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ON THIN ICE

Human-Polar Bear Conflicts In Ittoqqortoormiit

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Report

On Thin Ice: - Human –Polar Bear Conflicts In Ittoqqortoormiit

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Figure 1. Polar Bear reflection. When Sea ice is scarce, Polar bears seek the land. Mestersvig, East Greenland August 2014. © Lis bach

ON THIN ICE

HUMAN-POLAR BEAR CONFLICTS IN ITTOQQORTOORMIIT

SUMMARY

Human -polar bear conflicts are on a rise throughout a large part of the species range. Temporal changes in sea ice decline lead to longer time on land for the bears, decreasing access to prey and increasing deaths due to conflicts with people.

POLAR BEAR ON ICE © ISTOCKPHOTO

In Eastern Greenland, in the range of the East Greenland subpopulation of polar bears, conflicts have been on the rise during the last decades as has been the number of bears shot in conflict (DLP; defense of life and property) outside the allowed annual quota. Many of the local hunters consider the rising conflicts to be due to population increase, but the East Greenland subpopulation has not been inventoried, and the size and population development therefore unknown.

In Ittoqqortoormiit, hunting is still an integrated part of the life for many people in the society. The town is situated on the entrance to the Scoresbysund/Kangersuttaq fjord, of which the outer edge is ice free all year round, rendering the environment beneficial for marine species. In recent years, a larger part of the fjord has been ice free for an extended period of time, including the northgoing spring/summer route of the Polar bears, forcing them longer distances over land and often into the vicinity of the human habitation. During WWFs field survey, where interviews were conducted with hunters, and other local citizens, and a geographic survey of the town and its near lying regions were performed, we found the main attractant of Polar bears to be the harvested contents of seals and walrus kept in wooden storage crates for the sled dogs. These crates were placed along coastal routes to town, as well as in town itself. All documented Polar bear conflicts were centered around these storage crates, or were related to meeting Polar bears on coastal routes to and from town, as well as a few documented cases of Polar bears around the town dump, which was situated right next to a housing district. The information gained from

individual semi-structured interviews gave insight into individual conflict situations, as well as to the effect of utilized deterrence's and on the overall assessment and feelings of locals to the increased conflict situations. A public meeting held by the WWF representative and a visit to the local school gave further insight into the nature of conflicts and gave the local citizens the possibility to voice their opinions and concerns. We deem the conflict situation in Ittoqqortoomit to be serious, for both bears and humans and recommend initiating mediation, first and foremost by supporting the official organization of a local Polar bear patrol, and secondly by replacing wooden crates for dog food storage with Polar bear safe containers in a trial experiment. By integrating the positive experiences learned from working with communities in Alaska and Canada in implementing mediation efforts in Greenland, with local adaption and community involvement as an added goal, the negative spiral of increasing DLP events as an outcome of rising conflict levels may be turned. We furthermore deem that the need for actions is immediate.

INTRODUCTION

Sea ice conditions are rapidly deteriorating due to global warming. This is resulting in an increased number of polar bears (Ursus Maritimus) spending more of their time ashore, in a state of heightened hunger. Due to the loss of important sea ice hunting grounds, polar bears are facing an uncertain future (WWF-Norway, "Safer people – Safer polar bears,").

Polar bear-human conflicts are not a new phenomenon, but are on the rise throughout a large part of the species range (Clarke 2012, Honderich 1991; Stirling et al.1977). In the context of climate change and dwindling sea ice in the Arctic, these conflicts are becoming increasingly important for circumpolar communities and for their governing states and institutions for several reasons (Obbard et al. 2010). Temporal trends in sea ice decline due to climate change leads to longer periods of overlap and increased conflict with people (Stirling and Derocher 1993; Stirling et al. 1999; Stirling and Parkinson 2006), and concurrently international aims for Polar bear conservation are high, (Vongraven and Peacock 2011), leading to greater protection levels for the species, thereby underlining the need for development and dissemination of best management practices (Amstrup et al. 2010; Obbard et al. 2010).

Deaths of Polar bears shot in defense of life and property are frequent outcomes during conflicts with humans, occurring in 61% (Fleck and Herrero 1988) and 92% of incidents (Gjertz and Persen 1987). In contrast, human injuries or fatalities are infrequent: together comprising only between1% and 6% of incidents of kills from bears of all species, in a North American study (Middaugh 1987) and (Herrero and Fleck 1990), respectively.

Although rare, each human injury or material damage associated with Polar bears is highly publicized and media coverage shapes public discourse about Polar bear conservation (Foote et al. 2009). In Greenland, no human fatality has been reported from Polar bears in the past 100 years, nor serious bodily injury. Still, media coverage shapes and directs the way in which certain environmental issues are viewed (Hirokawi 2003, Netrebo 2012) and understood, and Polar bears in the vicinity of larger townships in Greenland, do create substantial media attention, perhaps in part because of its rarity, but at the same time, drawing away attention from the smaller settlements where HPBC situations are quite common, less novel, but more adverse, and where the actual problems at hand could benefit from some factual media coverage to highlight the need for not only governmental guidelines, but knowledge, support and mediation.

Researchers and local communities in the Arctic report increasing interaction between humans and Polar bears since the 1970s and relate this partially to deteriorating sea ice conditions resulting from global warming. The sea ice forms later in autumn and does not to reach the same

extent of thickness it did before the onset of global warming. Today the extent of the Arctic summer sea ice is 30% less than it was at the beginning of the 1980s.The extent during winter has diminished by about 10%[1]. Earlier break- up of the sea ice in spring results in restricted access of Polar bears to the sea ice where they hunt their main prey; seals (Pinnipedia), especially the ringed seal (*Pusa hispida*).

Therefore Polar bears, who in their distribution are driven primarily by the described accelerating climate change and retreat of annual sea-ice, are spending increasing portions of the year ashore, and more often approach humans and associated sources of food. Furthermore the earlier sea ice break-up leads to a mismatch in relation to the timing of Polar bear females leaving their maternity dens with their cubs in springtime (Smith 2007).

FIGURE 2. POLAR BEAR SCAVENGING AT CAPE TOBIN, ITTOQQORTOORMIIT AUGUST 2014 © CHARLOTTE M. MOSHØJ /WWF 2014

The increased shore time of stressed and starving polar bears, in areas with human settlement, coupled with increased accessibility of polar bear territory to activities related to tourism and scientific research, adds up to an increased likelihood of polar bear – human encounters.

Increased negative interaction between polar bears and people may lead to a less accommodating view and acceptance of polar bears and contribute to the threats facing the population and species as a whole. Ironically, the increasing incidence of conflicts between people and polar bears comes as the overall population of the species is decreasing.

[1] (http://polarportal.dk/en/arctic-sea ice/nbsp/understanding-the-arctic-sea-ice/)

As a default reaction, polar bears are often killed when they get too close to camps or populated areas especially in areas considered outside their range, or in high-incident conflict areas, where inhabitants in general have rifles at hand. There are, however, non-lethal options for managing these situations including deterrence, education, and more effective management of possible attractants.

This report will cover main aspects of current polar bear conflicts in East Greenland, the nature of the conflicts, the underlying reasons, and main options to solutions that could be applicable, based on similar conflicts from other Arctic nations. Furthermore some background information on Polar bear biology and population status and management in Greenland will be given, as well as listing the methodologies applied for the field work based part of this study.

POLAR BEAR POPULATIONS AND ECOLOGY IN GREENLAND

19 population units of polar bears, called subpopulations, are recognized throughout the circumpolar Arctic by the IUCN Polar Bear Specialists Group (PBSG 2010). Genetic studies have shown that polar bears from the various subpopulations are genetically similar, (Paetkau et al 1999), and there seems to be no evidence that any of the groups have been evolutionary separated for significant lengths of time. Consequently, the rate of genetic exchange between these groups does not deem them as true subpopulations in an evolutionary sense of the definition. The status of the given subpopulations (fig.3) as assessed by the PBSG in 2013 are seven in decline, one increasing, and eight subpopulations cannot be assessed regarding status due to inaccurate or lacking knowledge and data.

Greenland encompasses five of the subpopulations of polar bears, The East Greenland subpopulation, the Davis Strait population, Baffin Bay- and Kane Basin population, and the Arctic Basin population. Little is known of the status of the East Greenland and Arctic Basin Population, while the Davis Strait, the Baffin Bay and the Kane Basin populations all are in decline.

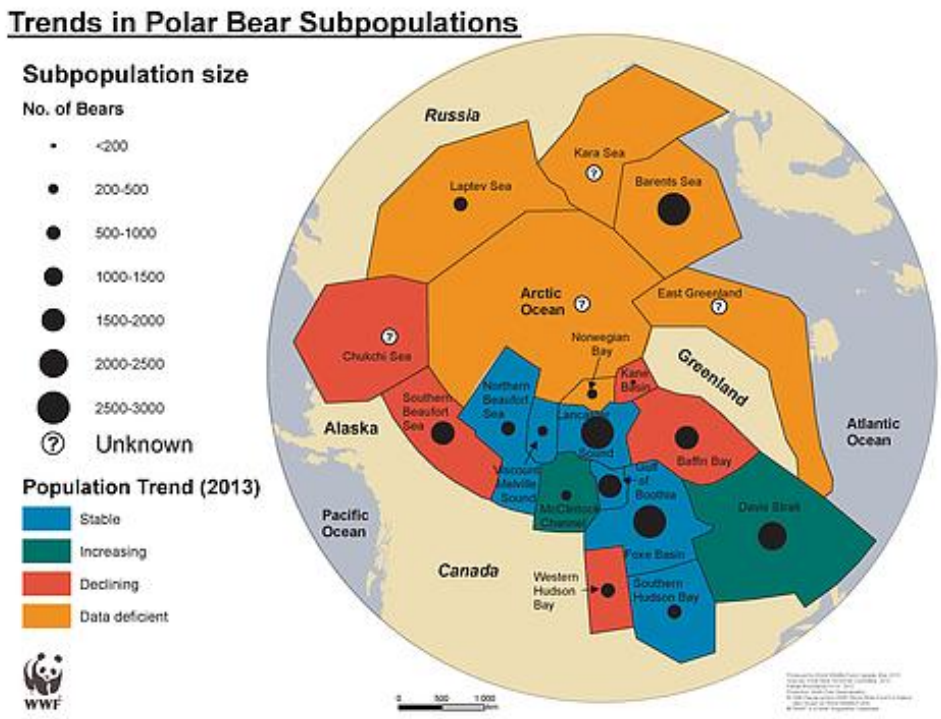

FIGURE3. MAP SHOWING POLAR BEAR SUBPOPULATIONS, ESTIMATED SIZE AND STATUS.

ARCTIC BASIN SUBPOPULATION

The Arctic Basin subpopulation is a geographic catchall to account for Polar bears that may be resident in areas of the circumpolar Arctic that are not clearly part of other subpopulations. Polar bears occur at very low densities here and it is known that bears from other subpopulations use the area (Durner and Amstrup 1993). As climate warming continues, it is anticipated that this area may become more important for Polar bears as a refuge but a large part of the area is over the deepest waters of the Arctic Ocean and biological productivity is thought to be low.

KANE BASIN SUBPOPULATION

Based on the movements of adult females with satellite collars and recaptures of tagged animals, the boundaries of the Kane Basin subpopulation include the North Water Polynya (to the south of Kane Basin), and Greenland and Ellesmere Island to the west, North, and East (Taylor et al. 2001a). Polar bears in Kane Basin do not differ genetically from those in Baffin Bay (Paetkau et al. 1999). The size of the subpopulation was estimated to be 164 ± 35 (SE) for 1994 – 1997 (Taylor et al. 2008a). The intrinsic natural rate of growth for Kane Basin Polar bears is low at 1.009 (SE, 0.010) (Taylor et al. 2008a), likely because of large expanses of multi-year ice and low population density of seals (Born et al. 2004). The Kane Basin population may act as a sink because of unsustainable rates of harvest, relatively unproductive habitat, and lack of genetic differentiation with the Baffin Bay population.

Davis Strait subpopulation

Based on the recapture or harvest of previously tagged animals and of adult females with satellite collars, the Davis Strait (DS) Polar bear subpopulation occurs in the Labrador Sea, Eastern Hudson Strait, Davis Strait south of Cape Dyer, and along an as yet undetermined portion of south-west Greenland (Stirling et al. 1980, Stirling and Killian 1980, Taylor and Lee 1995, Taylor et al. 2001a). A genetic study of Polar bears (Paetkau et al. 1999) indicated significant differences between bears from southern Davis Strait and both Baffin Bay and Foxe Basin; Crompton et al. (2008) found that individuals from northern portions of Davis Strait and those from Foxe Basin share a high degree of ancestry. In 1993 the estimate of the subpopulation of Polar bears in the Davis Strait was assessed to be 1400, and increased to 1650 in 2005. These increases were to account for the bias as a result of springtime sampling, the fact that the existing harvest appeared to be sustainable and not having negative effects on the age structure, and TEK (traditional ecological knowledge) which suggested that more bears were being seen over the last 20 years. The most recent inventory of this subpopulation was completed in 2007; the new subpopulation estimate is 2142. Presently, the Davis Strait population is stable or increasing according to IUCN. Ecological covariates associated with survival suggest that the decline may be as a combined result of short-term and local density dependence, stabilization of harp seal (*Pagophilus groenlandicus*) numbers and declining ice conditions.

Baffin Bay subpopulation

Based on the movements of adult females with satellite radio-collars and recaptures of tagged animals, the Baffin Bay (BB) subpopulation of Polar bears is bounded by the North Water Polynya to the North, Greenland to the East and Baffin Island, Nunavut, Canada to the west (Taylor and Lee 1995, Taylor et al. 2001a). Movements of tagged bears, indicate a distinct southern boundary at Cape Dyer, Baffin Island,(Stirling et al. 1980, Taylor et al. 2001a). A study of microsatellite genetic variation did not reveal any significant differences between Polar bears in BB and neighboring Kane Basin, although there was significant genetic variation between Polar bears in Baffin Bay and those in Davis Strait (Paetkau et al. 1999). An initial subpopulation estimate of 300 – 600 bears was based on mark-recapture data collected in spring (1984 – 1989) in which the capture effort was restricted to shore-fast ice and the floe edge off northeast Baffin Island. However, work in the early 1990's showed that an unknown proportion of the subpopulation is typically offshore during the spring and, therefore, unavailable for capture. A second study (1993 – 1997) was carried out during September and October, when all Polar bears were ashore in summer areas on Bylot and Baffin islands (Taylor et al. 2005). Taylor et al. (2005) estimated the number of Polar bears in Baffin Bay at 2,074 ± 226 (SE). The current abundance estimate is less than 1,600 bears based on simulations using vital rates from the capture study (Taylor et al. 2005) and up-to-date pooled Canadian and Greenland harvest records.

