average for most families was closer to thirty dogs. It was necessary to maintain this large number of dogs in order to handle harvest loads. For very large polar bears, two teams might be needed to pull in the hide alone.

Dog's diets depended on what was available in a particular region and time of the year, but generally, hunters avoided feeding polar bear meat to dogs, because it was "too rich" for them. Traditionally, dog teams were fed walrus meat which had been sewed up, stored underground, and fermented in its own hide. This was an abundant and long-lasting source of energy for dogs. When dog teams ceased to be widespread in the 1960s

and 1970s, communities found new avenues for utilizing resources from the traditional spring walrus harvest.

Older hunters remember the era of dogsledding fondly. As dogsledders, hunters felt a greater sense of self-reliance and control over their fate on hunting expeditions:

"Dogs are the only way to do it. Too bad we lost our dogs nowadays; they were more dependable...Whenever hunters go out hunting with their machines everyone worries. I wonder if that machine is breaking down, if they are coming. Back then they didn't worry because those dogs were coming home, even if it was bad weather. "

The replacement of dog teams by snowmobiles was not a simple matter of interchangeable technology. When snow machines became a common mode of transportation, it changed the hunters' strategies for hunting, as well as the nature of their encounter with the bear during hunting:

"In the old days they'd have dog teams, so they'd shoot the bear or run after it. Nowadays, you have fast machines, and you can catch up to a bear quickly."

Certainly, there was a more extended and dramatic element of "the chase" in bear hunts using dog teams: *"I got a bear about five miles from Shishmaref, on the mainland across the lagoon. I used my dog team to go catch the bear. I watched the polar bear grab one dog by the tail and swing him around by the tail!"*

Importantly for understanding current patterns of "opportunistic" vs. "active" bear hunting, one 86-year old Elder from Shishmaref recalled that in the old days, people would go out specifically for bears, using their specially trained dog teams, whereas now hunters on snowmobiles generally hunt bears through a more opportunistic, generalist approach. These different approaches to hunting are shaped in part by the characteristics of the different forms of transportation. The slower speed of dog teams meant that expeditions for bears before the 1960s often involved lengthy travel and stays out on the ice, rather than short trips back and forth from the village.

THE LEGACY OF COMMERCIAL HUNTING

In Point Hope, Shishmaref, and Wales, Elders remember the 1960s as a time of sport hunting for polar bears. In Point Hope, outsiders such as Don Johnson, Lee Holden, and Bill Summerville flew in and hired local guides to help them hunt bears for the fur market. In Shishmaref, the era of sport hunting was one in which people saw relatively few bears, which is attributed to their removal by commercial hunters. The end of sports hunting saw an increase in the number of bears around the village.

While some polar bear hunters in the villages were hired as guides, others gave up hunting for several years during the commercial hunting era. Sport hunting is remembered as a disruptive event, for Inupiaq polar bear hunting traditions as well as for polar bears:

"I think maybe the big thing is that they used to hunt them commercially. The cubs hadn't learned everything yet when their mothers were taken, and their scavenging changed, so that's why they're coming around now, and why they're learning to find stuff on the beach. Which is not good for them."

Conclusion

The findings from every village except Point Hope[3], demonstrate that the local abundance of bears on the eastern shores of the Chukchi and Bering Seas have declined *overall* in the last twenty to thirty years. While this decline has not been dramatic, it has been persistent, and has been discernible through occasional sharp variations in the number of bears in certain areas from year to year, such as 2012.

The earliest information that hunters shared about bear abundance in the region indicates that bear numbers were quite low through the 1960s, which is attributed to the impact of sports hunting. After this time, there was a brief period of increased bear abundance until the 1980s, when numbers started to decline once again. This long-term perspective on bear abundance is important, because it suggests that periods of bear decline and repopulation in the area have occurred before; current changes must be understood within this long-term context. Hunters often qualify their accounts of current bear abundance by suggesting that there is a cyclic nature—described as lasting several years to a decade—to the absence and return of bears in their part of the Bering and Chukchi Seas. The local abundance and distribution of polar bears may or may not be directly linked to the overall population abundance.

