



Yukon North Slope
Wildlife Conservation and Management
Plan
2021

Companion Report 8:
Polar Bear/Nanuq



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The principal writers of the Companion Report are Kim Heinemeyer and Joan Eamer. Kim is a conservation biologist with Round River Conservation Studies. She was ably supported by Julia O’Keefe, Maggie Triska, and Will Tyson. Joan is a former Council member, science writer, and environmental consultant. They were assisted with strong support from Mike Sutor - Environment Yukon biologist, Dave Tavares – Parks Canada science advisor, Craig Machtans – Environment and Climate Change Canada manager, and Tyler Kuhn – Environment Yukon biologist. Allison Thompson and Kaitlin Wilson – Council biologists, and Lindsay Staples – past chair – participated in all stages of report design, drafting and editing. Kirsten Madsen provided invaluable editing support.

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Companion Report to the Yukon North Slope Wildlife Conservation and Management Plan Number 8: Polar Bear / Nanuq

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About the Companion Report

This report is a companion document to the *Yukon North Slope Wildlife Conservation and Management Plan* (WMAC (NS), 2022). The *Yukon North Slope Wildlife Conservation and Management Plan* (the Plan) is grounded in traditional knowledge and Western science. It addresses traditional use and wildlife conservation and management issues affecting the Yukon North Slope. Strategies in the Plan align with actions underway or planned by a range of agencies and organizations with jurisdiction on the Yukon North Slope.

This companion report summarizes the information that was used to support the objectives and strategies in the Plan, and provides references for the studies used in its development. The companion report draws from authoritative works, reports that synthesize knowledge and issues, and presentations of recent research findings. Sources include traditional knowledge and traditional use, scientific reports and journal articles, and management and conservation reports.

Companion Report Table of Contents

Selected Topics

1. Traditional Use
2. Climate Change Effects
3. Contaminants
4. Aullaviat/Aunguniarvik

Featured Species and Species Groups

- | | |
|-----------------|---------------------|
| 5. Caribou | 10. Broad Whitefish |
| 6. Moose | 11. Geese |
| 7. Grizzly Bear | 12. Furbearers |
| 8. Polar Bear | 13. Dall's Sheep |
| 9. Dolly Varden | 14. Muskox |

Each chapter is available for download at <https://wmacns.ca/what-we-do/conservation-plan/companion>.

There are fourteen companion reports, addressing four selected topics of key interest as well as ten wildlife species featured in the Plan. The featured species were selected by participants at a workshop held in Aklavik. The wildlife species in the companion reports:

- Have high cultural or economic value or are important as food for Inuvialuit;
- Have similar habitat needs to other wildlife species, so that conserving their habitat is key to conserving habitat for other species; and/or
- Are important for healthy ecosystems, including species that are main food items for top predators.

The Plan identifies key conservation requirements on the Yukon North Slope for each featured wildlife species. The Plan's objectives and strategies are designed to meet these conservation requirements. This companion report summarizes the information that guides the objectives, strategies and conservation requirements in the *Yukon North Slope Wildlife Conservation and Management Plan*.

Companion Report: Polar Bear / Nanuq

This companion report provides information on the conservation requirements for polar bear as identified in the *Yukon North Slope Wildlife Conservation and Management Plan*. It summarizes the information that guides the objectives, strategies and conservation requirements in the Plan. It includes information on traditional use, population status and trends, important habitat types and locations, threats to polar bears, programs and measures for conservation and management, and selected studies and research relevant to the Yukon North Slope.

Conservation requirements for polar bear on the Yukon North Slope

1. Protection of denning areas, and summer refugia if or when they are identified.
2. Conservation of nearshore habitats critical to polar bears.
3. Cooperative, adaptive management of the Southern Beaufort Sea polar bear subpopulation across jurisdictions.

From the *Yukon North Slope Wildlife Conservation and Management Plan* (WMA (NS), 2022)

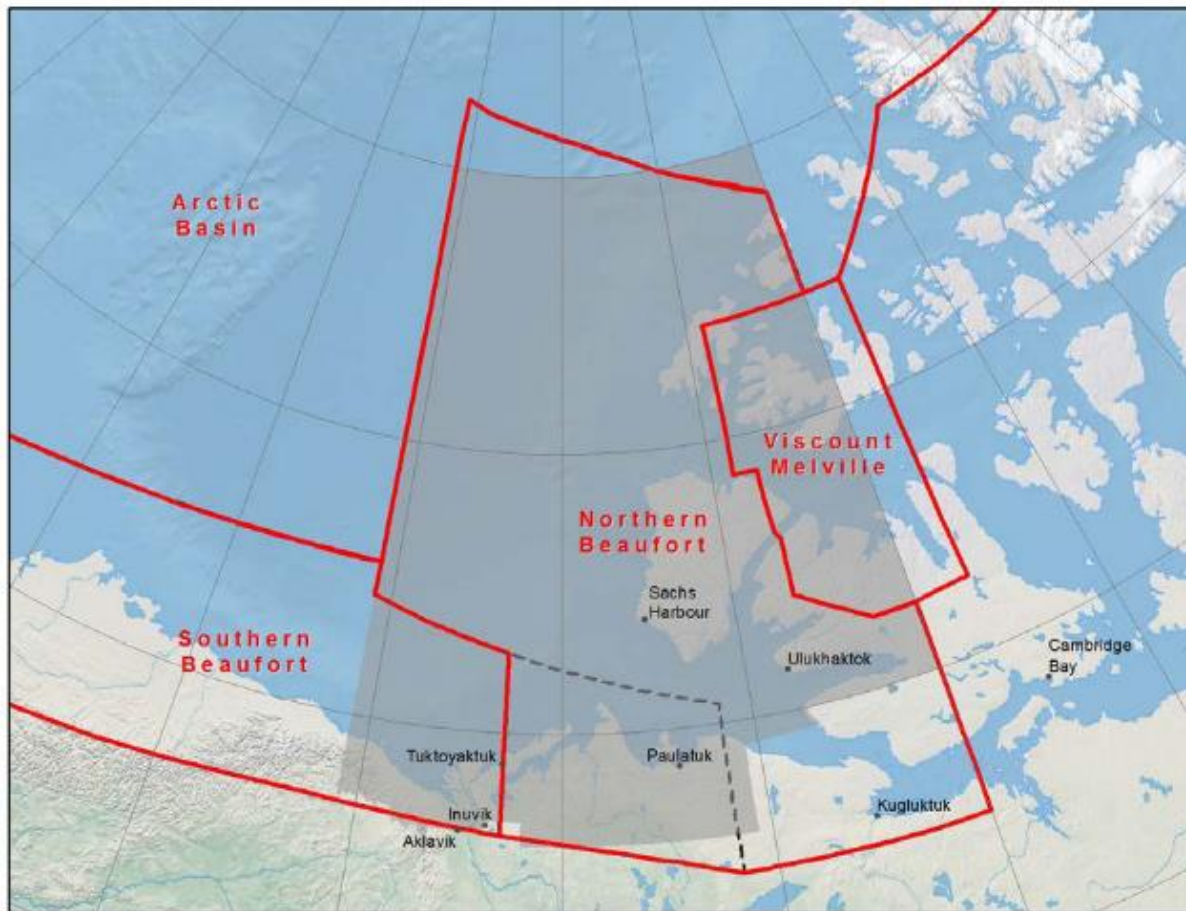
Polar bears on the Yukon North Slope

Polar bears (*Nanuq*, *Urus maritimus*) on the Yukon North Slope are part of the Southern Beaufort Sea (SB) subpopulation (Map 8- 1). Their seasonal distribution is linked to sea ice and the availability of seals that are their primary food year-around. They typically move north with receding sea ice from May-August and south in October as ice reforms along the coast (Amstrup, Durner, Stirling, Lunn, & Messier, 2000).