East Greenland subpopulation

The East Greenland Polar bears are thought to constitute a single subpopulation with only limited exchange with other subpopulations (Wiig 1995, Born et al. 2009), although various studies have indicated that bears from other regions may occur sporadically within the range (EG; Born 1995a, Dietz et al. 2000, Sandell et al. 2001). Satellite-telemetry has furthermore indicated that EG Polar bears range widely along the coast of Eastern Greenland and in the pack ice in the Greenland Sea and Fram Strait (Born et al. 1997, 2009, Wiig et al. 2003), and that directional movement also occurs against the main direction of the ice-flow. At the same time, the telemetry data indicates that contact and overlapping ranges between EG and the Barents Sea sub-population is minimal (Wiig 1995, Born et al. 1997, 2009, Wiig et al. 2003)[2], although home ranges of bears from the East Greenland subpopulation overlap with those of bears from Svalbard in Fram Strait.

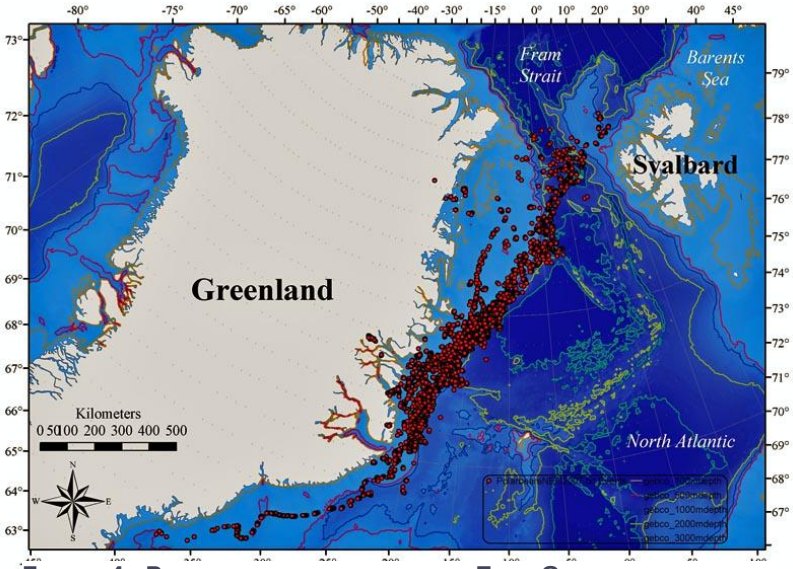

Figure 4. Polar bear distribution in East Greenland illustrated by satellite positions for tagged polar bears during 1993-1998 and 2007 (http://www.natur.gl/pattedyr-og-fugle/havpattedyr/isbjoern/)

In contradiction, , there is little evidence of genetic difference between subpopulations in the Eastern Greenland and Svalbard-Franz Josef Land regions, indicating substantial gene flow, (Paetkau et al. 1999). The highest occurrence of Polar bear dens is found in the National Park area, but may even occur in the south-eastern coastal areas[3]. Polar bears are known to frequent southwestern Greenland, by route of the pack ice from the East coast (Storisen) (Rosing-Asvid 2002). No inventories have been conducted in recent years to determine the size of the Polar bear subpopulation in Eastern Greenland, and their number is therefore unknown.

Polar bear ecology

In Greenland, female Polar bears become sexually mature around 4-5 years of age, and give birth for the first time at 5-6 years. Males become sexually mature at 5-6 years. The female Polar bears heat lasts from the end of March until June, with a peak in April/May. While on heat, the female

[2] http://pbsg.npolar.no/en status/populations/east-greenland.html
[3] http://www.natur.gl/pattedyr-og fugle/havpattedyr/isbjoern//

Polar bear emits a scent which attracts the adult males that during this period keep in close contact and vicinity of the females. Ovulation is activated by the act of mating, but the fertilized egg does not begin development before implantation into the uterus wall in October/November, also called “delayed implantation”. During this time the female bear digs a den. The female remains in the den for many months, in a state of fasting. The Polar bear utilizes its fats stores, while body temperature and metabolism only are slightly reduced to allow for fetal growth. The cub/cubs (one-four, but most commonly a single or two cubs) are born in the den in December/January, and the timing of implantation, denning and birth ensures that the cubs are born when the daylight has returned and the food supply is plentiful, in the form of new born ringed seal pups. Polar bear cubs only weigh around 600 grams at birth. Continued growth following birth is ensured by the intake of milk from the female bear, with a high fat content, of about 45%. The cubs keep company with their mother until they are 2.5-3 years old, and female bears therefore only produce a litter every third year, unless they lose their cubs earlier.

FIGURE 5 FEMALE POLAR BEAR AND CUBS ON LAND FOLLOWING ICE BREAK UP ©TRAVELWILD.COM

During spring, Polar bears hunt on the shore fast ice edge in search of seals. When summer comes, many bears stay with the retreating pack ice, or are stranded on land for periods of time due to earlier breakup of the ice. Stranded bears may find alternative prey when ice break up prevents them catching seals, or they may be reduced to scavenging or fasting, thereby increasing the risk of interactions with human settlements and conflict situations. In the fall, the bears return with the pack ice to coastal areas, and may travel along the coast. Therefore this is another period, where the risk of human-Polar bear conflict situations is enhanced. During winter,

the male and juvenile Polar bears, and family groups keep to the pack ice and its vicinity, while the adult pregnant female bears den.

Polar bears in Greenland live on average to be 20-25 years. The oldest bear caught in Greenland, was a 30 year old male bear. Mortality is highest during infancy, following the months when they leave the safety of the den. Small cubs follow their mother onto the drift ice, and severe weather is a risk. Studies in Canada, Alaska, West Greenland and Svalbard indicated that around 35-85% of cubs do not survive their first two years of life. Infanticide by male Polar bears is another risk; this is believed to be a behavior that ensures the individual males own genes, by eliminating offspring of competitors. Another theory is that killing of young reduces food competition, within the male bear's territory. Since cubs are not only killed, but also ingested, hunger could furthermore enhance and drive this behavior. Previously, the concern over male Polar bears killing small cubs was believed to be a problem for the Polar bear populations in Greenland, and led to
the release of seasonal hunting restrictions on male Polar bears, a ruling that later was revised. Young bears, inexperienced to hunting, and old / weak bears are most susceptible to starvation. Furthermore, studies have shown that pollution may affect bears by weakening their immune defense, and result in pollutants accumulating in their extensive fatty tissue (Sonne 2011). While Polar bears have few natural enemies, human harvest takes its toll. In Greenland, prior to the quota system introduced in 2006, the annual harvest varied between 121-278 bears with an average value of 174 bears a year.

Polar bears have very low reproductive rates due to delayed maturation, small litter sizes, long mother-offspring bond, and variable but often high cub death rate. The low reproductive rates mean that population growth rates are low, and if a population is substantially reduced then a long time is required for the population to recover: This is particularly so for populations that undergo continued harvest, or small populations. Small populations of all species are particularly vulnerable to over-harvest. In some areas, Polar bears have extremely small home ranges and good habitat may be limited. Under such conditions, most of the population may be concentrated into a small area. Therefore, it is possible to maintain a high harvest rate until the population is greatly reduced in numbers Therefore, if a population is excessively harvested and greatly reduced in numbers, then it may take many years or even decades for the population to return to its original size.

Figure 6. Females produce a litter every third year if conditions are ample. Cubs keep company with their mother until they are 2.5-3 years old. © David Jenkins / WWF-Canada

Polar bears and Sea ice

Approximately two-thirds of the Arctic is ocean, including the Arctic Ocean and its shelf seas plus the Nordic, Labrador, and Bering seas (ACIA 2005). The two primary forms of sea ice are 1) seasonal (or first year) ice, which is ice in its first year of melt and 2) perennial (or multi-year) ice (Polyak et al. 2010).

Some first-year ice survives the summer and becomes multi-year ice. In the present climate, old multi-year ice floes that have not been deformed by pressure ridges are about 3 meters thick at the end of winter (Cavalieri et al. 1997, Parkinson et al. 1999). Presently the extent area of sea ice area decreases from roughly 12 million km2 in March to five million km2 in September, as much of the first-year ice melts during the summer. The total area of multi-year sea ice has decreased considerably relative to the 1981-2010 average (see fig. 7)

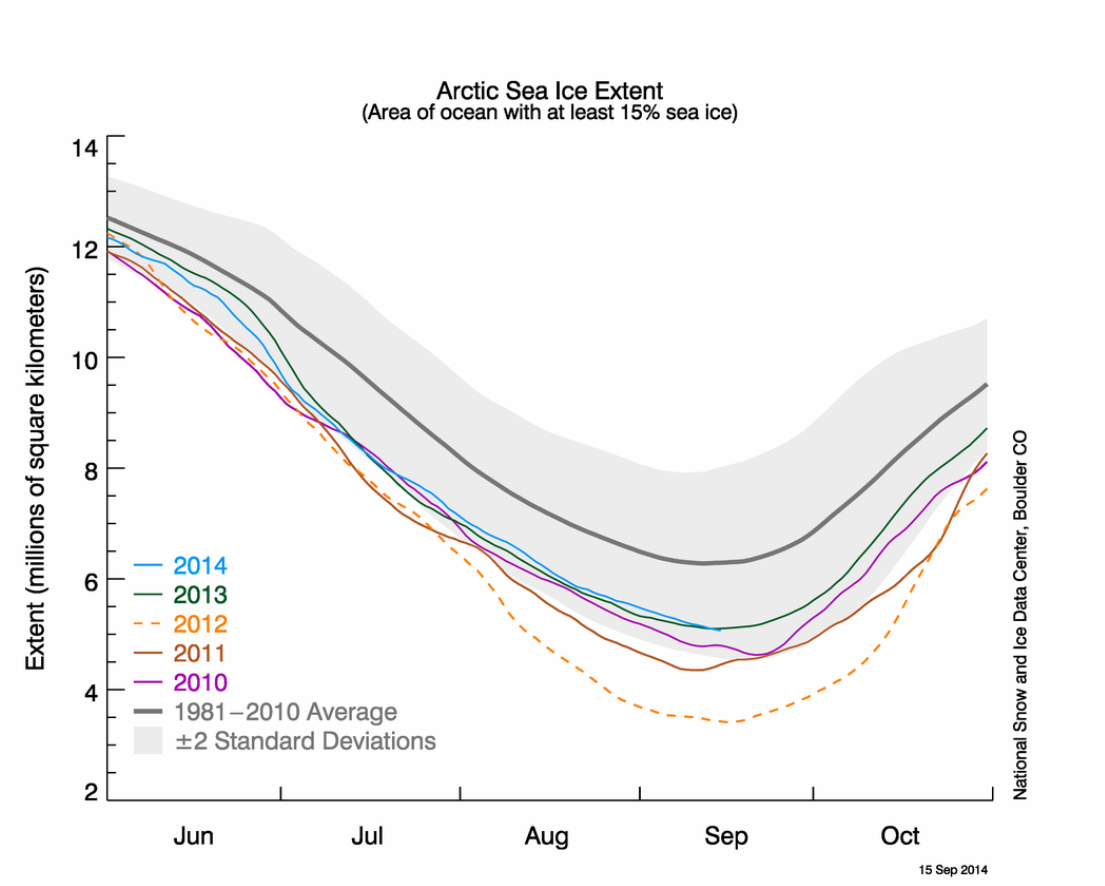

Figure 7 annual arctic sea ice extent (http://nsidc.org/arcticseaicenews/)

For Polar bears, under present conditions in the Arctic, compelling evidence points to the presence, distribution and composition of suitable sea ice available during the critical stages of the Polar bears life history as the main determining factor in the long term persistence of the subpopulations. Polar bears respond to variations in sea ice concentration, thickness, floe size,

FIGURE 8. FOR POLAR BEARS THE PRESENCE, DISTRIBUTION AND COMPOSITION OF SEA ICE IS A CRITICAL FACTOR FOR FUTURE EXISTENCE OF POPULATIONS © PAUL SOUDERS/CORBIS

the proximity of sea ice edges and water depth beneath the ice, selecting for sea ice that lies over the continental shelves, (Durner et al. 2009), and becoming land-fast when the sea ice melts[4].

In Baffin Bay, Davis Strait, and Western Hudson Bay and other areas of Canada and Greenland, Inuit hunters are reporting an increase in the numbers of bears present on land during summer and fall (Dowsley and Taylor 2005, Dowsley 2005, Born et al 2011). In many instances, the hunters believe this to be a result of increased population size. However, in an extensively studied Polar bear population with a long time series of capture data in Western Hudson Bay, monitoring data indicates that this population has in fact declined, and that the distribution pattern appears to be changing (Regehr et al 2007, Stirling and Parkinson 2006). Also the Baffin Bay population is declining (Stirling and Parkinson 2006). One of the main effects of the diminishing sea ice is ultimately the subsequent decline in Polar bear populations (Obbard et al. 2010). Earlier spring break up of sea ice was shown to have led to the decline in the Western Hudson Bay population between 1987 to 2004 by 22%, which was attributed to the resulting shortened time that bears can hunt on the ice (Regehr et. al. 2007). Furthermore the Southern Beaufort Sea, population

4 http://pbsg.npolar.no/export/sites/pbsg/en/docs/PBMonPlan_Draft6B_Board.pdf

appears to have declined from an estimated 1,800 bears in 1986 to 1,526 bears in 2006, which has been attributed to loss of sea ice (Obbard et al. 2010).

When ice conditions change, altered home ranges and movement rates of Polar bears may reflect this, which has been proven for the Western Hudson Bay population, where decreased ranges and movement, were believed to be related to reduced prey intake correlated with earlier ice break up (Parks et al 2006). These distribution shifts were restricted to shifts within the same general area, but shifts in movement and range size may also expand on land when food restricted Polar bears lose hunting grounds on the sea ice, and in both cases, local communities may experience more frequent observations of Polar bears in the settlement areas. Distribution changes in response to recently 12 recorded extreme ice retractions in areas such as the Chukchi Sea, Davis Strait and Arctic Basin, as well as other populations are undoubtedly also occurring, yet remain un-quantified by telemetry or aerial survey data (Towns, Derocher et al. 2009)

Survival of adults, juveniles and cubs, and overall reproductive rates are also declining as a result of the changes in ice and climate, as seen in the Beaufort Sea populations, as well as in the Hudson Bay populations, in studies from 1981-1998 (Stirling et al. 1999) and 2007-2011 (Regehr et al 2007, 2010 & Stirling et al. 2011). Furthermore, body condition and body size was shown to decline in Polar bears three years and older, between 1982 and 2006 in the Southern Beaufort Sea, which was attributed to increased nutritional stress (Rode et al. 2010).

Due to the delayed formation of stable sea ice for Polar bears to travel and hunt on, the bears are starving, and physically weaker and less healthy when it comes time to return to the ice. Female Polar bears are now on average 40 kg lighter than they were in the early 1980s (Stirling et. al 1999) They give birth to fewer cubs with average lower birth weights, which means they have a lower rate of survival. This decreases the possibility of maintaining stable populations. Polar bears that had starved to death, were found in the Southern Beaufort Sea during the spring of 2006 (Regehr et al. 2006), and researchers found that two to three times as many Polar bears were in a fasting state in 2005 and 2006 compared with 1985 and 1986, indicating increased nutritional stress (Cherry et al. 2009). Significant effects of extended starvation may also effect the future generations of Polar bears, due to cohort effects.