In this project, we made efforts to distinguish between general abundance of bears in the region and the number of bears coming directly into villages. This is an important distinction because biologists hypothesize that the loss of arctic ice, and its contingent food chains, will push scavenging bears out of their usual habitat and into sites of human habitation. Hunters' testimony both supports and complicates this hypothesis: they suggest that, because of a competition over scarce territory and resources between polar bears, the aggression of larger male bears is driving younger, weaker bears towards sites of human habitation.

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[3] In Point Hope, bear numbers have remained constant over time, but have increased in the last few years.

The increased draw of village food and food waste attractants for polar bears has already become apparent in some villages within the North Slope Borough. (For more information on human-bear encounters in Chukchi and Bering Sea villages, please see the Alaska Nanuuq Commissions 2011 "Deterrence Report"). For some villages on the Bering and Chukchi Seas, noticeably Point Hope, Point Lay, and Wales, the number of bears—particularly young male bears—venturing into the village has increased in recent years; this trend continued and was especially noticeable in the last year accounted for in this study, 2012. The number of bears coming into Gambell and Savoonga from year to year varies so greatly that it is difficult for hunters in these villages to identify a clear trend. This variation is due at least in part to unpredictable ice conditions that leave bears "stranded" on Saint Lawrence Island in some years, but not in others.

Although some of these bears are in poor physical condition, hunters report that many are in good condition, and appear to be more "curious" than hungry. Hunters have offered an additional hypothesis to explain the presence of bears in villages: that young bears, both hungry and curious, come into town because their mothers have been killed, creating a generation of "orphan bears" who have never been taught how to live and hunt on the ice. This rupture in polar bear generational connections is traced as far back as the 1960s, when sport hunting was common.

However, on the subject of human-bear encounters in villages, hunters again encourage us to take a long-term perspective. Bears have been coming into villages "even before white people," when the old village site of Point Hope was occupied, and sled dogs were ubiquitous enough to act as "warning bells" when bears were near.

Despite local and annual variations in polar bear abundance, the condition of bears is consistent throughout the region. From Point Hope to Gambell, hunters testified that bears have been in good condition in all of their living memory, and continue to be in good condition today. They are "fat and healthy," and able to grow very large. Although "king bears" are not common, hunters believe that they are still out there; resources remain adequate to support even these bears, the largest of all.

Hunters understand and experience the serious impact of arctic warming every day. They agree that these changing conditions cannot help but affect bears in some way. However, in Inupiaq and Siberian Yupik culture, it is important for hunters to avoid speculating about the future. The future is unknown, and because of this, it is believed that one should be humble and open-minded, rather than expecting any one particular outcome over another. Following these cultural norms, hunters caution that that impact of ice loss is not yet fully clear, and that the ability of polar bears to adapt to changing conditions may surprise biologists.

For example, where polar bear biologists have argued that bears that become trapped on land over the summer are likely to be in poor condition because terrestrial foods can never provide enough calories to keep up with polar bears' metabolism, hunters

report that stranded bears are usually in surprisingly good condition well into the summer, and are seen foraging for greens, eggs, and other land foods.

The great respect that people hold for polar bears grows in part out of the species' ability to find clever ways of adapting and surviving amidst very difficult conditions. Their propensity for finding clever survival solutions, among other traits, leads people to say that bears are more "like people" than other animals. It is this respect for polar bears that leaves hunters with a degree of optimism about the polar bears' future.

Yet in 2012, hunters expressed concern about the health of ice seals, as well as how disease carried by ice seals might affect the bears that eat them. Ultimately, concerns about climate change come down to concerns about the health of animals, and whether it will be safe for village residents to continue subsisting on their traditional marine mammal resources. Issues of food security, self-reliance, and health come to the fore.

Hunters share wildlife managers' concerns with the future of bears. They very much hope that bears will continue to be around for their grandchildren to observe and utilize, but also have concerns. "*Who knows, when they grow up to be hunters they might not have that opportunity.*" When asked, "What can we do to conserve polar bears?" Hunters from Gambell and Wales suggested that hunting should be temporarily limited only to males in order to let the population recover. At the same time, they suggest that "problem bears" that come into villages should continue to be the focus of local management efforts.

What the summation of local observations included in this report shows is that, for people living in the Arctic, the effect of climate change on polar bears is simply one of the most visible elements of much wider, systematic changes in the local ecosystem and way of life.

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