Polar bears move extensively to find ideal ice conditions for hunting, and to search for mates and maternal dens (Amstrup, 2003; Amstrup & Gardner, 1994; Species at Risk Committee, 2021). They can swim long distances in open water and are adapted to crossing varied terrain, including thin ice. They move swiftly on ice. Their foot pads are densely covered in fur during the winter, which improves traction (Amstrup, 2003; US Fish and Wildlife Service, 2020). Other adaptations which suit polar bears to living in Arctic marine environment include: white coloration for camouflage, water repellent guard hairs, dense underfur, black skin for absorbing warmth, specialized teeth for a carnivorous diet and the ability to store large amounts of fat for times when food is scarce (Amstrup, 2003; US Fish and Wildlife Service, 2020).

Polar bears are typically solitary and persist at low densities. Their reliance on sea ice for breeding, hunting, and most parts of their life history puts them at risk due to current and projected sea ice losses that come with climate change (COSEWIC, 2018; Species at Risk Committee, 2020).

Map 8- 1. Polar bear subpopulation boundaries in the Inuvialuit Settlement Region



Current (as of 2013) subpopulation boundaries (red lines) and previous deviations (dashed lines) in the ISR (light grey). Source: (Joint Secretariat, 2017)

Cultural Importance

I think the Inuvialuit are always concerned about the health of the polar bear and the population, because the polar bear has been a part of our lives all along and will continue to be. I think that if we notice a big difference in the number of polar bears or a loss of polar bears, it would have a great effect on the Inuvialuit. Just to see them is great! You don't necessarily have to be hunting them all the time.

PIN 102, Inuvik page 203 (Joint Secretariat, 2015)

Inuvialuit have lived near and harvested polar bears (nanuq) for many generations (JS, 2015). The Inuvialuit way of life has always been deeply intertwined with polar bear harvesting. Polar bears are a species of great importance, and are deeply respected. Polar bears are an integral part of Inuvialuit culture, spirituality, and economy. Inuvialuit knowledge of polar bears has grown through generations of living alongside and harvesting nanuq. This experience includes tracking and observing their behaviours, which can help us understand long-term changes in

polar bear populations, including how polar bears may respond to climate change effects (Joint Secretariat, 2015).

...But you know, there's things like polar bear hunting that is a part of our life, has been part of our lives, and will be part of our lives for, I'm hoping forever and ever. Because it's a part of us, eh?

PIN 163, Paulatuk page 202 (Joint Secretariat, 2015)

Inuvialuit often refer to polar bears as the most intelligent animal in the Arctic. They are further characterized as strong, agile animals, ones that require great skill to harvest (Joint Secretariat, 2015; D. V. W. Slavik, 2013; Species at Risk Committee, 2021). The practice of harvesting polar bears requires intimate knowledge of travel routes, ice conditions, weather patterns, and animal behavior. It often serves as a vessel for knowledge transfer between generations (Joint Secretariat, 2015; D. V. W. Slavik, 2013).

Inuvialuit have a unique relationship with polar bears and the species holds a venerated position in their beliefs and culture (Wenzel, 1983; Keith et al., 2005; Dowsley and Wenzel, 2008). Polar bears feature prominently in Inuvialuit mythology, spirituality, storytelling, art, song, and other forms of expression. Strong community values continue to guide polar bear hunting. Harvesters adhere to culturally derived rules, such as not speaking disrespectfully about polar bears, giving younger bears a chance to grow, not letting animals suffer, avoiding denning bears, and not bothering females when they are with cubs (D. V. W. Slavik, 2013).

Traditional Use

Polar bears are harvested in the wintertime when their furs are in prime condition (ICC, TCC, & ACC, 2006). Historically, the meat was used to sustain people and their dogs when food was in short supply, and the pelts were used for clothing, mattresses, and maintaining sled dog runners (Joint Secretariat, 2015). Today, selling polar bear pelts is an important economic opportunity that supports the ability of Inuvialuit to maintain their traditional harvesting practices and connection to the land.

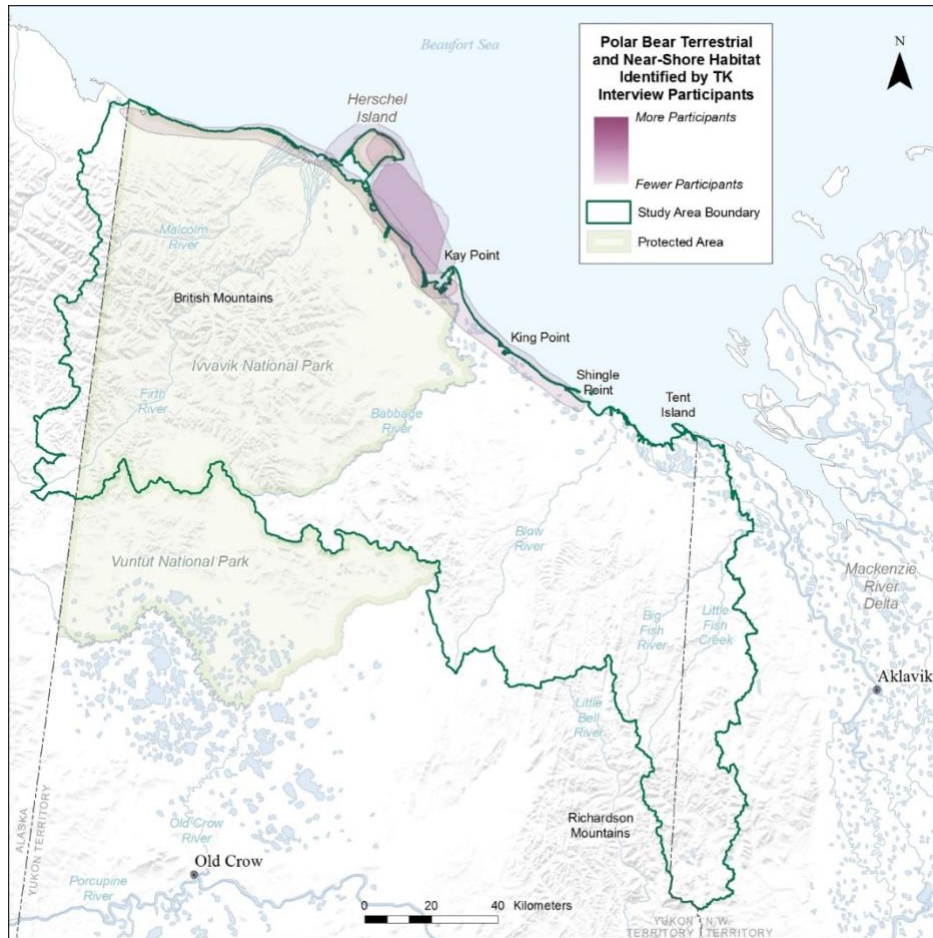
Harvest of polar bears is conducted within the bounds of the co-management system created by the Inuvialuit Final Agreement (1984) (see Population Management section). There are many external factors that influence Inuvialuit traditional use on the Yukon North Slope broadly, and polar bear harvest specifically. The impact of rapid change on Inuvialuit way of life throughout the 20th and 21st centuries (a shift to community-based living, participation in the wage economy, globalization, intergenerational trauma and the ongoing impacts of residential schools) has affected traditional use. Current examples include: the cost of gas and equipment, the global price of polar bear hides, and the demand for and cost of sport hunting (Joint Secretariat, 2015). These factors are complex and dynamic.