Nutritional stress is also believed to be behind documented altered hunting behavior, including increased observations of cannibalism, not only on cubs, as in known incidents of infanticide, but also on adult bears. Polar bears were documented using abnormal and inefficient hunting behaviors in spring of 2004 to 2006 in which they clawed holes through solid ice to try to catch seals (Stirling et al. 2008), and altogether nine instances of cannibalism were documented in 2004 -2009 in the Southern Beaufort Sea region and Hudson Bay, including an unprecedented incident in which a male Polar bear stalked, killed, and ate a mother Polar bear in her den (Amstrup et al. 2006, Stirling et al. 2008, PBI 2009).

When the freezing of sea ice in the fall is delayed, this may also lead to degradation of denning habitats, as stable ice and snow cover is not available when it is time for the Polar bears to dig their dens. The proportion of Polar bear maternal dens on pack ice decreased between 1985 and 2005 in the Southern Beaufort Sea (Fischbach et al. 2007), and denning habitat along the Alaska coast is being threatened by increasing coastal erosion due to changes in climate (Durner et al. 2006).

In the last decade, as a consequence of diminishing sea ice, incidents of long distance swimming and drowning Polar bears have increased. In the Beaufort Sea a survey conducted in September 2004 found 14 of 55 Polar bears (25%) in open water, of which four bears were drowned. Prior surveys during September 1987-2003 had observed only 4 % of bears swimming in open water and none drowned (Monnett and Gleason 2006).

An adult female was furthermore documented making a 687 km continuous swim over nine days to reach the distant sea-ice edge, followed by an 1800 km walk and swim, in fall 2008 in the Beaufort Sea during which time she lost 22% of her body mass and her yearling cub (Durner et al. 2011).

FIGURE 9. AS A CONSEQUENCE OF DIMINISHING SEA ICE, INCIDENCES OF LONG DISTANCE SWIMMING AND DROWNING POLAR BEARS HAVE INCREASED HTTP:// /2012/05/CAN-SUPER-ATHLETE-ENDURANCE-OF-POLAR.HTML

The fact that Polar bears are being forced to swim increasingly longer distances to find stable ice or reach land, increases mortality of their cubs (Pagano et al. 2011). A survey in the Chukchi Sea in August 2008 recorded ten Polar bears swimming in open water, with one bear more than 100 km (60 miles) from shore (Clarke et al. 2011).

Concurrently, diminished sea ice has led to concentration of Polar bears in areas where humans are more likely to encounter them. In the Southern Beaufort Sea Polar bears have shifted from offshore pack ice to the coast in fall as sea ice has retreated increasingly far from shore (Schliebe et al. 2008, Gleason and Rode 2009). Similarly, on the Chukchi Sea coast increasing numbers of Polar bears have been observed in November and December in the past 15 years (Kochnev 2006), and bears in this region have been delayed from returning to sea ice in fall by two to three weeks compared to the 1980s (S.E. Belikov cited in Durner et al. 2009).

More frequent sighting and increased number of conflicts with Polar bears can lead to the misconception that bears are increasing, but in fact most data points to the populations being in overall decline as a result of previous overhunting and climate change effects on demographic rates (Dowsley, M. and Wenzel, G. 2007). While populations are declining, conflicts are increasing when longer ice free seasons force the bears onto the land for longer periods of time. If the climate continues to warm and eliminate sea ice as predicted, Polar bears are predicted to disappear from the southern portions of their range. They may persist in the northern Canadian Arctic Islands and northern Greenland for the foreseeable future in areas with remaining sea ice, but their long-term viability, with a much reduced global population size and fragmented habitat in a remnant of their former range is uncertain (Stirling, I. and Derocher, A. 2012).

Other Conservation Issues

Pollutants

Polar bears are apex predators in Arctic marine ecosystems and are exposed to high levels of pollutants that are magnified with each step higher in the food web. Pollution in the Arctic is transported northward by the large rivers draining into the Arctic and on wind and ocean currents that bring pollutants from southern latitudes. The pollutants of most concern are organochlorines that are, or were, used in industry or as pesticides. A key characteristic of the pollutants is that they are persistent in the environment and resist degradation. Some pollutants such as polychlorinated biphenyls (PCBs) were used widely in industrial applications precisely because they were extremely stable. Other pollutants such as dieldrin, DDT, toxaphene, and chlordanes were used as pesticides but they are also stable enough to be transported long distances to the Arctic. Many of the pollutants are now banned from use in most countries but they are so persistent that they will likely remain in the environment for decades to come. Unfortunately, many of the organochlorine pollutants are lipophilic or "fat loving" and bond tightly to fat molecules. Because the Arctic marine ecosystem is highly dependent on fat for insulation, buoyancy and energy storage, these pollutants are accumulated in higher levels up the food chain. Polar bears are particularly vulnerable to organochlorines because they eat a fat rich diet. Ringed, bearded, and harp seals comprise the main food of Polar bears and the blubber layer is

Figure10. Polar bear consuming a seal, a fat rich diet which means a high intake of potential persistent organic pollutants www.scanpix.dk

preferentially eaten by the bears and subsequently, the intake of pollutant is high (Sonne 2011). Persistent Organic Pollutants (POPS) accumulated in the blubber are released during starvation when the fat is mobilized to meet the bear's large energy demand, for example for females in the denning period. Polar bear milk is high in lipids, and consequently the cubs are exposed to high levels of POPS. This has resulted in affects on reproductive organs, decreased immune reactions and bone density as verified in East Greenlandic Polar bears (Walker 2006).

Potential effects of oil spills on Polar bears

Oil development in the Arctic poses a wide of range of threats to Polar bears ranging from oil spills to increased human-bear interactions. As oil development increases in Polar bear habitat, there is an increased risk that oil spills will occur. It is probable that an oil spill in sea ice habitat would result in oil being concentrated in leads and between ice floes resulting in both Polar bears and their main prey (ringed and bearded seals) being directly exposed to oil. Studies have shown that Polar bears exposed to oil will absorb large quantities of oil in their fur[5]. Following oil exposure, Polar bears groom themselves and can digest sufficient oil to result in kidney failure, digestive system disorder, and brain damage that ultimately result in death. Other effects include loss of insulation from fur, hair loss, and skin and eye irritations.

Figure11. Oil development in the Arctic poses several threats to Polar bears ranging from oil spills to increased human-bear interactions. http://social.rollins.edu/wpsites/ /Exxon-Valdez-oil-spill.jpg

Another concern is that seals covered in oil may be a major source of oil to Polar bears. The effects of minor and chronic exposure to oil are unclear. The general consensus is that a Polar bear population exposed to a large oil spill could suffer widespread mortality sufficient to greatly reduce the population but this is dependent upon the time of year, sea ice conditions, and the area of the spill. Given the low population growth rates of Polar bears, a population damaged by an oil spill may take many years to recover. Another concern from oil development arises from

[5] http://pbsg.npolar.no/en/issues/threats/oil-development.html

exploration methods such as seismic surveys. Studies suggest that Polar bears are sensitive to disturbance at maternity den sites. Disturbance could occur both when a pregnant female is selecting a den site and during the winter-spring after the cubs are born. If exploration or development activity occurs sufficiently close to a den, the mother may abandon the den prematurely or abandon her offspring.

The accumulated effects of increased ship traffic, pollution from drilling compounds, and the effects of noise on Polar bears and their prey are unknown.

TOURISM

Tourism in the Arctic is increasing rapidly as people seek out new adventures and the Arctic becomes more accessible as a tourist destination. The number of conflicts with people will rise as the number of people in Polar bear habitat increases. Some of the problems occur simply by having people in Polar bear habitat. Polar bears often investigate novel items: this can be snowmobiles, cabins, tents or humans. Often inexperienced people perceive a curious bear as a threat and thus shoot the bear. Camping in prime Polar bear habitat and not emending to security measures when setting up camp (trip wire alarms etc.) contribute to problems.

Some tour operators have baited Polar bears to tourist vehicles, allowing tourists to see and photograph the bears up close. Such situations can cause problems when mothers with young venture into areas they would normally avoid: specifically, areas with other bears that may kill their young. Juvenile Polar bears have been killed by adult males when their mothers have been baited by a tourist vehicle where other bears had gathered (Dyck, M.G and Daley K.J. 2002).

In many areas, Polar bears have been killed at cabins or remote stations after following a scent of food. Habituated Polar bears may become dangerous as they lose their normal wariness and are more likely to seek out humans. Polar bears are fast to learn that human settlements may provide food, and habituated Polar bears are often killed when they approach settlements, garbage dumps and camps

Studies suggest that Polar bears are sensitive to disturbance at maternity den sites. (N. J. Lunn 2004). Disturbance could occur both when a pregnant female is selecting a den site and during the winter and spring after the cubs are born. If exploration or development occurred sufficiently close to a den, the mother may abandon the den prematurely or abandon her offspring[6].

6 http://www.jstor.org/discover/10.2307/3872901?uid=3737880&uid=2&uid=4&sid=21104729214807

POLAR BEAR HARVEST AND MANAGEMENT IN GREENLAND

Up until the 1960´s there were no restrictions on Polar bear hunting in Greenland. Anyone who observed a Polar bear was entitled to kill it. Open hunting of Polar bears was discontinued in the mid-1960s and now only professional licensed hunters have been allowed to hunt Polar bears. Harvest of Polar bears in Greenland was undertaken without quotas until 2006, when the Government of Greenland introduced system of annual quotas of total allowable catch (TAC). The quota is divided between relevant municipalities by the Ministry of Fisheries, Hunting & Agriculture in consultation with the Hunting Council, and are bound by international agreements, such as The International Agreement on the Conservation of Polar bears, as well as based on biological advice from the Greenland Institute of Natural Resources. Since implementation of the quota system, the number of bears killed in Greenland collectively under the quota and due to conflict killing has averaged between 118 -138 bears (see table 1.)

Year	2006	2007	2008	2009	20010	2011	2012
Polar bears killed	135	126	137	118	122	131	138

TABLE 1.POLAR BEARS KILLED ANNUALLY SINCE QUOTA IMPLEMENTATION; INCLUDES BEARS KILLED IN CONFLICT (DLP) (AS REPORTED IN PINIARNEQ (GREENLAND GOV. 2014)

REGULATIONS

Greenland´s national regulations for Polar bear management are furthermore fixed by law in Executive Order no. 21 of 22 September 2005 on the Protection and Hunting of Polar bears. It is prohibited to hunt females accompanied by one or more cubs, or to disturb denning Polar bears. Only professional occupational hunters of Greenlandic nationality can obtain a license for Polar bear harvest. All hunters must obtain such a license issued from the local authorities before the hunt, and immediately after the hunt, the hunter must report the catch to the local authority by filling in a standardized form for all Polar bear kills. The form furthermore includes information on the hunters name and license number, geographic location, date and sex, age and markings of the harvested specimen. Every year the hunter must report total catch including bears struck and lost to the Department of Fisheries, Hunting and Agriculture. This double reporting system is thus used to validate all catches. Bears killed in conflict, outside the quota, must be applied for by special permit from the Ministry of Fisheries, Hunting & Agriculture. In some instances when conflict bears are killed under circumstances where no such license was sought beforehand, the permit may be given after the bear is killed. The Polar bear quotas for all of Greenland, and specifically for East Greenland, are given in table 2 and 3.

Population	Quota 2014
Baffin Bay (Kangaatsiaq – Savissivik)	67
Davis Strait (Paamiut – Sisimiut)	3
East Greenland (East Greenland)	64
Kane Bassin (Qaanaaq) (Savissivik exempted)	6
Total	140

TABLE 2. POLAR BEAR QUOTA GREENLAND 2014 (PINIARNEQ2014)

East Greenland	Quota 2014
Ittoqqortoormiit	35
Tasiilaq	25
Nanortalik	4

TABLE 3.POLAR BEAR QUOTA EAST GREENLAND 2014 (PINIARNEQ 2014)

Bears are caught regularly in three areas in Greenland; East, North and South Greenland. In East Greenland, Polar bears were previously hunted on sledding trips further from the settlements than today, where Polar bears quite often can be hunted close to town, and in Ittoqqortoormiit area, Polar bears are often shot in the vicinity of Cape Tobin, along the coast from walrus bay and in hurry inlet, and further North in Liverpool land. In south Greenland bears are caught opportunistically, usually in the ice field during spring and summer, or when they sporadically appear in vicinity of the settlements and towns in these areas. A report on Polar bear harvest in Greenland (Rosing-Asvid 2002), prior to the harvest quota was instated, reports that the total yield has been stable in East Greenland during the reported period 1980-2002, whereas Central and Northwest Greenland have experienced an increase since mid 1980's, probably as a result of more bears in the area. More old bears are caught in Ittoqqortoormiit than in Northern Greenland/ Thule area and along the coast, there seems to be several segregations between sex and age groups

Bears killed in defense of life and property

In the newest edition of Piniarneq (2014) which reports on hunting statistics from 2012 and matters of relevance to hunting laws and regulations, it is stated that 2012 is the year with the highest number of bears killed in conflict up until now. 10 bears were killed in 7 different incidents, which equals 10 of that year's total quota of 140 bears. The number of conflict bears killed is a doubling of previous year's number. Since bears killed in conflict are not taken out of the quota per se, these bears are an additional harvest relative to the total number. In 2012, the quota though was not filled, and the total number of bears harvested (Quota+DLP) still is within the given limits of 140 bears (See tables 1&2). The Ministry of Agriculture, Fisheries and Hunting are due to this large rise in killing of conflict bears considering measures, where conflict bears killed are taken from the total allowable quota, since the annual quota is calculated as the highest sustainable yield from the given populations. Furthermore they have developed written guidelines, on how to deal with problem bears in the vicinity of settlements. The products pertaining from Polar bears killed in conflict are confiscated by the local authorities and do not in any way befall the individual hunter or warden. Often the meat products are later distributed amongst local institutions, i.e. nursing homes or other similar facilities. The byproducts, fur, skull, bones and relevant organs are sent to the Greenland Institute of Natural Resources for further research.

Figure 12 Polar bear killed under the quota hurry inlet, may 2014 ©ruth aaqqii http://ultimatunu.wordpress.com/

Greenland has signed the Biodiversity Convention (CBD), which commits to nature protection and maintaining biodiversity and sustainable harvest of natural resources, as well as the Convention on International Trade in Endangered species of Wild Flora and Fauna (CITES) making it possible to track the degree of trade in certain endangered or threatened species. In practice this means that special permits are required, or in certain cases that it is completely forbidden to trade in certain rare species dependent on their status. The Polar bear is listed as an annex II species, and since 2008, Greenland has had an export-ban on Polar bear products, and therefore products can only be sold or traded within Greenland. The ban on export of Polar bear products had led to a sharp decline in the value of Polar bear pelts and products, and hunters who individually have to arrange for the sale of these products have lost a valuable source of income. One Polar bear skin

is normally equal to the value of several seal skins, and prior to the ban the income from a Polar bear skin, along with the value and food supply from the meat, may ensure a family's income for a month or two. There are regional differences in the usage of Polar bear skins, and in East Greenland, almost all skins were put up for sale, as the usage of Polar bear skins for trousers or other clothing is not common in this region, as it is in North-west Greenland where the bear skin is of greater practical value than monetary, and where many boys are given their first pair of Polar bear trousers at a quite young age. Therefore, it is in East Greenland, where the export ban is felt imperatively hardest on the hunter's annual income.