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

PIN 13, Aklavik page 86 (Joint Secretariat, 2015)

Inuvialuit harvest of polar bears involves traveling self-sufficiently over vast distances in changing ice conditions. Inuvialuit, therefore, have significant knowledge about the wildlife, habitats, and ice conditions they travel through to harvest polar bears. *Inuvialuit and Nanuq* (2015) summarizes the holistic nature of Inuvialuit culture, worldview, and polar bear harvesting: "The most important aspects of Inuvialuit knowledge concerning polar bears are intergenerational knowledge (acquired from parents, grandparents and other elders) combined with direct experience. In general, this is what Inuvialuit mean by Traditional Knowledge (TK): personal knowledge acquired by travelling across ice, hunting seals and polar bears, running dog teams, reading wind directions, snow and cloud patterns, geographic features, currents and stars, and by intergenerational transmission." (p. 9)

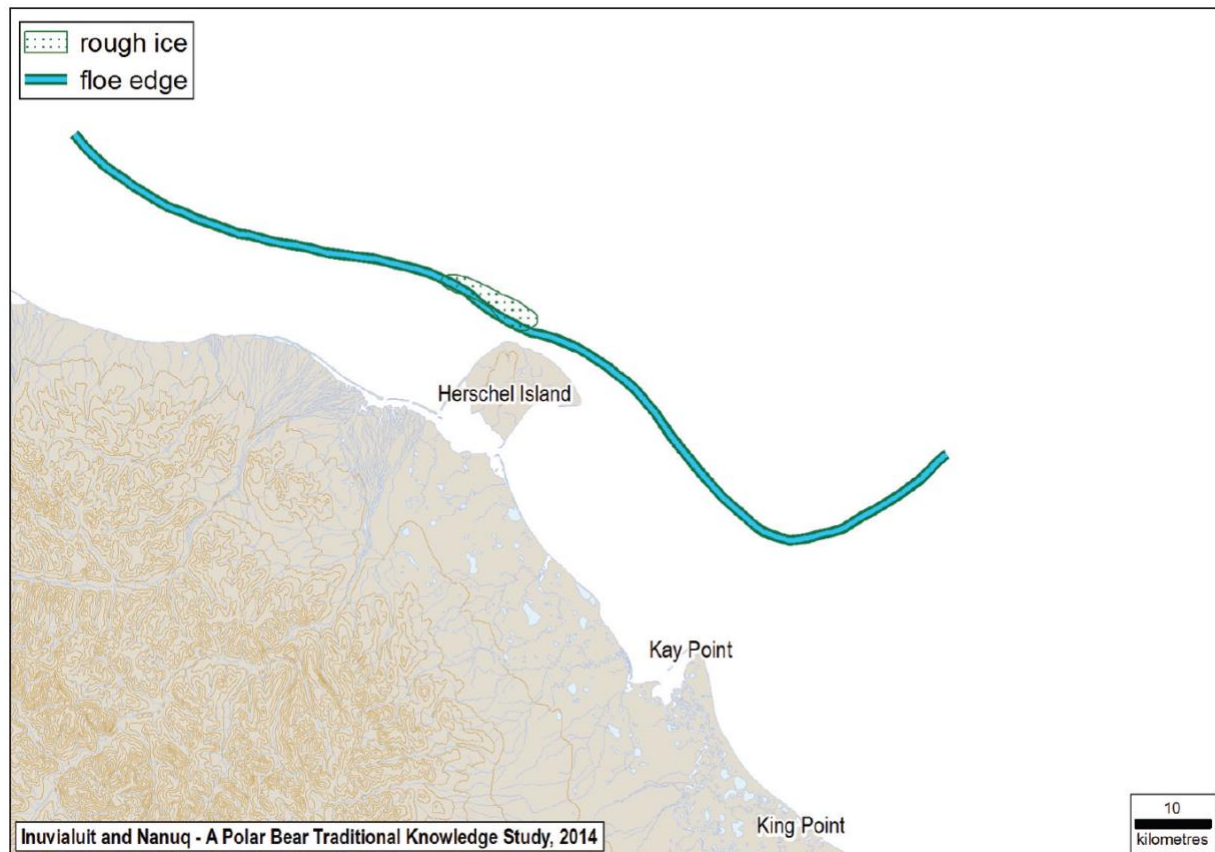
Map 8- 2. Overland and near-shore areas used by Polar bear in the Yukon North Slope for travel and foraging, identified through traditional knowledge interviews



Darker shades of purple indicate overlap in areas drawn by multiple Inuvialuit land users. Source: Map 7 (WMAAC (NS) & Aklavik HTC, 2018a)

Traditional knowledge holders reported observing and harvesting polar bears primarily near Qikiqtaruk (Herschel Island). Polar bear presence near Qikiqtaruk is linked to its close proximity to the floe-edge, the interface between landfast ice (ice attached to the shore) and moving ice and open water (Map 8- 3) (Joint Secretariat, 2015). The floe-edge and open leads of water, exposed when ice cracks apart in response to pressure from winds, tide and currents, occur where new ice forms. This area often contains hauled-up seals and breathing holes (Joint Secretariat, 2015).

Map 8- 3. Approximate location of an area of rough ice and the floe-edge near Qikiqtaruk (Herschel Island)



Source: Map 24 (Joint Secretariat, 2015)

Habitat for Polar Bear

Polar bears predominantly live on sea ice and along the coastline. They rely on sea ice for travel, breeding, and hunting. Its presence is intertwined with polar bear survival. However, they travel, den, and occasionally feed on land.

The SB polar bear subpopulation occupies the Beaufort Sea along the Yukon, NWT, and Alaska coastline (Map 8- 1). This area has divergent sea ice: the ice melts away from the coast in the summer, is carried offshore by the currents, and sea ice cover returns to the coast in the autumn (Species at Risk Committee, 2020). Therefore, during the summer individual bears can either remain onshore or on sea ice. In the Yukon North Slope, polar bears predominantly occupy offshore sea ice. Their distribution and habitat use is directly linked to dynamic sea ice conditions, such as ice type, thickness, and location (Joint Secretariat, 2015, 2017; Species at Risk Committee, 2020). SB polar bears display a strong preference for floe-edge or moving ice situated over shallow waters of the continental shelf. This is likely due to the high productivity of

these marine areas and the density of ringed seal (*natchiq*, *Pusa hispida*) (Durner et al., 2009). As the sea ice melts in the summer and retreats from the coast, polar bears typically remain on the pack ice (Pongracz & Derocher, 2017). In the autumn, ice returns to the coast, and polar bears may scavenge near land and establish maternal dens either on the sea ice or inland.

A small proportion of animals remain near the coast on land rather than on the sea ice. The numbers of bears on land during the summer has been increasing (Schliebe et al., 2008). Polar bears utilize the coastline for hunting and scavenging, and may travel inland for denning (Map 8- 2; Eric V. Regehr, Hunter, Caswell, Amstrup, & Stirling, 2010; Species at Risk Committee, 2021; WMAC (NS) & Aklavik HTC, 2018a). In the late winter and early spring adult females with cubs are often located on landfast ice (i.e., ice fastened to the coastline) versus floe-edge and moving ice (Ian Stirling, 2002). It is likely females with cubs avoid sea ice to protect their cubs from adult males and the risk of infanticide (Ian Stirling, 2002). As the climate warms and summer sea ice decreases, the reliance of polar bear on land sites for denning and habitat may increase (Amstrup, 2003; Species at Risk Committee, 2020).

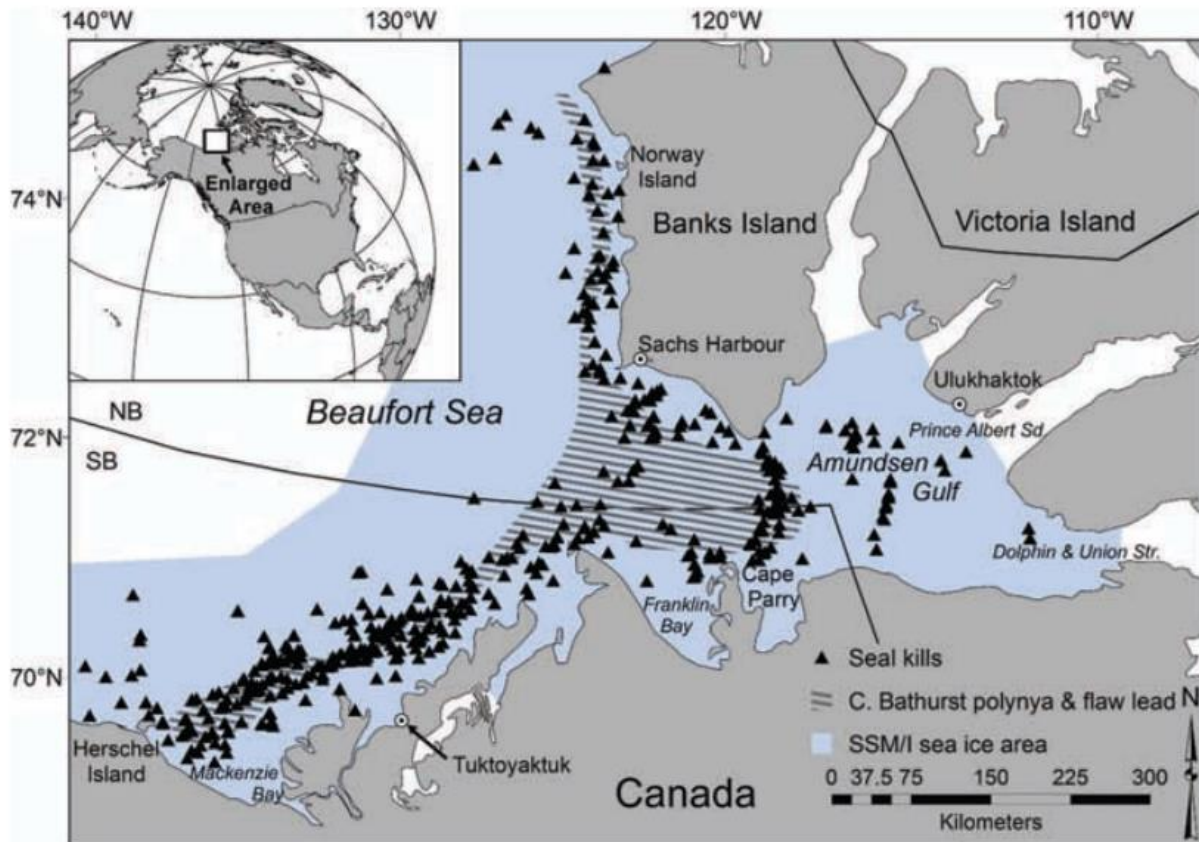
Feeding Habitat

Polar bear feeding habitat is areas with annual sea ice that provide easy access to abundant seal populations (Joint Secretariat, 2017; Thiemann, Iverson, & Stirling, 2008). SB Polar bear diets predominantly contain ringed seals (*natchiq*, *Pusa hispida*) year around, regardless of sex or age class (Florko, 2018). Studies have shown that ringed seal productivity and ice conditions are linked to polar bear body condition, survival and reproduction (Eric V. Regehr et al., 2010; Species at Risk Committee, 2021; Ian Stirling, 2002). Bears hunt seals from their breathing holes, where they are hauled up on the ice, and from their spring dens (D. V. W. Slavik, 2013; Species at Risk Committee, 2021). Polar bears are opportunistic predators and will pursue other seal species along the sea ice edge including bearded (*Erignathus barbatus*), harp (*Pagophilus groenlandica*), and harbour seals (*Phoca vitulina*) (Thiemann et al., 2008). Close to the shoreline they may hunt walrus (*Odobenus rosmarus*) (Species at Risk Committee, 2021). They also hunt beluga whales (*Delphinapterus leucas*) that are stranded in open leads, or scavenge beached beluga and bowhead whale (*Balaena mysticetus*) carcasses. There is also evidence that polar bears use bowhead whale bone piles from subsistence-harvested animals (Mckinney, Atwood, Iverson, & Peacock, 2017; Pongracz & Derocher, 2017). The consumption of ringed seals and bowhead whales (via bone piles) have independently been linked to improved polar bear body condition (Amstrup, 2003; Florko, 2018; Mckinney et al., 2017).

Ringed seals have adapted to life on sea ice. Their body condition, distribution and abundance are directly influenced by sea ice properties (COSEWIC, 2018; Species at Risk Committee, 2021). Changes in sea ice and snow conditions exacerbated by climate change may reduce seal availability and abundance (Andrew E. Derocher, Lunn, & Stirling, 2004; Hezel, Zhang, Bitz, Kelly, & Massonnet, 2012). Polar bears rely on ringed seals year-round, but particularly in the spring when seal pups are abundant (Map 8- 4) (Pilfold, Derocher, Stirling, & Richardson, 2015; Ian

Stirling, 2002). In the eastern Beaufort Sea, years displaying reduced abundance of ringed seal pups were followed by reduced polar bear birth rates, suggesting a direct relationship between ringed seal and polar bear abundance (I. Stirling & Lunn, 1997).

Map 8- 4. Locations (n=650) of seals killed by polar bears from early-April through late-May, 1985-2011, in the Beaufort Sea



The solid black line on the left side of the map represents the old boundary between the Northern and Southern Beaufort polar bear subpopulation. The current boundary occurs just east of Tuktoyaktuk (see Map 8-1). Source: Figure 1 (Pilfold et al., 2015)

Denning Habitat

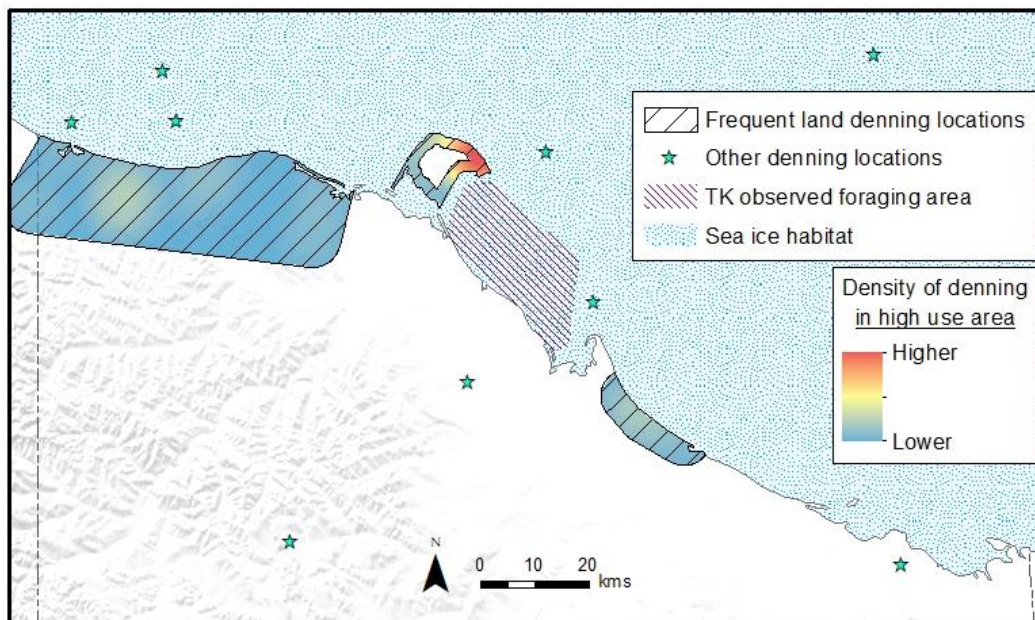
Most polar bears forage for seals on sea ice through the winter. Usually only pregnant females enter dens (Amstrup, 2003). Pregnant females establish maternal snow dens in autumn or early winter. They give birth and nurture the young for 4-5 months until they venture out of their dens (Joint Secretariat, 2017). Polar bear cubs are born very immature and dependent upon their parent. Denning is recognized as a critical part of the polar bear's life cycle (Amstrup, 2003).

Den location is influenced by presence of adult males, decreased disturbance potential, avoidance of adverse weather and proximity to prey (Joint Secretariat, 2017; US Fish and Wildlife Service, 2020). Dens may be located in snowbanks near the coastline, on the sea ice (typically multi-year pack ice) or inland in ravines and small valleys (Amstrup & Gardner, 1994; Joint

Secretariat, 2017). On land, dens typically occur near the coast, but dens up to 20 km from the coast are not uncommon. In the Alaska portion of the SB subpopulation, critical denning habitat is defined as 32 kilometres or less from the coast (Amstrup, 2003; US Fish and Wildlife Service, 2020). Along the Yukon North Slope coast, dens are known to occur on the coastal plain of Ivavik National Park and between Kay and King points. Dens are also common on Qikiqtaruk (Map 8- 5) (Aklavik HTC, Aklavik Community Corporation, WMAC (NWT), FJMC, & Joint Secretariat, 2016; Amstrup & Gardner, 1994; ICC et al., 2006; WMAC (NS) & Aklavik HTC, 2018a).