Greenland, as one of the Polar bear range states has committed to developing a national action plan, as well as conforming to a circumpolar Arctic plan (CAP) that is to be formalized at the next meeting of the range states which will be held in Greenland in 2015. The foundation of the CAP is the 1973 Agreement and the IUCN Polar bear Species group (PBSG) is rendering scientific support and advice. The CAP will link into the national action plans, as well as to other relevant initiatives being developed elsewhere (e.g. Arctic Council). Two of the main objectives of CAP are furthermore to ensure responsible harvest practices, and to manage human-Polar bear interactions.

TRADITIONAL ECOLOGICAL KNOWLEDGE ON GREENLAND SUBPOPULATIONS

Born et al. (2008, 2009, 2011) interviewed 72 Polar bear hunters residing in northwest Greenland, who hunted in Baffin Bay and Kane Basin. The majority of the informants noted an increased occurrence of bears closer to the coast (i.e., in areas usually used for hunting). A majority (about 31%) of the respondents specified that the reason for this change was an increase in the number of Polar bears, whereas 16% of the respondents specified it was due to a decrease in sea ice cover. The hunters in the Qaanaaq area were more inclined to believe that a decrease in sea ice cover explained the increase in coastal occurrence of Polar bears, whereas the informants in the Upernavik area further south primarily believed it was an increase in the total number of bears. That Polar bears had been scarce during the 1960s and 1970s was generally agreed. During recent years, perhaps beginning in the 1990s, the hunters noted marked environmental changes. Most pronounced, and of greatest importance to hunting, was the decrease in sea ice cover. This change, most pronounced in the southern parts of the Upernavik district, was mentioned by some of the informants as an additional reason for the increased catch of bears since the early 1990s (a boat has a larger range and can cover more ground faster than a sled). About 24% of the informants said that Polar bears demonstrated physical changes (e.g., had become thinner either as a result of increased competition or access to less food due to a decrease in sea ice). Thinner

bears were more frequently reported in Qaanaaq than in the Upernavik area. The reason for the regional difference is not clear.

An interview survey conducted in 2006 showed that until 2006 (i.e., before quotas) more than 1/3 of the Polar bears taken by Greenlanders living in the Qaanaaq area were hunted in northern Smith Sound and Eastern Kane Basin. Due to the reduction of sea ice there has been a decrease in dog sled hunting trips to these areas and an increase in the proportion of Polar bears that are taken from skiffs since the 1990s. It was the impression that bears have come closer to inhabited areas. Several interviewees were of the opinion that this represents an increase in the Kane Basin population, whereas other suggested that it might reflect a change in distribution related to the decrease in sea ice (Born et al. 2008, 2009).

In 1999, 52 hunters living in Eastern Greenland (30 from Ittoqqortoormiit and 22 from the community of Tasiilaq) were interviewed about Polar bear distribution and occurrence, and about the Polar bear hunt (Sandell et al. 2001). Groups of bears showing site fidelity were thought to exist in both the Ittoqqortoormiit and Tasiilaq areas. Observations of maternity dens were sporadic and overall, information about such dens was scarce. Generally, the hunters had not noted any changes in distribution or abundance of Polar bears. The overall opinion was that the abundance of bears reflected natural fluctuations in abundance of prey (in particular seals) which on the other hand depended on natural variation in the extension and seasonal distribution of ice. However, in both areas it had been noted that the ice conditions had deteriorated since the mid-1990s. While Polar bears are hunted mainly by use of dog sleds, however hunting with skiffs powered with 50-70 horsepower out-board engines had become increasingly important since the early 1980s, reflecting the decline in sea ice resulting in a longer boating season (Sandell et al. 2001).

Dowsley and Wenzel (2008) studied TEK of the Baffin Bay subpopulation through semi-directed interviews. While they found significant differences in the responses among communities in Nunavut regarding whether there had been any change in the size of the subpopulation and numbers of bears in town, the majority of respondents in each community reported an increase. No respondent indicated a decrease in the subpopulation or a decrease in the numbers of bears in communities. Respondents also observed receding of the floe-edge towards land, and a decrease in the amount of land-fast ice in the region.

CHARACTERISTICS OF PROBLEM POLAR BEARS

Although the term is often used, the term “problem bear” lacks a clear descriptive definition (Stenhouse et al. 1988, Calvert et al. 2002). A problem Polar bear or a Polar bear “Killed in defense of life and property” (DLP) is defined as a Polar bear that come into close contact with

humans, or their property and is destroyed to preserve the life of one or more people when public safety is considered to be at risk.

The potential for Polar bear–human interactions (defined as one or more persons and one or more bears being aware of one another) (Smith et al. 2007) is increasing in the Arctic and in Greenland specifically (Vongraven, D. et. al. 2012) Increases in the human population (Inuit and non-Inuit), economic development through natural resource exploration and extraction, and interest in the Arctic as a tourist destination can contribute to the likelihood of Polar bear– human interactions occurring (Stirling and Calvert 1983, Ross 2000)

Defining Human Polar bear conflict

A human–bear conflict has occurred when a bear has (1) exhibited stress-related or curious behavior, causing a person to take extreme evasive action (Schirokauer and Boyd 1998), (2) made physical contact with a person (e.g., to assert dominance, while acting defensively or taking human food) or exhibited clear predatory behavior, or (3) was intentionally harmed or killed (not including legal harvests) by a person (e.g., poached, wounded/killed).

Figure 13. The potential risk for human-Polar bear interactions is increasing in the Arctic. Photo: http://www.ens-newswire.com/ens/oct2009/20091030_hunterbear.jpg

The government of Greenland has defined guidelines for human Polar bear conflict situations[7], which also include the following confiscation of the pelt, skull and stomach of the individual bear following a conflict killing. In short, these guidelines state that feeding of Polar bears is forbidden, and that one should keep a safe distance too, and retreat away from Polar bears that are observed in the wild. Certain hot spot Polar bear areas are listed as areas of high risk, and it is listed which potential signs of Polar bears one should be on the lookout for, when in potential Polar bear habitat. Furthermore a step by step ordination of action involving meetings with Polar bears are given, and special focus is given to defining the age by size, of Polar bear cubs in company of their mother, as the killing of mother with cubs is forbidden (exempting conflict situations). Another more detailed description of how to best avoid encountering a Polar bear in its habitat, including best methods of deterrence and how to set up various alarm systems around camps and responses to conflict situations, is given in Henning Things "Encounters with wildlife in Greenland"[8] (Thing, H. 1990).

Scientific term	Definition
Human bear interaction	An occurrence when a human and bear are mutually aware of each other
Incident	An occurrence that involved a human-bear conflict or episodes where bears caused property damage, obtained anthropogenic food, killed or attmpted to kill livestock or pets, or were involved in vehicle collisions.
Conflict	When a bear exhibited stress-related or curious behaviour, causing a person to take extreme evasive action, made physical contact with a person or exhibited clear predatory behavior, or was intentionally harmed or killed (not including legal harvests) by a person.

TABLE 4. TERMINOLOGY USED IN HUMAN-BEAR CONFLICT MANAGEMENT AS RECOMMENDED IN CLARK ET. AL.(2012) AND HARPE ET. AL. (2010)

[7] http://dk.vintage.nanoq.gl/Emner/Erhverv/Erhvervsomraader/Fangst_og_Jagt/Saerinstrukser/S%C3%A6rinstrukser%20for%20problembj%C3%B8rne.aspx

[8] http://www.zackenberg.dk/fileadmin/Resources/DMU/GEM/Zackenberg/pdf/encounters-with-wildlife.pdf

In Greenlandic communities, traditions of drying, aging, and storing of foods outdoors are still practiced. A significant attractant in Arctic community's results from traditional methods In addition, household and community waste is often available to bears due to insecure storage practices. As bears become more common on shore, communities may have to consider new solutions for preserving and storing foods for the long winter months that protect the valuable food. With the shrinking of their sea ice habitat and increased human activity in the Arctic, encounters between Polar bears and people will become much more frequent, and increase as the bears seek alternative food sources.

The result of a study on Polar bear attacks, however, revealed that including all historic documentations available, there were altogether a total of 100 recorded instances of Polar bear attacks causing severe human injury on a circumpolar scale. Set against the numerous, up to tens of thousands[9] of nonviolent encounters with Polar bears across the North the fraction is punitive.

Documentation, history and cause of Polar bear-human conflicts in Greenland

In 2014, at least 12 bears have been killed in Greenland due to conflict during the period 1 January- 1 October. This includes nine adult bears and three cubs. And the problem is still escalating, according to the Ministry of Fishing Hunting and Agriculture[10]. With increasing bears in and around settlement areas due to receding sea ice, the problem will only increase. This is also seen in other Polar bear range states, i. e in Churchill Canada, where Polar bears follow a route that passes very close to the town. In Churchill, conflict bears are captured and attempted relocated to more remote areas. This solution though is costly. Still, the number of bears now killed in conflict on an annual scale, underscore the need for new guidelines and alternative thinking in the management of human-Polar bear conflicts in Greenland. The conflict killings that have taken place during the first nine months of 2014, have taken place in Nanortalik, Nuuk Kangaatsiaq, Aasiaat and Qeqertarsuaq, West Greenland, and Ittoqqortoormiit and Tasiilaq, East Greenland.

In Ittoqqortoormiit, the fjord is ice free for an extended period of time, and when the bears wander North in late spring and summer, larger parts of their habitual routes will be ice free, forcing them to travel longer distances over land. This is one of the casual effects. Reviewing the 50 most recent media coverage stories of Polar bear conflicts throughout all of Greenland, reveals that another may be not appending to the recommended guidelines, even though the guidelines from the Greenland government recommends not approaching a Polar bear, but instead underlines the relevance of leaving the scene or attempting to scare off the intruding bear, this recommendation is not always followed. People's curiosity or fascination of the Polar bears, increases the risk of a conflict situation. In June, a juvenile male bear was shot after being seen swimming close to

[9] http://polarbearscience.com/2014/01/06/polar-bears-in-winter-starving-bears-and-attacks-on-humans/
[10] http://knr.gl/kl/node/70404

Nuuk. The bear did not swim towards human settlement at first, but avoided the imminent coastline, making a detour instead towards land in Nipisat Sound. But curious onlookers followed the bear by boat, even leaving the vessel to approach the resting bear on foot. As a consequence of a growing crowd of inquisitive onlookers, and of being approached while resting, the bear commenced on a 12 hour long swim, ending up in Kanassut, a summer residential area. Here too the bear became the subject of interest of onlookers, who ignored safety precautions, and in the end the bear had to be shot as the situation was posing a risk for the people there[11]. This was the second bear shot under similar circumstances in the Nuuk area during the same month. In other cases, most often in the smaller settlements where traditional fishing and harvest still contribute to economy and where Polar bears are not such an uncommon occurrence, Polar bears may be scared off according to regulations, but still return due to hunger, or lack of other feasible routes over land. When the problem bears keep reappearing, this creates an unsafe environment for the people in town, and in the end the problem bear may have to be put down after all.

FIGURE 14 POLAR BEARS IN TOWN ARE BECOMING MORE COMMON BUT ARE STILL A NOVELTY. IN MANY CASES, POLAR BEARS LOSE THEIR LIFE DUE TO PEOPLES LACK OF ADHERING TO SAFETY PRECAUTIONS. THIS BEAR WAS SHOT AFTER UNAVAILINGLY ATTEMPTING TO ESCAPE CURIOUS ONLOOKERS. HTTP://SERMITSIAQ.AG/BILLEDER-ISBJOERN-NEDLAGT-I-SISIMIUT

[11] http://knr.gl/en/node/68172

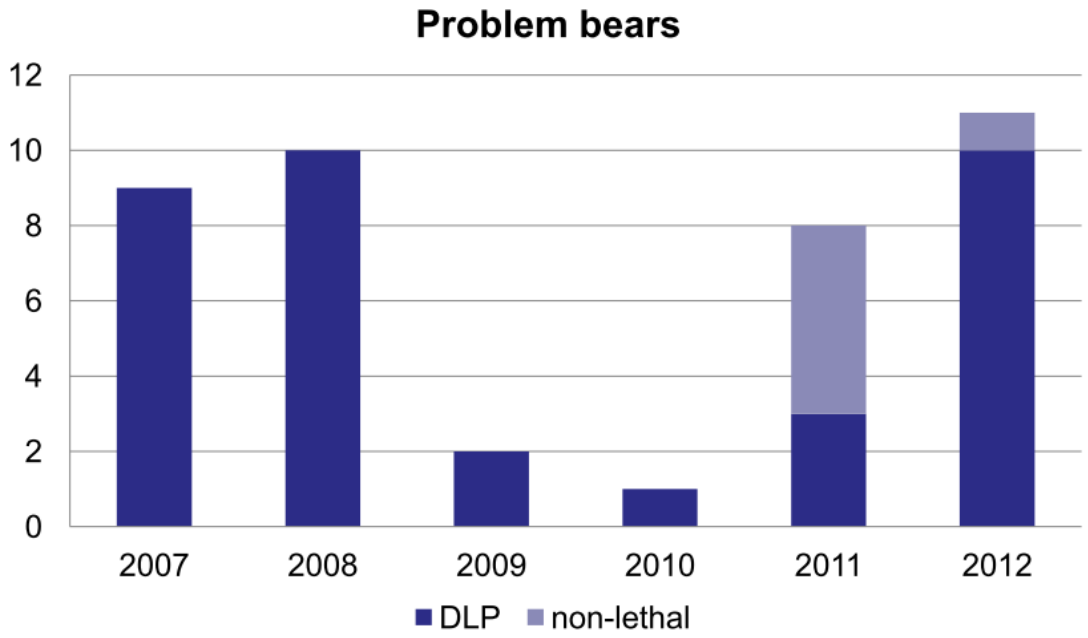

FIGURE 15 THE OCCURRENCE OF POLAR BEAR CONFLICTS IN GREENLAND 2007-2012. THE COLUMNS ARE DIVIDED INTO WHETHER THE CONFLICT ENDED NON LETHALLY OR NOT (DLP)

Figure 15 shows the occurrence of Polar bear conflicts in Greenland 2007-2012. While the low occurrence of incidents in 2009 -2012 is believed to be related to the relatively higher sea ice cover compared to the prior and consecutive years, it is more difficult to explain the rise in incidents occurring with lethal outcomes for the Polar bears.