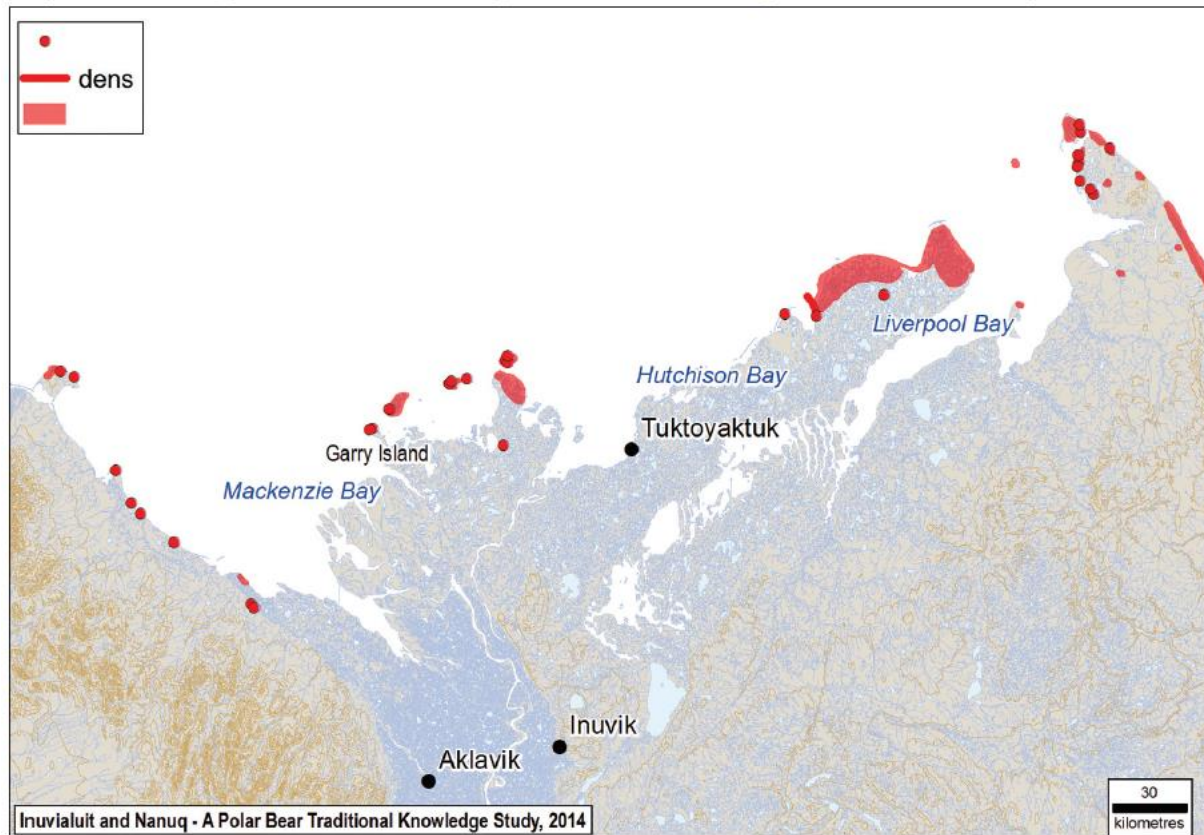
Den site fidelity has not been identified in the SB subpopulation, but bears displayed a den selection preference for either pack ice or land (Amstrup, 2003). In comparison to other subpopulations, a slightly greater proportion of SB polar bears historically selected pack ice versus on-land dens (Amstrup & Gardner, 1994). Of radio collared polar bears (n=90) ~53% denned on multi-year pack ice up to 300km offshore (Amstrup & Gardner, 1994). The success of bears denning on pack ice versus land did not differ (Amstrup & Gardner, 1994). Reductions in the availability and quality of pack ice due to climate change has been linked to decreased pack ice denning. Sea ice denning in the Alaskan range of the SB subpopulation decreased by 30% over a 20-year timespan (1985-1994 to 1998-2004) (Fischbach, Amstrup, & Douglas, 2007). The trend of increased denning on land is expected to continue as sea ice declines, unless a point is reached at which autumn sea ice is too far from land for pregnant females to access the coast prior to denning (Fischbach et al., 2007).

Map 8- 5. Polar bear den sites and an area important to polar bears and Inuvialuit, based on surveys of den sites and interviews with Inuvialuit experts



Map sources: USGS 2010, Environment Yukon and Parks Canada; unpublished traditional knowledge data

Map 8- 6. Maternity den locations from the Tuktoyaktuk Area and along the Yukon North Slope



Source: Map 38 (Joint Secretariat, 2015)

Polar Bear Demographics and Management

Polar bears are not strictly territorial but are generally solitary and nomadic. They occur at low densities, although they can be found in groups occasionally, for mating or feeding (D. Slavik, Inuvialuit Game Council, Wildlife Management Advisory Council (North Slope), & Wildlife Management Advisory Council (NWT), 2009; Species at Risk Committee, 2021). Polar bears have very large ranges. Their movements are influenced by the complex spatial and temporal dynamics of sea ice. In the Beaufort Sea region, the annual core activity areas for females ranged from 13,000km² to 597,000km² (Amstrup et al., 2000).

Demographics and Reproduction

The maximum recorded age of polar bears harvested in the SB was 25 years for males and 34 years for females (S. Baryluk, personal communication, July 20, 2021); this age is similar to longevity recorded elsewhere. Few polar bears survive more than 25 years (Ian Stirling, 2002). In the SB subpopulation, females are able to breed at 5 years of age, whereas males do not begin

to breed until 8-10 years of age (A. E. Derocher & Stirling, 1998; Hensel & Sorensen, 1980; Ramsay & Stirling, 1988; Saunders, 2005; I. Stirling, Pearson, & Bunnell, 1976). In most parts of the Canadian Arctic, female polar bears begin breeding at 4 years of age, and the later breeding in SB females has been linked to lower ringed seal densities in the region compared to other areas in the Arctic (Amstrup, 2003). Breeding may occur throughout a female's lifespan, but it is possible that reproduction potential declines after 20 years of age (Amstrup, 2003).

Polar bears breed in the spring, with females in estrus from March to June; implantation is delayed until autumn (Amstrup, 2003; Ian Stirling, 2002). Typically, polar bears have 1-3 cubs, with pairs being the most usual (Joint Secretariat, 2015). Cubs are born every 3 years on average. Cubs in the SB remain with their mothers until they are 2.5 year of age (Stirling 2002). Survival rates are lowest for cubs-of-the-year followed by yearlings and senescent adults (≥ 21 years of age) (Amstrup, 2003; Species at Risk Committee, 2021).

Species Conservation Status

Across Canada, in jurisdictions with species at risk legislation, polar bears are variably listed as special concern, vulnerable, or threatened, with projected sea ice decline identified as the primary threat to the persistence of the species (COSEWIC, 2018). The Northwest Territories Species at Risk Committee re-assessed the status of polar bears in the Northwest Territories in 2021. This assessment included the SB subpopulation; Northwest Territories polar bears were assigned a status of special concern (Species at Risk Committee, 2021).

Table 8- 1. Polar bear conservation status: Canada, Yukon, and global

Status assigned by	Applies to	Status	References
Species at Risk Act (SARA)	Canada	Special Concern; listed on Schedule 1 since 2011	(Canada, n.d.)
Committee on the Status of Endangered Wildlife in Canada (COSEWIC)	Canada	Special Concern, last assessed in 2018	(Canada, n.d.)
Northwest Territories (includes SB subpopulation)	Northwest Territories	Special Concern, last assessed in 2021; listed since 2014	(Government of the Northwest Territories, n.d.)
Canadian Endangered Species Conservation Council (General Status of Species in Canada)	Canada	N3: Vulnerable*; 2015 status	(Canadian Endangered Species Conservation Council, 2016)
Yukon	Yukon	S1: Critically Imperiled*	(Yukon, 2020)
NatureServe	Global	G3: Vulnerable*; last reviewed 2016	(NatureServe, n.d.-b)

*Following the ranking system developed by NatureServe, an international network of conservation data centres (NatureServe, n.d.-a). G=Global; N=National; S=Subnational

Southern Beaufort Sea Subpopulation Trends

A comprehensive study of Inuvialuit knowledge of polar bears (Joint Secretariat, 2015) conducted interviews with 72 polar bear harvesters from the six Inuvialuit Settlement Region communities. The study found that overall, polar bear body condition has remained stable over time, with significant variation within and between years. Since the mid-1980s, there have been fewer very large bears, and they are not as fat. The mid-1980s is when knowledge holders began to observe major climate-related changes in sea ice conditions. The study also found that polar bear abundance has remained generally stable over time (Joint Secretariat, 2015).