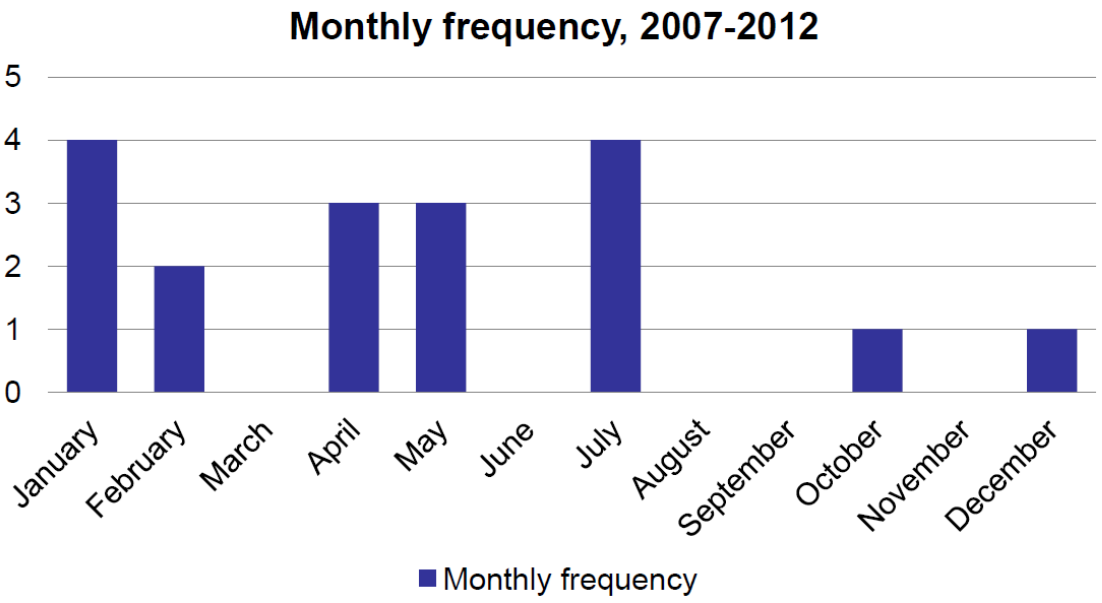

FIGURE 16 POLAR BEAR CONFLICTS ON A MONTHLY BASIS 2007-2012

The occurrence of Polar bear conflicts in Greenland, visualized from the years 2007-2012 and subdivided into monthly incidents, reveal that the risk of conflict is increased during several periods of the year. In January, the new hunting quota is released, and many hunters are actively

pursuing Polar bears if the weather conditions allow. This increases the potential for conflict incidents. The second peak occurs in spring, when the Polar bear females and cubs leave the den, and the ice break sets in. In July, with little access to food over the summer, and sea ice now all gone, many Polar bears will be in a state of hunger, increasing likelihood of their occurrence near anthropogenic food sources and settlements. In October, the occurrences may, according to studies increase when the ice returns, due to increased possibility for Polar bear movement on new sea ice. This though, cannot be verified from the single registered occurrence in the figure above (figure 16) and further data is needed overall on the frequencies and more detailed description of the type and circumstances curtailed to individual conflict situations before generalizations can be made.

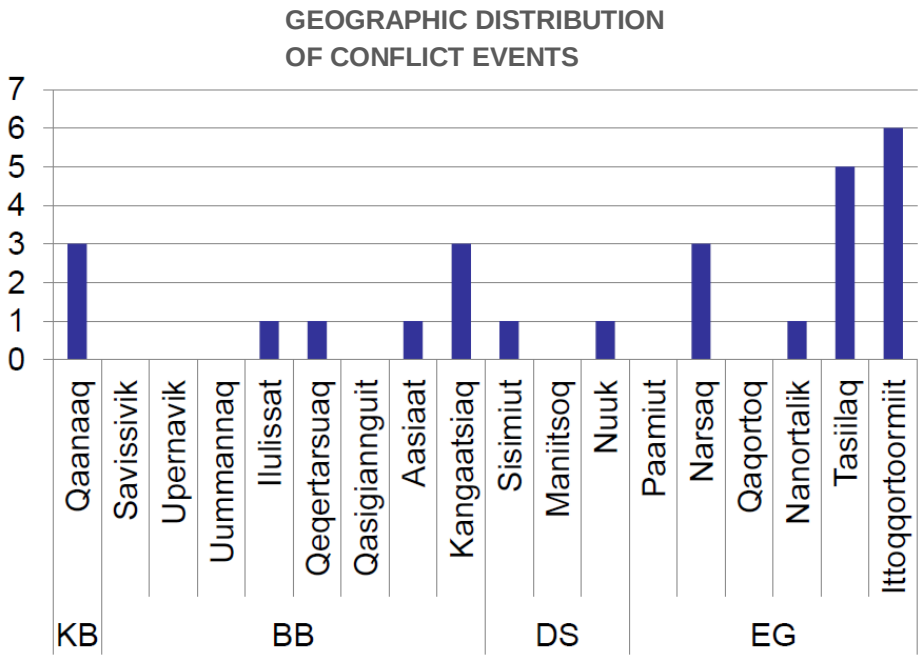

FIGURE 17 THE GEOGRAPHIC DISTRIBUTION OF CONFLICT INCIDENTS.

On a spatial scale, figure 17 illustrates how the conflicts are distributed geographically. Polar bears sighted in Paamiut, Narsaq, Qaqortoq, and Nanortalik originate from the EG population. Most situations occur on the East coast, with the highest occurrence in Ittoqqortoormiit and Tasiilaq.

STUDY SITE

Ittoqqortoormiit lies at the entrance to Scoresbysund /Kangersuttuaq fjord, 900 km from the nearest town to the south, Tasiilaq, and bordering the edge of the National Park towards the North. The area is characterized by mountains that rise steeply from the edge of the fjord. The outer edge of Kangersuttuaq fjord is ice-free all year round, rendering the environment beneficial for marine species[12] .

FIGURE 18 ITTOQQORTOORMIIT IS SITUATED AT 70°30´N. 1° 57W, ON THE EAST GREENLAND COAST, AT THE ENTRANCE TO SCORESBYSUND /KANGERSUTTUAQ FJORD, 900 KM FROM THE NEAREST TOWN TO THE SOUTH.© CHARLOTTE M. MOSHØJ 2014

The climate in the area is characterized as high-Arctic. The winter is long with temperatures down to -28°C and frequent storms. The first snow falls in the beginning of September and disappears again during July. In October/ November the fjord begins to freeze. December to march is the coldest period, with the average temperature at -15 degrees°C . Summers are short, with highest average temperatures in June to August at around zero degrees. During this period there is midnight sun, while the winter period between the end of November and mid January is characterized by darkness, with the sun never rising above the horizon[13].

[12] http://sermersooq.gl/fileadmin/user_upload/composite/Sermersooq/Om%20Kommunen/Lokalsamfundsprofiler_byer/Ittoqqortoormiit_DA_FINAL.pdf

[13] (www.dmi.gl, Destination Eastgreenland).

FIGUR 19 WITH EXTENDED ICE FREE PERIODS THE USE OF DOG SLEDS AND DOGS IS DECLINING- TRADITIONALLY MANY POLAR BEARS WERE HARVESTED DURING LONGER HUNTING TRIPS BY SLED, BUT TODAY AN INCREASING NUMBER OF BEARS ARE SHOT CLOSE TO TOWN, AND ALSO HUNTED FROM BOAT. © CHARLOTTE M. MOSHØJ / WWF 2014

The area has been inhabited periodically since 2500 BC., but little is known of the distribution or size of the prehistoric settlements, or of the extent or magnitude of the Polar bear harvest during these periods. In 1925, 89 people moved to the newly founded settlement Scoresbysund (Sandell 2001). Today 472 people inhabit Ittoqqortoormiit, and hunting is no longer the main livelihood, in perspective of monetary value or in occupation number[14]. Still, although the number of full time hunters has drastically declined, hunting is still an integrated part of life for many people in the society and an important aspect of everyday life.

Whales, Polar bears, seal and walrus constitute the main harvested species and the harvested products and byproducts are all part of local trade economics, although seasonally dependent. The Polar bear is a very valued hunting object in Ittoqqortoormiit. The meat is considered a delicacy and a large part of the meat from harvested bears is sold and eaten locally. The skull, teeth and claws of the Polar bear as well as the skin have value and are utilized in handicraft, clothing and for decorative purposes. The ice hinders more than seasonal exploitation of fish stock, and fishing is therefore not under any expansion, but tourism is gaining rising importance, not least as a additional income for subsistence hunters whose income levels have dropped relative to the levels that existed prior to amendment of hunting restrictions, quotas and regulations.

FIGURE 20 MATTAK FROM FRESH CAUGHT NARWHAL IS DIVIDED AFTER THE HUNT © CHARLOTTE M. MOSHØJ/ WWF 2014

[14] http://www.stat.gl/publ/da/ES/201402/pdf/2008-2012%20erhvervsstrukturen.pdf

Cape Tobin

Cape Tobin**,** or Uunarteq, is a little hunting settlement, 7 km south of Ittoqqortoormiit, in East Greenland at 70°24′ N 21°58′ W. The settlement was colonized in 1926, and the highest number of inhabitants at any time was 120, and at that time, the settlement encompassed a weather station and a school. The weather station was closed in 1980 and the last families moved from the settlement in 2007. With changing climate, it is becoming increasingly more difficult to regularly dock the shores by boat, due to more frequent storms.

Most of the remaining houses are owned by inhabitants in Ittoqqortoormiit, and they are utilized as hunting and summer cabins. Due to the periodic annual use as a hunting base, the settlement area is scattered with seal blubber and other remains from harvested species, and also human litter and waste, which acts as an attractant for the Polar bears in the area. The settlement is situated at the fjord inlet, making it ideal for harvest of marine mammals. Consequently, Polar bears may often be found in the vicinity of the abandoned settlement.

Figure 21 cape tobin /uunarteq, abandoned settlement now seasonal hunting base where Polar bears are often sighted © Charlotte M. Moshøj/ WWF 2014

METHODS

INTERVIEW SURVEYS

During the field study in Ittoqqortoormiit in August 2014, interviews were conducted with altogether 20 respondents with varying backgrounds and professions. Two questionnaires were utilized (see appendix) 1) based on questions relative to their observations on the presence, occurrence and geographic observations of bears, and 2) questions based on conflict situations with Polar bears, and how these situations related to changes in the environment, climate or in the community. The recorded answers included own observations as well as the respondents overall impression of the general situation. The questionnaires were translated to Greenlandic and were also available in Danish. Interviews were conducted with or without a translator, dependent on the need. Interviews were conducted in private homes, workplaces as well as in the local guest house and following a community meeting in the local village hall. Most interviews were conducted onsite at a hunter's camp in Hjørnedalen, Scoresbysund fjord of the coast of Milne Land, where the majority of the hunters were gathered due to the ongoing narwhal hunt at the time WWF´s field work was conducted. Answers were noted down or recorded, and later transcribed. Some of the interviews were filmed on a digital recorder. The interviews were conducted as semi structured interviews, with the overall aim to collect information on quantifiable data (weather, ice, currents, storms, observations of bears,) in such a way as to collect the respondents own observations and viewpoints, and their underlying motivations and reference points, the type of information that Usher (2000) categorizes as "Category 1 TEK" traditional ecological knowledge and experiences.

FIGURE 22. SOME INTERVIEWS WERE CONDUCTED WITH AID OF A LOCAL TRANSLATOR ©CHARLOTTE M. MOSHØJ / WWF 2014

The questions on the two questionnaires were chosen with the aim to get most information collectively from as few questions as possible, as well as reflecting questions from the PBHIMS[15]

[15] Polar Bear Human Information Management System

[16]survey seeking compatibility for future grouping and further analyses of data from all range states (questionnaires; appendix 3&4)

GEOGRAPHIC VERIFICATION

SCOUTING AND OVERVIEW OF SETTLEMENT AND LANDSCAPE.

At the onset of the field work, the layout of the town and its near surroundings were investigated as to the general layout, the availability of attractants in town, i.e. meat drying racks, whale and seal slaughter sights, etc., the vicinity of the dump and the possible way of passage for bears into town. The nearby hiking trails were visited to get a better overview of the area, and to investigate the areas and routes near town where sled dogs are staked out during the ice-free seasons, and where the meat for feeding the dogs is stored in wooden containers. People strolling/hiking these routes were questioned on the frequency and usage of the paths and the nearby surroundings as well as on the previous usage or appearance of bears in the area.

As a result of the interview-field work based part of this study being relocated by necessity from Ittoqqortoormiit to the narwhal hunting camp at Hjørnedalen, a large part of the Scoresbysund coastal area was viewed, by boat on route to Hjørnedalen, including the area around the previous settlement Cape Hope.

At the narwhal hunters camp in Hjørnedalen, respondents were asked to propose and verify the geographic locations of high frequency of bear visitations, as well as well as sites where bears were killed, or known to den, etc.

Finally an overnight stay and surveying trip was made to Cape Tobin, to reconnoiter the area, overview the available attractants available there and scout for Polar bears, as well as inspect one of the areas where the Polar bears most frequently come to shore or pass through.

16 http://awsassets.wwf.no/downloads/bob_hansen__3____pbhims_expanded_possibilities.pdf

PUBLIC DISSEMINATION AND HEARING.

FIGURE 23. 3-5TH GRADE AT THE EJNAR MIKKELSEN SCHOOL IN ITTOQORTOORMIIT SHARE EXPERIENCES ON LIVING WITH POLAR BEARS ©CHARLOTTE M. MOSHØJ /WWF 2014

During the stay in Ittoqqortoormiit, a talk informing of the purpose and aim of the project was given at the town meeting hall, with attendance of locals, and the opportunity for mutual sharing of information and experiences as well as thoughts as to possible mitigation in the growing conflict problematic with Polar bears. Furthermore, Ejnar Mikkelsens School, a elementary school encompassing children from preschool through 9th grade, altogether 156 children, was paid a visit with the purpose to inform also the younger generations and let their views and experiences be voiced and give weight and insight into the problem at hand, concerning the increased visitations of Polar bears.

RESULTS FROM FIELD STUDY

INTERVIEW SURVEYS

20 interviews were conducted. Most of the interviewed respondents (66 %) were male. Some of the individuals interviewed had jobs/ voluntary positions affiliated with hunting/harvest, other than being professional or part time hunters; these included the local hunting warden, his assistant, the local representative of the hunter's organization, KNAPK, and a local government representative. Most were full time or part time hunters, employed in other industry or private enterprise, or pensioned or unemployed. Priority was given to talk to as broad a range of respondents as possible, to key people at the community office/ government officials, hunting warden on the issue, their experiences and their thought on future solutions and extent of the problem at hand. Also questions were posed on the possibility of their future involvement/role in mitigation of the conflict. For this report, the answers to the survey questionnaires have been grouped into six main topics, and the main points given in the answers to interview questions within these main categories are given below.