Polar bear observations

“From my general observations, the polar bear population in the Western Arctic at least, I think is in good, stable condition. You do see them during the winter months, travelers that are out on the land, out on the coast; and during the spring months when I can do the work at Herschel, in and out, two weeks off, two weeks in. The observations that I have made I think the polar bears are still, even though the ice conditions in the springtime are going out a lot earlier, the polar bears seem to still be in stable condition; the numbers are still up there... I don't think there's a change in the numbers [of polar bears] at all, no... We've never seen a fluctuation or a de-fluctuation of bears.”

Source: Aklavik, *Inuvialuit and Nanuq: A Polar Bear Traditional Knowledge Study* (Joint Secretariat, 2015. p.19).

The most recent population estimate for the SB subpopulation is 1,215 bears as of 2006; this estimate is used for management purposes (Griswold et al., 2017). The population estimate was derived from a re-analysis of Regehr et al. (2006) that adjusted the abundance estimate from that study in consideration of the 2013 boundary change between the SB and NB subpopulations (Griswold et al., 2017). The Griswold et al. (2017) estimate cannot be compared with historic estimates to infer trends in abundance because of the boundary change. However, the Regehr et al. (2006) population estimate of 1,526 bears can be compared to the previous (Amstrup et al., 2001) population estimate of 2,272 bears (from the period 2001-2006); while the more recent estimate is lower, the difference is not statistically significant. Prior subpopulation estimates were: approximately 1,480 bears in 1992 (Amstrup, 1995), and 1,788 bears in 1972-3 (Amstrup et al., 1996)

Recent research has explored trends in relative abundance and body condition (from 2001-2015) in the SB subpopulation. A 2015 analysis completed suggested that the SB subpopulation experienced a decline in abundance of ~25-50% from 2004-2006; this decline was followed by comparatively stable adult and cub survival from 2007-2010 (Bromaghin et al., 2015). The Bromaghin et al. (2015) analysis contained caveats, including that the data were not collected using the same methods on the Alaskan and Canadian sides of the border. More recently, Atwood et al. (2020) analyzed data from the Alaska portion of the SB subpopulation and found a

similar trend, with abundance and body condition declining in the mid-2000s. Furthermore, Atwood et al. (2020) found that abundance and body condition stabilized from the mid 2000s through to 2015.

Polar bear observations

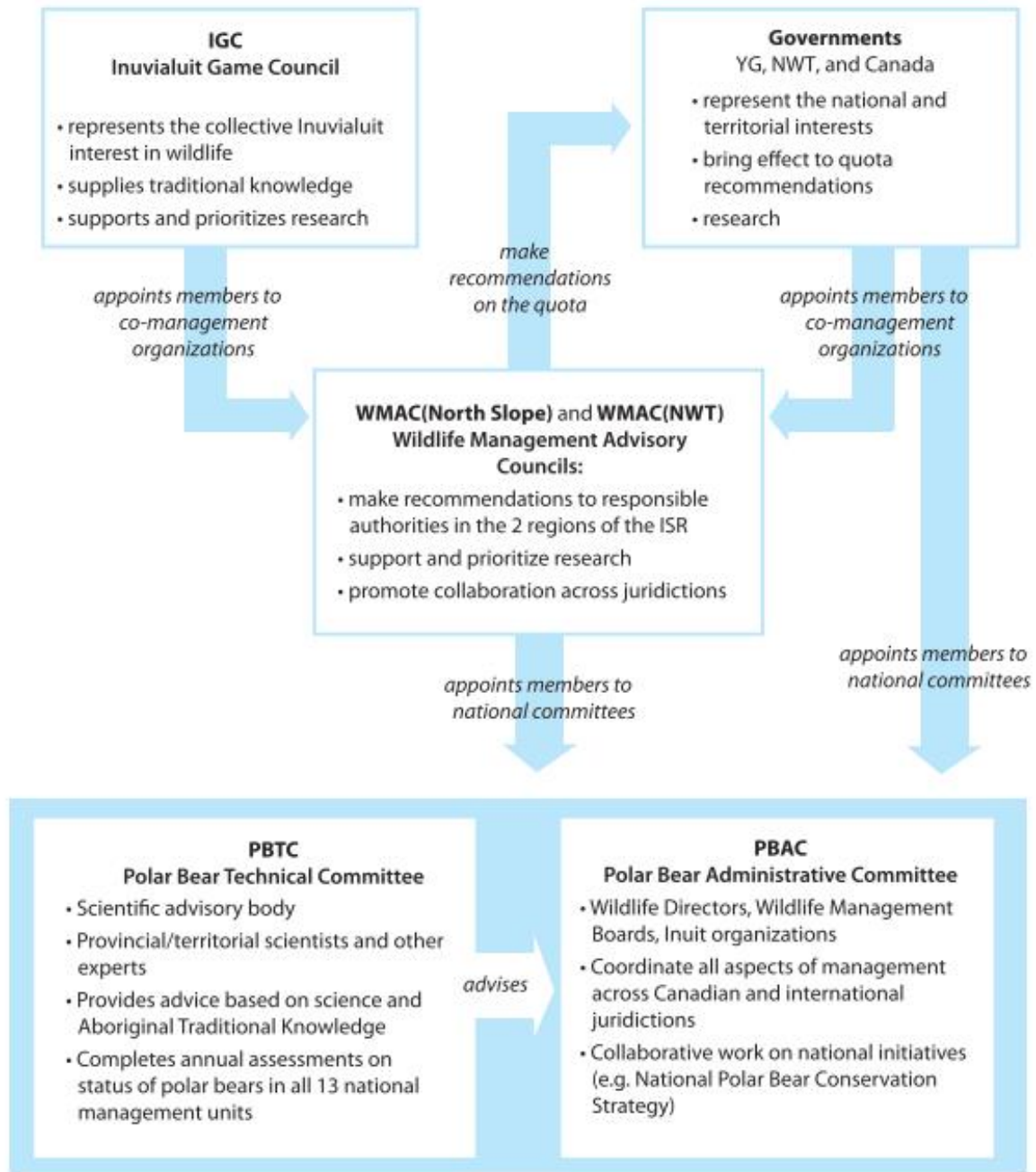
“The bears that I do see are in good shape. They’re hunting and they are being successful and getting fed. If polar bears were starving, you think they would start to pop up here – they would be here and there. And that’s not happening.”

Source: *Inuvialuit and Nanuq: A Polar Bear Traditional Knowledge Study* (Joint Secretariat, 2015, p.9).

Population Management

Management of polar bears is jurisdictionally complex. In the Inuvialuit Settlement Region, the Inuvialuit Final Agreement (IFA) (1984) sets out the wildlife management regime. In implementing the IFA, Inuvialuit jointly manage polar bears with the governments of Canada, the Northwest Territories, and Yukon. The SB subpopulation is shared with Alaska; the Inuvialuit-Inupiat Polar Bear Management Agreement in the Southern Beaufort Sea (1988, revised in 2011) facilitates transboundary cooperation for managing SB polar bears. The agreement includes a provision to manage harvest on a sustainable yield basis. Harvest is managed carefully and monitored closely. Within Canada, the Inuvialuit have the exclusive right to harvest polar bear in the ISR and annual quotas are allocated to Inuvialuit communities. Figure 8- 1 illustrates the co-management system outlined in the ISR as it applies to polar bears. For a detailed description of polar bear management in the ISR, see the *Inuvialuit Settlement Region Polar Bear Joint Management Plan* (Joint Secretariat, 2017).

Figure 8- 1. Inuvialuit Settlement Region (ISR) co-management system for polar bear research and management.



Source: (Joint Secretariat, 2015)

The current quota system and tags for SB polar bear harvest in Yukon and NWT are coordinated by representatives from the governments of Yukon and Northwest Territories, Parks Canada, Inuvialuit Game Council and Wildlife Management Advisory Councils (North Slope and NWT). These quotas are based on Western science and Indigenous knowledge and currently allow for

~4.5% of the total estimated population to be harvested. There is also a harvest sex ratio of 2:1 males to females. All harvest is reported through the quota system. In the SB, however, this annual quota is typically not met (Joint Secretariat, 2015; Joint Secretariat, 2017). Additionally, a small fraction of the polar bear tags is provided to guided sport hunts. Sport hunts generally target larger male polar bears (Amstrup, 2003). Sport hunts also have a conservation role; tags assigned to a sport hunt are considered used even if the hunt is unsuccessful and are not available to be assigned to others.

Transboundary Considerations

SB polar bears traverse the coastal region along the Beaufort Sea in Canada and the USA. Polar bear management occurs at the local level up to the international scale.

Formal international agreements exist in regards to polar bear conservation, including management, harvest and research (Inuvialuit-Inupiat Polar Bear Management Agreement in the Southern Beaufort Sea, 2000; Agreement on the Conservation of Polar Bears, 1973). Polar bear Range States (Canada, Norway, Greenland, the Russian Federation, and the United States) meet biennially to coordinate circumpolar polar bear management (Polar Bears in Canada, 1973). The range states have the support of the IUCN and have established domestic and inter-jurisdictional polar bear research and management criteria.

In the USA, polar bears are listed as Threatened under the Endangered Species Act (since 2008) and are protected under the Marine Mammal Protection Act of 1972 (U.S. Fish and Wildlife, 2015). Native Alaskans who live along the coast may conduct subsistence harvest of polar bears; however, no sport hunting is allowed (U.S. Fish and Wildlife, 2015).

The Canadian Polar Bear Administrative and Technical Committees coordinate polar bear research and management at the national level.

Observations, Concerns, and Threats

Impacts of Climate Change

Extreme variations in weather, climate, snow, and sea ice patterns have been observed by Inuvialuit since the 1980s (Joint Secretariat, 2015). It is clear that climate in the Arctic is changing (see Chapter 2: Climate Change Effects), resulting in variable sea ice conditions. These include reduced ice extent, reduced thickness of multi-year ice, longer ice free periods, and changes in the seasonal timing of spring ice break-up (earlier) and autumn ice freeze up (later) (Derksen et al., 2019; Joint Secretariat, 2015, 2017; Zhang et al., 2019).

In the shorter term, reductions in seasonal sea ice may increase polar bear access to ringed seals via thin and channeled ice. However, in the long-term, sea ice reductions may negatively impact

polar bears (COSEWIC, 2018; Durner et al., 2009; Eamer et al., 2013). Changes in hunting grounds may occur as sea ice retreats to deep polar waters beyond the continental shelf that provides preferred ringed seal habitat (Durner et al., 2009). An earlier break-up of sea ice followed by longer open water times may shorten the time sea-ice hunting grounds are accessible, causing diet shifts (Andrew E. Derocher et al., 2004; Thiemann et al., 2008). It is likely that multiple years of continual sea ice retreat may lead to reduced body condition, reproduction, and survival of polar bears, related to these shifts in prey abundance and the increased energy requirements and risk associated with open water travel (Bromaghin et al., 2015; Andrew E. Derocher et al., 2004; E. V. Regehr, Amstrup, & Stirling, 2007).

Parasite and viral infections may increase as polar bears shift or expand their food sources or begin to eat seal intestines and internal organs versus just their fat or blubber in response to changing conditions and prey availability due to climate change (Andrew E. Derocher et al., 2004). Additionally, reductions in sea ice and changes in wind and snow conditions may influence maternal denning habitat (Andrew E. Derocher et al., 2004; Joint Secretariat, 2015). Land-based denning may increase, or bears may remain on sea ice year-round (Fischbach et al., 2007).

The magnitude of the impact of sea ice decline on polar bears is unknown. When available, sea ice is highly used by polar bears, but individuals can persist in areas with ice-free summers; therefore population responses to declining sea ice are expected to vary across Canada (COSEWIC, 2018; Species at Risk Committee, 2021).

Inuvialuit observations of sea ice change

- “Freeze-up occurs a month later than it did previously;
- Break-up occurs a month earlier...
- Ice is thinner, and wind and currents can easily break it up and rubble it;
- Ice does not ground on shoal areas the way it used to because it is thinner...
- There have been significant reductions in multi-year ice in many parts of the Beaufort Sea region;
- Floe edges are closer to shore
- Pressure ridges that used to form predictably in the same location from one year to the next are no longer there;
- There is more open water than ever before...
- Winds shift unpredictably across a number of directions, ... wind velocities have increased noticeably ...”

(Joint Secretariat, 2015, p.162)

Adaptation

This global warming is happening, and these bears will have to adapt to what's happening.

PIN 19, Aklavik page 195 (Joint Secretariat, 2015)

The 2015 Inuvialuit traditional knowledge study of polar bears concluded its discussion on climate change effects on polar bears with the statement: "For the Inuvialuit, the future cannot be predicted; it could be good or bad as far as polar bears are concerned. However, the consensus among the workshop participants was that polar bears are highly intelligent animals that can adapt to climate change because they have been adapting to many things for thousands of years" (Joint Secretariat, 2015).

Western science also recognizes that polar bears can shift their diet based on food availability and adapt to periods of low-food by altering their metabolism to enter a hibernation-like state (Andrew E. Derocher, Nelson, Stirling, & Ramsay, 1990). During these periods, they make use of refugia or shelter dens; thus this habitat may become increasingly critical during the summer and winter seasons (Ferguson, Taylor, Rosing-Asvid, Born, & Messier, 2000). Polar bears may use terrestrial and sea ice for summer refugia when nearshore ice is absent (Pongracz & Derocher, 2017).

Additionally, polar bears may shift their range north as the ice retreats. Inuvialuit state that some polar bears are expanding north to find multi-year ice and stable seal populations (Species at Risk Committee, 2021). Some bears may move further inland (Andrew E. Derocher et al., 2004; Species at Risk Committee, 2020). Polar bears in the SB subpopulation have been recently reported travelling further inland than was historically common.

Impacts from Human Activities

Resource extraction and shipping

Sea ice reductions have led to the shear zone (the area between landfast and pack ice) occurring closer to shore. This opens access for increased shipping, transport, and tourism, as well as oil and gas exploration and development (Species at Risk Committee, 2021). Offshore oil and gas exploration (which are not expected to be a threat in the near-term future) and development increases the risk for pollution and disturbance. Increased dumping or accidents may negatively impact polar bears and their prey (Andrew E. Derocher et al., 2004). The use of the Northwest Passage by marine traffic may contribute to multi-year ice decline as open leads are prevented from freezing (Species at Risk Committee, 2021).

Human waste management

Polar bears in the SB subpopulation have been observed eating refuse in recent years, and harvested bears have been found to have significant amounts of garbage (up to the size of a beach towel) in their stomachs. In many cases, bears that consume indigestible garbage cannot pass it through their system. An accumulation of indigestible waste in the stomach can eventually lead to starvation.

Contaminants

Polar bears are apex predators, and are thus likely to accumulate environmental contaminants (persistent organic pollutants (POPs) and heavy metals) in their tissues, which may decrease their overall health (Joint Secretariat, 2017; Species at Risk Committee, 2021). POPs were detected in SB polar bear samples collected in the 1980s, indicating that historic exposure may be underestimated (Liu et al., 2018). Polar bear exposure to contaminants may increase if shipping and oil and gas exploration and development expand. Increased exposure to contaminants is likely to stress their immune systems, making polar bears more vulnerable to expanding diseases and parasites (Andrew E. Derocher et al., 2004).

Links to Plans and Programs

This section lists plans and programs that link to the objectives and strategies of the *Yukon North Slope Wildlife Conservation and Management Plan*. These plans and programs informed the development of the Yukon North Slope Plan and are an integral part of its implementation.