PREVALENCE OF BEARS AND TIMING OF CONFLICTS ON ANNUAL SCALE

In general nearly all interviewed persons claimed that there were more Polar bears in the area, today than in prior times. So many that they have to come close to town to find food. This problem started growing after the ban on hunting females with cubs, according to several of the interview subjects. The Polar bears can come at any given time, and it does not in any way affect them, when they are attempted scared off. They just return, is the general experience. Another common stated answer was that previously Polar bears never or only rarely ventured into town. The rise in numbers came after the hunting restrictions, (quotas and seasonal protection.).The prevalence in time of conflict bears or bears in the vicinity or in the village is synchronized with the disappearance of the ice. When the ice is gone, the bears arrive. The peak-bear-periods were believed to be in March-April when the sea ice disappears as well as in the start of the summer when all the ice is gone, and right after the first ice returns. Last year in fall when the ice appeared on the bay, many bears appeared.

Several hunters mentioned the need for an inventory of bears in Eastern Greenland. They expressed their belief that the population in fact in no way was threatened, and that to them it seemed that the given quotas were based on invalid information and that the population after several regulations on harvest and protection was actually increasing. For many respondents this theory was enforced by the more common sighting and conflict incidents that occurred in the village and in the neighboring areas. One young female, the mother of two children, verified that the bears to her belief were closer to town than previously, and that this was an occurrence that was becoming more and more common. She referred to the female Polar bear with cubs that during the previous winter had taken residence on the sea ice right in front of town for several

days, where they had foraged on remains from a seal that had been flayed on the ice. The bears were in this incidence also a favored attraction for the townspeople, but still the situation in her mind seemed inherently dangerous and one that could have gone wrong. In the winter, when the quota has been filled, and no hunters therefore regularly visit the outpost areas, and when it is still dark when the inhabitants set out for work or school, the risk of Polar bears entering towns without being spotted pre-appearance is much greater.

"Before, when Cape Tobin and Cape Hope were inhabited by hunters year round, we never had problems with Polar bears in town. We had to travel North for Polar bear hunting, and Polar bears travelling down the coast would be shot or scared away at cape Tobin: Now when the quota is filled in May, Polar bears are free to wander into town. They come from Cape Tobin or Walrus Bay They smell out and scavenge on the seals and walrus we feed our dogs and store in the wooden crates. When I was a child, we played freely in town and at Walrus Bay. Now it is not safe anymore.

Johannes, pensioned hunter, Ittoqqortoormiit.

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FIGURE 24 POLAR BEAR MOTHER AND CUBS, THAT STAYED FOR SEVERAL DAYS ON THE SEA ICE IN THE BAY RIGHT IN FRONT OF ITTOQQORTOORMIIT TOWNSHIP. PHOTO ©RUTH AAQQII 2014

The hunting warden told of an experience where someone had spotted a Polar bear in the shadows outside of the house, and he had rushed off on his ATV to verify the sighting and scare of the potential bear, but had ended up passing right by it without noticing, due to in part the

darkness, but also the structure of the landscape, which can best be described as gravel roads intertwined by rough rubble/gravel hills and mountainous landscape. It has occurred on many occasions that bears in this way have wandered all the way into the middle of town before being sighted. Furthermore, the Walrus Bay area, another often used entrance way for the bears into the settlement, very often becomes a conflict area, in part due to the recreational value of the bay area to hunters and civilians alike, as it in summer is the local bathing/beach site, and hang out for youngsters as well as for people on family outings.

GIVEN REASONS FOR THE RISE IN CONFLICT

About half of the respondents believed that the prey situation for the Polar bears was unaltered. They believed that there were still many seals, and that the reason for the up scaled visitation occurrence of bears in the village was due to the lack of sea ice in longer periods now than previously, wherefore the bears choose to travel over land. The other half believed that the prey situation had worsened, and that seals were scarcer in the longer ice free seasons, as well as overall.

Several interviewees mentioned the changed ice conditions as a reason for the rise in conflict, with the ice breaking up earlier and forming later and with an increase in storms altogether forcing the bears onto land for longer periods of time. In the prevailing year pack ice broke around 20th June, and the outlook for new ice formations is October/early November, leaving an ice free period of 4-5 months. According to the locals, the pack ice is first broken up by Liverpool Bay, which may occur already in May. The reformation of ice is furthermore dependent on the prevailing wind direction. When the northern winds prevail in late autumn early winter, this means the return of the ice. In worst case scenarios the bay is still ice free at Christmas. Many hunters mentioned how travelling on the ice has changed, both the extent of the ice free seasons, and the reliability of the sea ice once it is there.

Finally several people mention the hunting quotas and restrictions as a cause for the rise in conflicts. Several hunters question why hunting mothers and cubs is not allowed any more. They believe that this restriction caused the escalating problems with rising numbers of conflict bears.

> *"The sea ice is changing. It is breaking up early, and arriving late, and so are the seals. More often, storms arise, and we cannot trust the sea. Before, in past times, we travelled more on the ice. Now the sea ice is often treacherous and many people have abandoned our traditional ways of travelling by dog sled. Now there are not many full time hunters, and many must supplement their income by tourism and day jobs".*
>
> *Johan Aaqqii, full time hunter, Ittoqqortoormiit.*

CONDITION, AGE AND SEX OF CONFLICT BEARS

During the interviews several people stated that previously it was mainly young bears that entered the town vicinity, but now it is also adult, bears, including old individuals. Some of these are reported to be quite emaciated while others seem to be in normal condition for the time of year. Some of the bears that have been killed look to be in good condition, are reported to have empty stomachs and intestines, when they were examined after the kill. This could suggest a recent lack of food availability prior to the conflict situation and killing. Some of the bears that are seen scavenging on the dumpsite and on very old remains at Cape Tobin seem to be quite hungry, and accept the presence and vicinity of people as a trade off for the availability of food. The hunters and others believe that the problems are both with young, adult and old bears, and that is a conflict that did not happen as frequently previous to quotas and regulations, than it does now. The hunting officer, who spends a great deal of time handling the situation with the conflict bears, states that previously it was mostly young male bears that ventured into the township or its vicinity, while the present situation sees bears of all ages and both sexes. One bear shot in conflict during summer, had very worn teeth, and may have had to scavenge and prey on carcasses and remnants due to ill condition and old age.

> *"Previously it was mainly young bears that entered the town vicinity, but now it is also adult, bears, including old individuals. Some of these are reported to be quite emaciated while others seem to be in normal condition for the time of year. Some of the bears that have been killed look to be in good condition, but when opened turn out to have empty stomachs and intestines, suggesting recent lack of food availability. I've already spent many days this summer, chasing away potential problem bears.*
>
> *Erling Madsen, Hunting warden, Ittoqqortoormiit.*

FIGURE 25 POLAR BEARS SCAVENGING AT CAPE TOBIN ©CHARLOTTE M. MOSHØJ / WWF 2014

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Polar bear hot spots in Ittoqqortoormiit- where do conflicts occur?

Most of the interviewed respondents were in agreement on the location of Polar bear conflict hotspots, and also on the entrance routes to the township. Bears coming in from south of town, normally wander along the coastline, through Amdrup Havn and enter over the mountaintop via the Telemountain or by the garbage dump. When the fjord is covered in ice, and seals and other harvested animals are flayed on the ice, the bears may walk straight over the ice and into the settlement. Bears coming in from the North-East enter via Walrus Bay, and then either wander over the mountain or use the narrow road connecting Walrus Bay with town. Sometimes they may enter and be discovered by the heliport or via the river that divides the town. Seven kilometers out of town, to the west lays Cape Tobin, described on p. 36. Due to the use of this area as a summer harvest site, for hunters from Ittoqqortoormiit and also by tourists, there are often remnants of food and blubber that the bears can scavenge on, as well as other remains from human waste and harvest. This attracts the bears, and while they during the hunting season most often are shot when spotted along the shoreline or at Cape Tobin, they have unhindered passage along the shoreline route during the approximately seven months of the year after the quotas are used. Cape Tobin was closed down during the period 2005-2008 while Cape Hope, East of the town was closed down in 2006. This was mainly due to weather conditions, seeing as the ever so often more turbulent seas made landing boats at the shores increasingly difficult, and the longer ice free periods enforced the effects. Still the cabins here are also often used during periods of hunting of whales or seals, and therefore this site also acts as an attractant for bears searching for food. (See map in appendix).

Main attractant

Other than the above mentioned harvest remains that are left at recent and also more relict harvest sites, the main attractant for the vast majority of all Polar bears was clearly the wooden storage boxes that contained the fresh remnants of meat for feeding the sled dogs. In Ittoqqortoormiit, it is conditioned that sled dogs must be kept tied up when not in use, and during the ice free seasons, many dog teams are placed along the banks of the fjord arms, and for every team, there is one or more wooden boxes that contains the meat, remnants of seal or i.e. walrus that is stored on a weekly basis. The hunter then feeds the dogs a couple of times a week with this meat, and all around the site are therefore bones, blubber, blood and left over's from this meal. The rest of the harvested meat is kept in the storage boxes, and the only safety mechanism that holds the lid is most often a pile of heavy stones, which is no hindrance, for a hungry Polar bear. This is by far the main attractant for the Polar bears, since drying meat or fish or pelts on racks in town as seen in Western Greenland was not customary. Nearly all Polar bears that came into town were first seen and attempted scared off at or in the vicinity of these dog feeding sites, according to the interviews. Since Polar bears visited the garbage dump, the waste material, garbage animal bones and other organic matter found here also constitutes an attractant for the

bears, as has been seen and reported in other Arctic villages in the Polar bear range states (Circumpolar HPBC strategy report). Young Polar bears and Polar bears with cubs are most likely to raid garbage dumps (Hemstock, A. 1998).

THE NATURE AND FREQUENCY OF THE REPORTED CONFLICTS

Following the interviews, the nature and frequency of the reported conflicts was attempted assessed to gather an overview of the gravity of the actual situation and level of conflict on an overall basis for Ittoqqortoormiit. The hunting warden, his assistant and also the local representative of the hunter's organization KNAPK all fed into this given summation, supplemented by the information gathered in the interviews with the local hunters and other inhabitants in Ittoqqortoormmiit. The warden reflected on how his job had grown in time spent on conflict bears, during the last four-five years. This year, from May to August he had already spent altogether three full weeks chasing away conflict bears and handling two situations where bears were killed in conflict. Three more bears entered the settlement or became a threat in the vicinity areas, and one of these had to be shot.

FIGURE 26 POLAR BEAR HUMAN CONTACT THROUGH WINDOW IN CABIN CAPE TOBIN. PHOTO ©JAN LORENZEN

The first bear was shot that summer right before the pack ice disappeared from the fjord. This bear, as is the usual case, was attempted scared away from the scene by shots, but returned several times over the course of some days to the same hunters dog-food storage container, and then following set upon yet another container further down the coast towards town. In the end, a license was sought and the bear was shot. Other deterrence methods used than the rifle were reported as throwing stones, or driving towards the bear in an ATV or even as in one case, a bulldozer. The 15th of July another bear was killed at Amdrup Havn. There, dogs were staked out as well as storage boxes with seal meat. The dogs, including a litter of puppies that were not tied up, were unharmed, but the boxes were broken into and the meat was gone. The bear was chased away three times in the matter of a few consecutive days, and finally permission to kill the bear was obtained. The assistant hunting officer, described the

Polar bears as being cunning, moving with little sound and being known to stalk people. That bears have been known to stalk people, has been reported in other studies[17].

In Ittoqqortoormiit, many people reported that previously the bears used to be scared of humans, but this natural wariness seems to have decreased. When bears are chased of, they very often return. As an example, during the field study for this report, one of these bears was chased away three times, from the road leading from Walrus Bay to town, but after the third attempt, the bear attacked, and had to be shot in defense. Two other bears were successfully chased of during the same time span, one large male from Walrus Bay, and a young male bear that was seen in the area of the heliport. Consecutively, a mother bear and her yearling cub were viewed daily by several tourists and for nearly a week kept within the area of the houses and the creek and gorge that runs through the abandoned settlement at Cape Tobin. While visiting, WWF´s staff viewed the duo several times at close hold, not seeing the slightest fear or attempt to retreat in the female bear.

Most bears are scared off with a rifle. It was furthermore denoted that although the conflict level in Ittoqqortoormiit is very high, and leads to both a lot of work, effort and ammunition in attempts to scare bears off, as well as rendering a high level of fear and the feeling of having to always look over your shoulder, the media instead always focus on the single annual individual bear that walks into larger south or west coast settlements/ or towns where Polar bear occurrences are much less common. This is most probably due to the more dramatic effect of reporting on a rare crowd gathering event, than what is to a larger degree something that happens on a weekly basis during peak periods in Ittoqqortoormiit, but nevertheless, the side effect of this, along with the remoteness and distance to media is that there is not enough focus or awareness on the severity of the problem at hand.

The hunting warden stated during his interview, that the Polar bears can come at any given time, and that it does not in any way affect them, when they are attempted scared off. They just return, is his experience. He questions why, if conservation of Polar bears is so important not only on national but also on global scale, this is not backed in any economical sense, so that options like relocating problem bears as is done in Churchill, Canada might become available for problem areas in Greenland, i.e. in Ittoqqortoormiit.

Responses to possible future mitigation efforts

During the interviews, the respondents were asked to give their thoughts on possible future solutions to less and aid the human Polar bear conflicts. They were introduced to some of the possibilities of hazing, deterrence, Polar bear patrols, fencing of problem areas and meat storage boxes that are utilized and on trial in other WWF HPBC projects in the range states. Most hunters questioned had a pragmatic outlook, and did not believe in the economic feasibility of fencing

[17] http://www.ursusinternational.org/en/factspolar.html

problem areas (i.e. the dump) since it would be very costly, and the belief was that Polar bears would occur near town anyway, based on the current observed situation with Polar bears coming into town from several main points, not only by the dump. Still they were not opposed to the idea. but did not see where the money for such a project would come from. The other locals (non-hunters) that were interviewed were more positive to fencing, especially the dump, which was not surprising seeing that several of the interviewed lived in the same area as the dump was situated, which is also one of the main entranceways that Polar bears used into town. The largest agreement/ belief were in the Polar bear patrol. As many respondents replied, the Polar bear patrol was quite similar to the unofficial non-organized system that already existed in the village, with hunters scanning the coastlines with binoculars in the mornings, and the first people out on the streets making a quick scouting by ATV for Polar bears, that were then reported to the warden. A of now, the system though is not organized, which would be preferable so that job descriptions and time allotment was discussed, as well as a possible compensation for resources used on gas and bullets. The hunting warden questioned whether or not, if the conflict situation increased at current level or even higher, it would be appropriate to discuss relocating Polar bears in the future, as in Churchill, Canada.

CONCERNS FOR PRESENT AND FUTURE INCREASES IN HUMAN-POLAR BEAR CONFLICTS.

In Ittoqqortoormiit, the present escalating situation with increasing number of human Polar bear conflict incidents is both precarious and hazardous for humans and bears. The local people, living with the bears virtually in their backyard, feel that they have to be highly alert on a daily basis towards the imminent danger of having a bear on their doorstep. Currently bears enter the town more often, and are a constant nearby presence to be dealt with and worried about. Some people state that they do not dare send their kids out on their own, while it was apparent to WWFs representative, that some children at least did roam the streets by themselves, and this occurred also after sunset, and even on the road to and from Walrus Bay, even though 2 bears were seen on the road/in the bay just the day before and the day after this incident, and one bear was even shot and killed on this road, after it initiated a attack.

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Several people stated that they worried more now about the presence of the bears than they did earlier. They feel that they are on a constant lookout. They worry for their children when they send them to school. One young women told of how she grew up thinking that she should always carry pair of mittens, summer or winter, when she was on her way to school, following an incident where another pupil had stopped a stalking Polar bear by throwing her mittens on the ground. Several people mentioned that it was a bad thing that the school had changed the schedules, back to having the 1st morning class before 9 am, seeing as how late starting time enhanced the chances of any Polar bears having been scared off by ATV morning traffic beforehand-.
The pupils at Ejnar Jacobsen's school (third, fourth and fivth grade) that participated in the WWF mediated Polar bear talk, had all seen at least one live Polar bear in their life. This in itself speaks of how close the borders between the human inhabitants and the bears have become.

When conflict situations are long and drawn out, with individual bears returning consecutively, the burden of responsibility and pressure to resolve the situations weighs heavily on the shoulders of the person in charge. This was expressed both by the local hunting warden, but also by individual hunters that have attempted to scare of bears from their dog food storage containers. They feel they are left with no other options available, the only thing left to do when a conflict bear keeps reappearing despite hazing, is to put it down.

FIGURE 27 POLAR BEAR CLOSE TO TOWN. ITTOQQORTOORMIIT AUGUST 2014© CHARLOTTE M MOSHØJ/WWF

The local people seek other options, and another outlook. What can be done, and what resources can be made available to aid in the conflict reduction and prevention. What is the future for bears and humans, conflict or coexistence?

> *"We worry more, and we are always on the lookout for bears, from the early morning. One does not dare send kids out, on their own. An ideal safe community should not have to worry about there being Polar bears in town*
>
> *Ejnar Hammeken, local KNAPK representative, Ittoqqortoormiit.*

The scale of value of Polar bears to locals

One of the less pragmatic questions posed to all respondents, was “what the meaning and value of Polar bears was to them, and how they would feel, if there were no more Polar bears left?”

Although this question builds on the individual person’s subjective feelings, and not observations or factual findings, all respondents found the question relevant and most of them gave in-depth answers. These varied between that they would miss the meat and the hunt, to emotional feelings of loss of nature due to mismanagement or climate, to the outbursts of individual children who stated that they would be glad, because then they would be free to play and roam the streets safely. No one answered, that it would not matter.

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> *”If Polar bears were gone from the earth, we would have failed nature, ourselves and the future generations. I cannot imagine living in a world without Polar bears and would feel great guilt if I in some way had behaved to instigate or escalate this situation.*
>
> *Young male hunter, wishing to be anonymous.*

Geographic surveys

Scouting and overview of settlement and landscape.

The survey of the town area gave an overview of how the town is divided into several main areas (See map in appendix). One is the central settlement area, reaching from the heliport to general store and down to the bay, including the lower lying territory where the hospital and local administration is situated, and East towards the hunters harbor. On the left side of the river, towards town and across from and behind the general store, lies another housing area which also encompasses the warehouse and public service building, and stretches into the valley along the river Kuuk. The sports facility is situated at inner part of this area, and there is also a small cluster of houses there. On the other side of the river, by the dump and weather station, lies another housing area. This is bordered by the Telemountain and the coastline out towards Amdrup Havn and Cape Tobin. On the Eastern coastline is the road out towards walrus bay and Mågefjeld. Most of the area is rocky cliff, transverse by rough gravel roads, and little existing vegetation. While surveying town, it was apparent that meat drying racks and skinning posts were not common here, as in western Greenland. Neither was the fish drying racks or lines, only one very small rack was spotted, with a few dried fish. Drying skins/pelts were not observed in this survey.

The road connecting Walrus bay area to town is banked on one side by a steep mountainside and on the other by a narrow ledge which ends in a steep drop off to the cliffs and sea below. The

FIGURE 28 WOODEN CRATES USED FOR STORING MEAT FOR DOG SLEDS IS ONE OF THE MAIN ATTRACTANTS FOR POLAR BEARS IN THE AREA ©CHARLOTTE M. MOSHØJ / WWF 2014

road is utilized by all going to or coming from town/ Walrus Bay, people, as well as bears. The ledge area is also the setting for a few seal hunting hide-outs built by the local hunters

During the survey the wooden crates used for storing seal or other harvested meat for the sled dogs was observed in several places. They were placed next to the staked out dog teams, a few in the housing area, some along Kuuk riverbed as well as on the road to Walrus Bay and Amdrup Havn. These were deemed to be the most significant source of attractant to the bears, as had been verified during the interviews.

At Cape Tobin, the landscape is similarly rocky, interspersed by gorges and snowbeds even in August. The Polar bear, female and yearling cub that were observed there during 24 hours stay, utilized these landscapes staying in the vicinity of the settlements houses, scavenging for blubber, harvest remnants and human garbage, which was plentiful at Cape Tobin, during their active hours.

FIGURE 29 FEMALE POLAR BEAR AND CUB, CLOSE ENCOUNTER CAPE TOBIN ©CHARLOTTE M MOSHØJ /WWF 2014

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Public meetings and dissemination

The two meetings/ disseminations that WWF´s representative held while in Ittoqqortoormiit presented the opportunity for general discussions and responses to the overall human-Polar bear conflict situation, and the results from the interviews collected during the field work. At the public meeting, questions were asked about the possible mitigation measures and on handling Polar bear conflict situations in other range states. Individual conflict situations that had been experienced or heard second hand were also discussed on specific levels. At the school, following the talk given on Polar bear biology and conservation and conflict issues, the children were asked questions on their own observations, as well as feelings about Polar bears. We also talked best practice on how to act if face to face with a Polar bear and how to handle garbage and harvest products, to minimize attractants for bears. This is important in the sense that the young people are the voice of the future and often the mitigators of change in the society as they become adults.

Figure 30 School kids from Ejnar Mikkelsens school showing off WWF tattoos ©Charlotte M. Moshøj /WWF2014

LESSONS LEARNT: EXPERIENCE WITH HANDLING POLAR BEAR CONFLICTS FROM OTHER COUNTRIES

In several other of the Polar bear range states, where HPBC have become an increasing issue, varying mitigation efforts have been tried out and tested. The following is a compiled introduction to these methods, with focus on experiences with their effectiveness and an evaluation of which methods would be most befitting to the specific HPB conflict issues experienced in Ittoqqortoormiit.

HAZING AND DETERRENTS

In several of the range countries, hazing and non lethal deterrents have been attempted with

1) Loud noises; bangers, horns, metal lids, speakers, signal pistols and warning shots from firearms. People have also been known to scare off Polar bears with loud shouting.
2) Bright lights from firecrackers, flares, spotlights, carlights.
3) Physical deterrence: rubber bullets, bear spray, chased with vehicles
4) Guard dogs
5) Translocation of problem animals

ATTRACTANT MANAGEMENT

1) Improved food storage in bear-safe bins that are not easily accessible to bears and reduce the distribution of smells;
2) Fencing garbage dump sites to make them inaccessible to bears
3) Minimising the practice of drying skins and meat on racks in town
4) Relocating flaying/ butchering sites to outside housing areas
5) Effective removal of harvest remains from i.e. whales
6) Dissemination of best practice in garbage control, and handling and storage of harvest products

FIGURE 31 EXAMPLE OF POLAR BEAR WARNING SIGN

SAFE PROOFING VILLAGES

1) Ensuring that villages/towns have appropriate lighting,
2) The main routes to and from schools, medical centers, and sports facilities are not placed on outskirts or close to garbage dumps,
3) Fencing of problem areas with electrical fencing
4) Placing warning signs at problem areas, so that not only locals but also visitors and tourists may be warned appropriately.
5) Distribute safety and best practice flyers at tourist information centers
6) Organise local Polar bear patrols

SHARING RANGE-STATE EXPERIENCES AND INSTIGATING STANDARDIZED MONITORING

In February 2013, WWF organized a human-Polar bear conflict reduction and mitigation workshop in Tromsø, Norway, which brought together 35 practitioners and experts from across the Polar bear range states who had experience with human-Polar bear conflicts and Polar bear conservation in a variety of professions. The workshop's purpose and questions raised were sharing best practices and lessons learnt in human-Polar bear conflict prevention and mitigation measures from across the Arctic. Following up on this workshop and its initiatives, and continued cooperation and knowledge transfer between practitioners, experts and stakeholders is necessary for the success and future of initiatives taken to lessen and mitigate HPBC on a circumpolar scale. Furthermore, utilizing the PBHIMS database as a basis for the development of general questionnaires and data collection, as has been done in this study, would aid in the ability to interpret results from HPBC studies across varying studies throughout the range states.

EFFECTIVENESS OF MITIGATION AND PREVENTION MEASURES:

Generally it will vary between PBHC range states, areas and specific settlements which specific measures are warranted and found to be effective. At the moment, no comparative study exists on hazing/deterrent measures, although this is on the planning table within WWF (Koopmans pers.com).

Attempting to compare with other areas within the Polar bear range states, where the level and nature of conflicts are similar, we looked to the Russian and Alaskan Arctic, where patrol groups supported by local communities or governments play an important role in the safety of local communities. They haze Polar bears from communities, assist people in setting up safety measures such as electric fences, and escort children to and from school.

Arviat in Canada is a community of approximately 2,800 people, located on the west coast of Hudson's Bay, 90 kilometers North of the tree line and about 250 kilometers North of Churchill, Manitoba, The second-largest community in Nunavut, Arviat has strong ties to the land, the population being mainly Inuit. In recent years, the community of Arviat has reported more and more Polar bears near the town. This is mainly due to climate related changes in sea ice habitat patterns forcing more bears to stay along the coast, and increases in Arviat's population creating more bear attractants, including garbage at the dump. The community is increasingly concerned with the threat Polar bears pose not just to property, but also to children and sled dogs. In the WWF supported project, a Polar bear patrolman was hired to haze bears from the village during October through December, the three-month period with the most bear activity in the region. Steel bins for storing food were also provided, and electric deterrent fences around several of the community's dog team pens were installed. As a result, Polar bear conflicts were radically reduced, and in 2013, no DLP killings of Polar bears occurred for the first time in three years. The project is still ongoing, and at the moment the food storage bins are being redesigned to be even more Polar bear resistant.

Similarly, in Chukotka in the Russian Arctic, where Polar bear conflicts were on the rise in the early 2000´, a Polar bear patrol was organized supported by WWF and at the initiative of the local people. This was named the Umky patrol, Umky being the Chukchi word for Polar bear, and it works to ensure the safety of locals by hazing Polar bears, patrolling problem areas, escorting kids to school and keep the locals informed on Polar bears in the vicinity. The patrol also offers education, attractant management and anti poaching efforts (Koopmans 2011).

In Ittoqortoormiit, the main focus of any initial mitigation attempt should be aimed at attractant control as this was clearly the main common denominator of all HPBC recorded in the area. Furthermore, community involvement and awareness could furthermore be roused by organization and support of a Polar bear patrol, an initiative that in part already unofficially exits on a voluntary basis. One of the main common denominators of complaint from local citizens was the lack of recognition of the extent and gravity of the problem from regional and national authorities. Therefore recognition and active aid in support and alleviation of local HPBC from official governmental side is a necessity. Below, these comprised experiences from Ittoqqortoormiit and experiences from other circumpolar HPBC projects are merged into recommendations for future actions both locally in Ittoqortoormiit, but also on the governmental

policy level.

RECOMMENDATIONS

- We recommend that attractants be managed in a way that diminishes the risk of Polar bears in or in the near vicinity of Ittoqqortoormiit. Since the main attractant recognized was the containers in which harvested meat was kept for the sled dogs, our foremost recommendation would be to instigate trials with the Polar bear safe containers, in certain of the hot spot areas. Furthermore, general focus on waste management and the possibility of moving the dump further from town, or fencing it should be a focus of future planning.

- Initiating the formal organization of a Polar bear patrol, with training and organizational help in collaboration with the local hunting warden. Ensuring that the Polar bear patrol has the necessary approved hazing devices according to best practice, and that they are familiar with their use.

- Securing the placement of signposts at problem/hotspot areas, i.e on the route to Walrus Bay as a warning to locals and visitors of the risk of meeting a Polar bear. Furthermore the development of a pamphlet designating best practices if and when one meets a Polar bear. This pamphlet should be handed out to all visitors upon arrival.

- On a management level, the governmental aim should be to minimize the number of polar bears killed in conflict. Therefore the number of conflict bears killed annually should be assessed when setting the national quotas.

- Steps to induct and endorse work on the national Polar bear conservation plan, as well as on the circumpolar Polar bear action plan should be initiated.

- Management authorities on a governmental and regional level should incorporate human-Polar bear conflict into their planning and management decisions and implementation of Polar bear conservation programmes. This should include outreach and information gathering on local scale in the problem districts.

- Management authorities should ensure collection of data on HPBC through use of the PBHIMS database on Polar bear natural history data, sightings human-Polar bear interaction and actual conflict situations, to alleviate the comparison of incidents and outcomes and mitigation efforts of HPBC across the range states.