Polar Bear Conservation and Management

- *Agreement on the Conservation of Polar Bears (1973) and Circumpolar Action Plan (2015)*
This Agreement is an international coordination of polar bear research and management, intended to protect the polar bears as a significant resource of the Arctic region through conservation and management measures. It includes ecosystem protection measures and prohibitions against taking of polar bears aside from subsistence purposes, and trade in polar bears or polar bear parts. The goal of the Circumpolar Action Plan (2015) is “to secure the long-term persistence of polar bears in the wild that represent the genetic, behavioral, life-history and ecological diversity of the species.”
- *Inuvialuit-Inupiat Polar Bear Management Agreement in the Southern Beaufort Sea (1988, last revised in 2011) (Inuvialuit Game Council & North Slope Borough Fish and Game Management Committee, 2000)*
Agreement between the Inuvialuit in Canada and the Inupiat in Alaska on the harvest of polar bears, which promotes transboundary cooperation and information sharing, and facilitates coordinated management for the SB polar bear subpopulation.

- *Aklavik Inuvialuit Community Conservation Plan* (Aklavik HTC et al., 2016)
This is a community-based planning document which identifies important habitats on the Yukon North Slope, traditional use, management plans and research priorities for polar bears on the Yukon North Slope and in the NWT.
- *Inuvialuit Settlement Region Polar Bear Joint Management Plan* (Joint Secretariat, 2017) and *implementation agreement* (NWT Conference of Management Authorities, 2018)
Describes the management goals and objectives for polar bears across the ISR. The management goal is “to ensure the long-term persistence of healthy polar bears in the ISR while maintaining traditional Inuvialuit use.”
- *Ivvavik National Park of Canada Management Plan* (Parks Canada, 2018)
Conservation and management of polar bear is part of the plan’s strategy “to protect and conserve natural ecosystems, habitat, wildlife, cultural resources and Inuvialuit practices, based on the best available scientific and traditional knowledge”.
- *Species Status Report for Polar Bear (Ursus maritimus; Nanuq)* (Species at Risk Committee, 2021)
The Species at Risk Committee was established under the Species at Risk (NWT) Act and they assess the biological status of species at risk, including polar bear. This report compiles and analyzes information on the biological status of polar bears in the NWT, including potential threats and positive influences. These threats and influences are likely to be similar in the Yukon North Slope portion of the SBS polar bear subpopulation.

Research and Monitoring Programs

- **Interjurisdictional cooperation**
Canadian Polar Bear Administrative Committee and Canadian Polar Bear Technical Committee
Forums of representatives of federal, territorial, and provincial governments, Indigenous authorities, and wildlife management bodies. The administrative committee shares and coordinates information, management objectives, and policy for Canada’s polar bear populations. The technical committee undertakes an annual assessment of Canada’s 13 polar bear subpopulations and provides technical advice to the administrative committee.
- Polar Bear Range States**
Biennial meeting of signatories to the 1973 *Agreement on the Conservation of Polar Bears* (Norway, Canada, Greenland, the Russian Federation, and the United States) to coordinate circumpolar polar bear management.
- Inuvialuit-Inupiat Southern Beaufort Polar Bear Commission**
Annual meeting of Inuvialuit and Inupiat representatives to address population and harvest management and research of Southern Beaufort polar bears.
- **Harvest monitoring: Inuvialuit Harvest Study** (IRC, 2017, 2018, 2019a)
Annual harvest monitoring in the ISR was led by the Inuvialuit Game Council and the Inuvialuit Regional Corporation. From 2017-2019, this program included polar bear harvest

monitoring. This program built on previous harvest monitoring methods and data (Inuvialuit Harvest Study, 2003).

Selected Studies and Research Relevant to the Yukon North Slope

There is a solid base of both traditional and Western scientific knowledge about polar bears of the southern Beaufort Sea region. Inuvialuit traditional knowledge about polar bears has been recorded through a major research project which documents polar bear relationship to the environment they occupy including climate, geography, fauna, weather, and ice conditions (Joint Secretariat, 2015). Traditional knowledge is documented through ongoing community-based monitoring and harvest management initiatives (IRC, 2019b; Joint Secretariat, 2017).

Research and monitoring by US and Canada government agencies and researchers occurs through international cooperation agreements. Polar bear research using Western science methodologies is very expensive and occurs in remote locations with inherent danger, including rapidly changing weather patterns and ice conditions. These factors influence both study frequency and success. Multiple studies (current and historic) have assessed polar bear movement, population dynamics, denning habits, foraging, and TK in the region (Amstrup et al., 2000; Amstrup & Gardner, 1994; Bromaghin et al., 2015; Durner et al., 2020; Florko, 2018; Eric V. Regehr et al., 2010; Ian Stirling, 2002; Thiemann et al., 2008; WMAC (NS) & Aklavik HTC, 2018a). In fact, the Southern Beaufort Sea polar bears are one of the most studied subpopulations of polar bears. Research has also assessed the potential influence of climate change effects on polar bears (Andrew E. Derocher et al., 2004; Durner et al., 2009). These studies provide a baseline for current and future management including sustainable harvest and potential population changes due to climate change and other factors.

This section is an annotated listing of selected reports, scientific papers, and other resources that provide support to the *Yukon North Slope Wildlife Conservation and Management Plan* and highlight issues and research directions that will be important to consider during its implementation.

Traditional Knowledge Studies

- [Inuvialuit and Nanuq: A Polar Bear Traditional Knowledge Study \(Joint Secretariat, 2015\)](#)
This study documents Inuvialuit knowledge on polar bears. Seventy-two traditional knowledge holders in 6 communities were interviewed. Interviews were typically conducted during a single session, included around 145 questions, and lasted up to 3 hours. Follow-up verification workshops were held with some participants (n=12) to address differences in polar bear demographics, behaviour, habitat, and ecology related to climate change.

- *Yukon North Slope Inuvialuit Traditional Use Study* (WMAC (NS) & Aklavik HTC, 2018b) and *Inuvialuit Traditional Knowledge of Wildlife Habitat, Yukon North Slope* (WMAC (NS) & Aklavik HTC, 2018a)

These two studies were undertaken by the WMAC (NS) and the Aklavik HTC to document traditional use patterns and knowledge about wildlife habitat on the Yukon North Slope. Both studies were based on interviews with Aklavik Inuvialuit land users. All geographically referenced data were digitized and displayed on maps. The results were used in developing the Plan and are described and referenced throughout this chapter.

Assessments and Syntheses of Monitoring and Research Findings

- *Polar bears and seals in the eastern Beaufort Sea and Amundsen Gulf: A synthesis of population trends and ecological relationships over three decades* (Ian Stirling, 2002)
Includes population trends of polar bears from their overharvest during the 1960s (and potentially 1950s), across their recovery to current conditions including declining sea ice and links to seal population health. At the time of this publication, the authors note that the population estimates for polar bears in the SBS are outdated.
- *Polar bears in a warming climate* (Andrew E. Derocher et al., 2004)
Climate change models predict that preferred polar bear habitats (sea ice) will decrease or be substantially altered in the future. Polar bears are expected to alter behaviours, but the authors propose that their highly specialized nature will restrict their ability to adapt to great changes in their preferred habitat.
- *Polar bear diets and arctic marine food webs: insights from fatty acid analysis* (Thiemann et al., 2008)
The fatty acid signatures of 1783 individual polar bears, sampled in the Canadian Arctic over 30 years, were evaluated. This study indicates that polar bears are opportunistic foragers who may alter their foraging habits to take advantage of locally abundant prey, potentially compensating for variation in their dominant prey. However, polar bear dependence on the availability of ringed and bearded seals may make them further vulnerable to climate-related changes.
- *Assessment and Status Report for Polar Bear *Ursus maritimus* in Canada* (COSEWIC, 2018)
The COSEWIC report summarizes available information on population status and trends and on threats to polar bears in Canada. The report presents the rationale for the designation of polar bear as a species of Special Concern.

➤ Species Status Report for Polar Bear (*Ursus maritimus*) in the Northwest Territories (Species at Risk Committee, 2021)

The Species at Risk Committee report summarizes available Indigenous and community knowledge and scientific knowledge about polar bears in the Northwest Territories (which includes part of the SB subpopulation). The report presents the rationale for the designation of polar bear as a species of special concern.

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