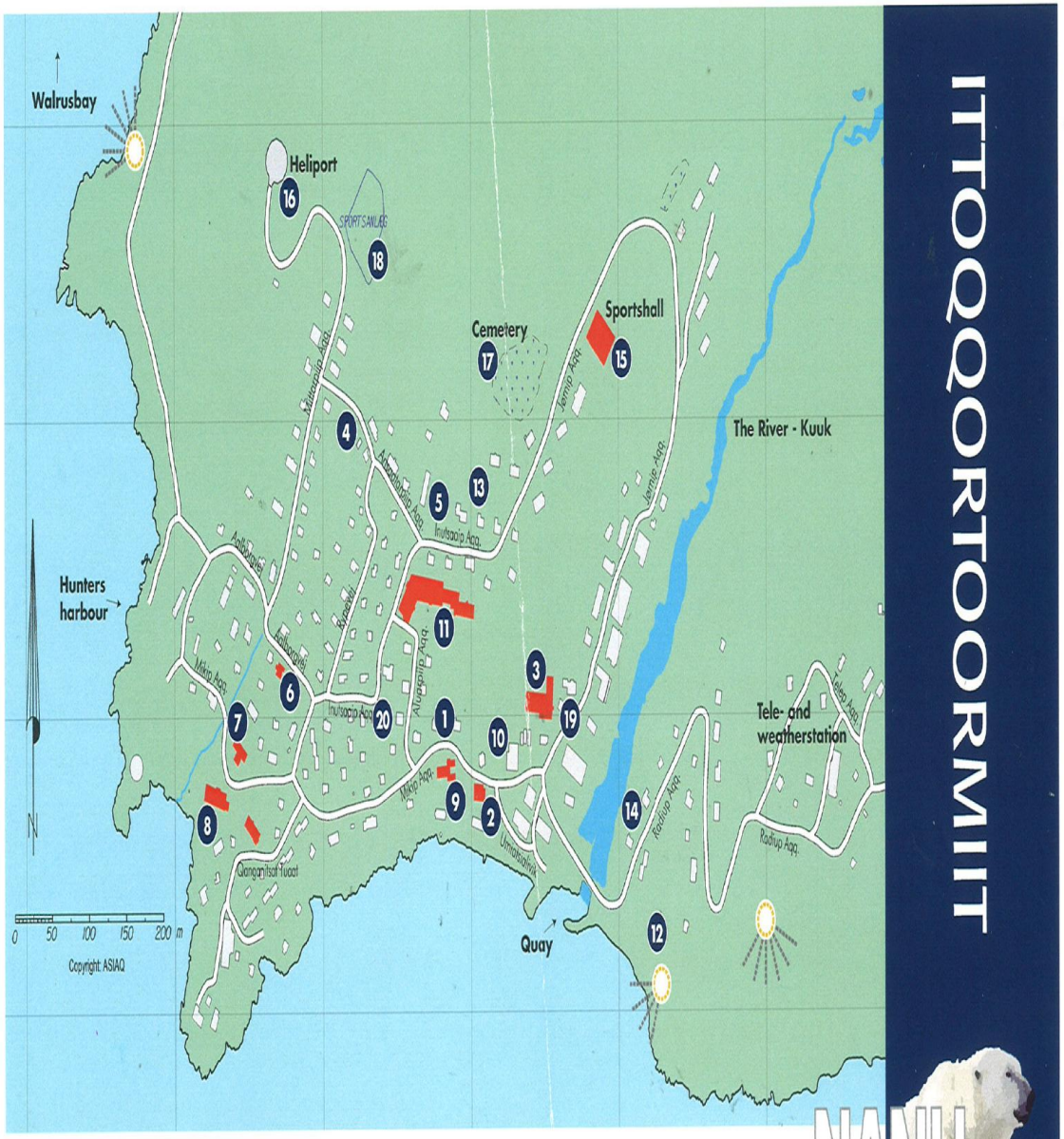
- Since the extent of conflict, and the seasonal occurrence and therefore also the suggested mitigation efforts may vary between regions in Greenland, background information on regional variations in Polar bear occurrence and conflict level will be gathered. Comparative field work should be performed in Tasiliaaq, where HPBC occur at close to the same frequency level as in Ittoqqortoormiit.

CONCLUSIONS AND FUTURE PERSPECTIVES

Conservation and sustainable management of Polar bears is very important for Greenland, for intrinsic, cultural, social and economic reasons. Following this initial field study in Ittoqqortoomiit, we must underline the gravity of the local situation for the bears and the inhabitants, and the overall need for intervention and mitigation measures to be instated in this otherwise escalating conflict. Furthermore, to prevent that conflicts that end with lethal outcome for bears occur at similar frequencies in other Greenlandic communities in the future there is a compelling need for identification of other hotspot communities and the basis of the conflicts on a regional and local level. On an extended timescale, these goals can best be achieved in cooperation with key partners in Greenland, including the hunters organisation KNAPK, Government representatives, research institutions, local environmental organisations and interest groups. This therefore is an underlying aim in itself, of this rapport which may be achieved through mediation of the results within this report.

Given the accelerated rate of climate change effects in the Arctic and the added threat of increased industrial development, more frequent interactions with Polar bears are expected in the coming years. To effectively prevent conflicts, we need to understand the underlying causes and the frequency in which they occur and with what outcome, to be able to instigate, alleviate and mediate HPBC situations in Ittoqqortoormiit and overall in Greenland where this conflicts is escalating. WWF therefore also aims at supporting critical research that monitors overall population counts in Greenland, behaviour and distribution changes of bears on land, as well as changes in reproduction, and survival. We will integrate the positive experiences learned from working with communities in Alaska and Canada in implementing mediation efforts in Greenland, with local adaption and community involvement as an added goal. While Polar bear populations are declining, conflicts are rising, demanding the need for immediate actions.

APPENDIX 1 MAP OF ITTOQQORTOORMIIT



APPENDIX 2 METHODS

STRUCTURED INTERVIEWS/QUESTIONNAIRES

Aim: Collect information on quantifiable data (weather, observations of Polar bears, conflict situationsbears,) in such a way as to collect the type of information that can be transcribed into applicable results (Usher 2000).

Utilizing interviews as a method has obvious advantages and disadvantages. Among the advantages are the fact that you get a local perspective on the situation and that you can collect extra information about changes or variations e.g in hunting methods and individual variations, details that are not given in a questionnaire unless they are specifically stated or asked for. Interviewing experienced hunters offers the opportunity to collect information on observation of changes over the years and to collect information from informants with varying experience and observational skills. Another obvious advantage is that attaining, documenting and sharing(?) the observations of the local hunters may alleviate some of the frustration that the hunters express by not being heard in the ongoing debate on the state of Greenland's natural/ wildlife resources.

On the other hand, information should be collected and summarized as systematically as possible to lessen the risk of over-generalization of "little" information and/ or presumptions (Wenzel 1999, Usher 2000). By collecting and assimilating information systematically it becomes possible for the receiver to judge the background and character of what has been said (the quality, degree of detail, background in observation in the field, contra for example politically motivated speech, or presumptions).

POLAR BEAR-HUMAN INFORMATION MANAGEMENT SYSTEM (PBHIMS)

In 1973, the Polar bear range states, including Canada, Denmark (for Greenland), Norway, the Soviet Union, and the United States, signed the *Agreement on the Conservation of Polar bears*. In this agreement, the range states ratified to find solutions to emerging threats to Polar bears. One such threat in light of climate change is human-Polar bear conflict. During the March 2009 Polar bear Range States Meeting in Tromso, Norway, the parties identified the need to develop comprehensive strategies to better manage human-bear conflicts. One objective of this initiative was to develop a user-friendly, range state-wide database of bear-human interaction and natural history information that could be displayed in GIS format, and to link it with a database which is designed to analyze the important variables associated with bear-human interactions. Its aim is to reduce lethal takes of bears, and to protect people in Polar bear country, by assembling critical information related to bear-human interactions. The Range States therefore developed the Polar

bear-Human Information Management System (PBHIMS) to catalogue interactions in a systematic and consistent manner. It will allow for a scientific identification of conflict hotspots and to target management responses. To date, 1587 incidents from four range state governments have been entered.

Much more information on bear conflict incidents is available outside government agencies. WWF aims to accelerate the implementation of PBHIMS in the range states and with a wider group of partners including communities and NGOs.These data will aid in a better overview of locations where most conflicts occur (conflict‘ hotspots’), and the effectiveness of various deterrent methods applied to prevent conflicts. The database can also give insight into the type of human activity which most conflicts are associated to.

APPENDIX 3 QUESTIONNAIRE 1

Survey regarding sightings of Polar bears and Polar bear related conflicts in Ittoqqortoormiit

(Participation in the survey is voluntary and all answers are treated anonymously and confidentially). It is allowed to complete more than one survey per person as every survey address a single meeting with a Polar bear/Polar bears)

---

1) **The nature of the meeting**. Mark with **X** the description that fits best.

Polar bear observation _____

Meeting with a Polar bear (human/bear are aware of the presence of each other) _____

Polar bear conflict: (e.g. bears steal food, destroy possessions, encounter people with or without injury/mortality sustained to bear/human) _____

---

2) **Date (day-month-year) the event took place** (write the date): _____

Time (mark with **X**) 06am - 12am _____ 12am - 06pm _____ 18pm - 24pm _____

3) **Place:** Specify as accurate as possible. Describe the place. If possible illustrate it by marking the spot at the attached map.

_____

---

4) **How long did the observation/meeting with the bear last?** Mark with **X** the category that best fits

Less than 10 minutes _____ between 10 and 30 minutes_____

between 30 and 60 minutes _____ more than an hour _____

---

5) **Number, gender and age of the people involved** (mark with **X** and write the number):
Male_____ Female_____ Age_____

---

6) **The age and gender/status of the bear** (mark with **X** and write the number): Adult male_____ Adult female _____

Female with cubs_____ Juvenile bear_____ Cub _____

---

7) **Describe theobserved condition of the bear** (in good shape, emaciated, injured, etc.?)

_____

_____

____

---

8) **Has/have this bear/bears been involved in other conflicts** Yes_____ No_____ do not know _____

---

9) **Did the bear attempt to attack?** Yes _____ No_____ Do not know _____

---

10) **The closest distance between human/bear in meters** _____

---

11) **Was it attempted to haze the bear attack without weapons**? Yes_____ No _____

If yes, how/by what means (specify) _____

---

12) Was the bear shot at? Yes_____ No_____

---

13) **Was the involved person/persons injured**? (mark with **X** and describe) Yes_____ No _____

Extent of the injury of involved persons? (mark with **X**) Superficial _____ craved hospitalization _____

Very serious_____ Deadly_____ How many were injured _____

---

14) **Did another person/other people come to the rescue?** Yes _____ No_____

15) **Was the bear** (mark with **X**) Injured _____ Shot/killed _____ Scared away_____ left on own accord _____

_____

16) **Were hazing agents like noise, warning shots, bear spray, vehicles or anything else used?** Yes_____ No_____

If yes, which? _____

_____

17) **Were dogs involved/present at the meeting/attack?** Yes_____ No_____

_____

18) **Was food/prey/captured prey in proximity?**

Yes_____ No_____ **If yes, which species/food item** (e.g. captured prey, remnants of the captured prey, waste, fish ?)

_____

Was the bear about to approach or eat the food item?

_____

_____

19) **How was the food item stored?**

_____

_____

20) **If firearms were involved, which type/caliber?** _____

Distance shot from (mark with **X**) : 1-10 m_____ 10-50m_____, 50-100 m_____ above 100 m_____

_____

21) **What was the output of a hazing attempt, if tried?** Describe in words_____

_____

_____

22) **Did the meeting/conflict take place** (Mark with **X**) on shore_____ in a boat or on the ice _____

In the urban area _____ outside the urban area _____

_____

23) **What was the bear doing just before the conflict (feeding on prey, hunting, sleeping, interacting with other bears, in motion, in water/on shore)** (write)

_____

_____

_____

24**)** **What did the people do?** (Hunt, tourism, exercise, prepare catch, social interaction, transport) (Describe)

_____

_____

_____

25) **Describe the meeting/conflict in your own words and as detailed as possible.**

APPENDIX 4 QUESTIONNAIRE 2

Survey regarding occurrences and harvest of polar in Ittoqqortoormiit

(Participation in the survey is voluntary and all answers are treated anonymously and confidentially). If you are not a professional or recreational hunter, you can still complete the survey and skip the questions which are not relevant for you.

Personal questions. Mark with **X** and write

Male_____ Female_____ Age_____

1) **Are you a professional hunter?**_____ Another profession, specify which _____
2) **Are you a recreational hunter?** _____
3) **Have you previously been a professional hunter?** _____ **If yes, what caused you to change profession/stop working?** _____

_____

Occurrence of bear: Mark with **X**

4) **Have the occurrences of bears occurring in proximity to the village increased?**

   Yes____ No____

5) **Do the bears occur in special areas along the coast/on shore?** (mark with **X** and write)

   Yes____ no_____

   Where_____

6) **Is it your perception that the bears have habitual wandering routes over land?**

   (mark with **X** and write)

   Yes____ no_____

Where_____

7) **If yes, has these wandering routes changed during the time you can remember?**

Yes_____ No_____

If yes, how have they changed? _____

8) **Have you seen bear tracks?** Yes___ No ____ **If yes, in which season and months do you see most often see bear tracks close to the village?**

(write)_____

9) **In which season and month are bears most often observed close to the village?**

_____

10) **Have you observed small bear tracks? (That is, from a mother with cubs)**

Yes_____ no_____Do not know_____

11) **Have you seen females with young cubs in dens?** Yes_____ no_____Do not know___

12) **Have you observed bear dens?** Yes_____ no_____Do not know_____

13) **Have the occurrences of dens changed through the years?** Yes_____ no_____Do not know _____

14) **If yes how has it changed (describe)**_____

15) **Have you seen Polar bears mating, mating behavior or maybe tracks that indicate this has occurred?** Yes_____ No_____

16) **Do you perceive/have you seen that there are more male bears than female bears?**

Yes_____ no___ Do not know_____

Hunting of bear: (**Mark with X**)

17) **In this village, are more bears caught now than previously?** Yes_____ No_____ Do not know_____

18) **Are more Polar bears caught from boat compared to the past?** Yes_____ No_____ Do not know_____

19) **Are more bears caught on shore compared to the past?** Yes_____ No_____ Do not know_____

20) **If you are a hunter, have you then changed your hunting habits?** Yes_____ No_____

If yes, how? _____

_____

_____

21) **Do you hunt/see more young bears than previously?** (**Mark with X**) Yes_____

no_____

If yes, is it mostly male bears_____or female bears? Or a family group?_____

_____

Climate change (**Mark with X**)

22) **Have you observed changes in ice conditions?** Yes_____ No_____ Do not know_____

If yes, specify which

_____

_____

23) **Have you seen changes in the distribution and occurrence of icebergs?**
Yes_____ No_____ Do not know_____

If yes, specify which

_____

_____

24) **Have you seen changes in the distribution and occurrence of glaciers?**
Yes_____ No_____ Do not know_____

If yes, specify which

_____

25) **Have you seen changes in the distribution, depth and occurrence of snow?**
Yes_____ No_____ Do not know_____

If yes, specify which

_____

26) **Have you seen changes in main currents?** Yes_____ No_____ Do not know_____

If yes, specify which _____

_____

27) **Have you seen changes in the weather?** Yes_____ No_____ Do not know_____

If yes, specify which _____

_____

28) **Have you noticed other climatic changes?** Yes_____ No_____ Do not know_____

If yes, specify which _____

_____

If yes, specify which _____

_____

29) **Changes in hunts and occurrences of Polar bears**

Have the changes affected the hunt on Polar bears? Yes_____ No_____ Do not know_____

If yes, specify which _____

_____

30) **Have the Polar bears, which you have caught/seen, changed in relation to their fitness/weight/appearance?** Yes_____ No_____ Do not know_____

If yes, specify how _____

_____

31) **Have you observed changes changes in the distribution and occurrence of Polar bears?** Yes_____ No_____ Do not know_____

If yes, specify how _____

_____

32) Have changes occurred in what Polar bears hunt/eat? Yes_____ No_____ Do not know_____

If yes, specify how this has changed_____

10/12/2014 Copenhagen

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Charlotte Moshøj, PhD, Arctic Biologist WWF-DK.

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