THE STATE OF THE POLAR BEAR REPORT 2023

Susan Crockford

The Global Warming Policy Foundation
Briefing 67

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About the author

Dr Susan Crockford is an evolutionary biologist and has been working for more than 40 years in archaeozoology, paleozoology and forensic zoology.[1] She is a former adjunct professor at the University of Victoria, British Columbia and works full time for a private consulting company she co-owns (Pacific Identifications Inc). She is the author of *Eaten: A Novel* (a science-based polar bear attack thriller), *Polar Bear Facts and Myths* (for ages seven and up, also available in French, German, Dutch, Portuguese, and Norwegian), *Polar Bears Have Big Feet* (for preschoolers), and several fully referenced books including, *Polar Bear Evolution: A Model for the Origin of Species*, *Sir David Attenborough and the Walrus Deception*, *The Polar Bear Catastrophe That Never Happened,* and *Polar Bears: Outstanding Survivors of Climate Change,*[2] as well as a scientific paper on polar bear conservation status and a peer-reviewed paper on the distribution of ancient polar bear remains.[3] She has authored several earlier briefing papers, reports, and videos for GWPF, as well as opinion pieces for major news outlets, on polar bear and walrus ecology and conservation.[4] Susan Crockford blogs at www.polarbearscience.com.

Foreword

This report is intended to provide a brief update on the habitat and conservation status of polar bears, with commentary regarding inconsistencies and sources of bias found in recent literature that won't be found elsewhere. It is a summary of the most recent information on polar bears, relative to historical records, based on a review of 2023 scientific literature and media reports, and, in places, reiterates or updates information provided in previous papers. This publication is intended for a wide audience, including scientists, teachers, students, decision-makers, and members of the general public interested in polar bears and the Arctic sea ice environment.

Executive summary

2023 marked 50 years of international cooperation to protect polar bears across the Arctic. Those efforts should be hailed as a conservation success story: from late-1960s population estimate by the US Fish and Wildlife Service of about 12,000 individuals, numbers have almost tripled, to just over 32,000 in 2023 (with a wide range of potential error for both estimates).

- There were no reports from the Arctic in 2023 indicating polar bears were being harmed due to lack of suitable habitat, in part because Arctic sea ice in summer has not declined since 2007.
- Contrary to expectations, a study in Svalbard found a *decrease* in polar bears killed in defense of life or property over the last 40 years, despite profound declines in sea ice over the last two decades.
- A survey of Southern Hudson Bay polar bears in 2021 showed an astonishing 30% increase over five years, which adds another 223 bears to the global total.
- A concurrent survey of Western Hudson Bay polar bears in 2021 showed that numbers had not declined since 2011, which also means they have not declined since 2004. Movement of polar bears across the boundaries with neighbouring subpopulations may account for the *appearance* of a decline, when none actually occurred.
- The IUCN Polar Bear Specialist Group has ignored a 2016 recommendation that the boundaries of three Hudson Bay subpopulations (Western HB, Southern HB, and Foxe Basin) be adjusted to account for genetic distinctiveness of bears inhabiting the Hudson Bay region. A similar boundary issue in the western Arctic between the Chukchi Sea, and the Southern and Northern Beaufort subpopulations, based on known movements of bears between regions, has been acknowledged since 2014 but has not yet been resolved.
- The US Fish and Wildlife Service and the IUCN Polar Bear Specialist Group, in their 2023 reports, failed to officially acknowledge the newfound South-East Greenland bears as the 20th subpopulation, despite undisputed evidence that this is a genetically distinct and geographically isolated group. Numbers are estimated at 234 individuals.

1. Introduction

Fifty years ago, on 15 November 1973, the five Arctic nations of Canada, Russia, the USA, Norway and Greenland signed an international treaty to protect polar bears against the rampant overhunting that had taken place in the first half of the 20th century, and which had decimated many subpopulations. The treaty was effective, and by the late 1990s, polar bear populations that could be studied had at least doubled, making it a huge conservation success story. However, in 2009, the wording of the treaty was amended to protect the bears against on-going and future loss of sea ice habitat , which was assumed to be caused by human-generated greenhouse gas emissions. This was in line with similar declarations by the International Union for the Conservation of Nature (IUCN) and the US Endangered Species Act (USESA). These pessimistic conservation assessments, based on computer-modelled future declines rather than observed conditions, have been upheld ever since, even as the predicted relationship between polar bear survival and sea-ice loss has failed to emerge in the observational data.[5]

The current population of polar bears is large, and their historical range has not diminished due to habitat loss since 1979. Indeed, previously inhabited areas have been recolonised as numbers have recovered: recent data suggest that territory in Davis Strait used before 1970 during the summer ice-free period – by all ages and by pregnant females for maternity denning – is now being used once again.[6.]

2. Conservation status

The IUCN, in their 2015 Red List assessment, provided by the Polar Bear Specialist Group (PBSG), again listed polar bears as 'vulnerable' to extinction, just as it did in 2006. Similarly, in 2023 the US Fish and Wildlife Service (USFWS) upheld its 2008 conclusion that polar bears were 'threatened' with extinction. In both instances, conservation status assessments have been based on computer-modelled predictions of future sea-ice conditions and assumed resultant population declines rather than current conditions.[7]

In Canada, the 2018 COSEWIC report assigned a status of 'special concern' to the species. This assessment had not changed by 2023.[8]

3. Population size at 2023

Global

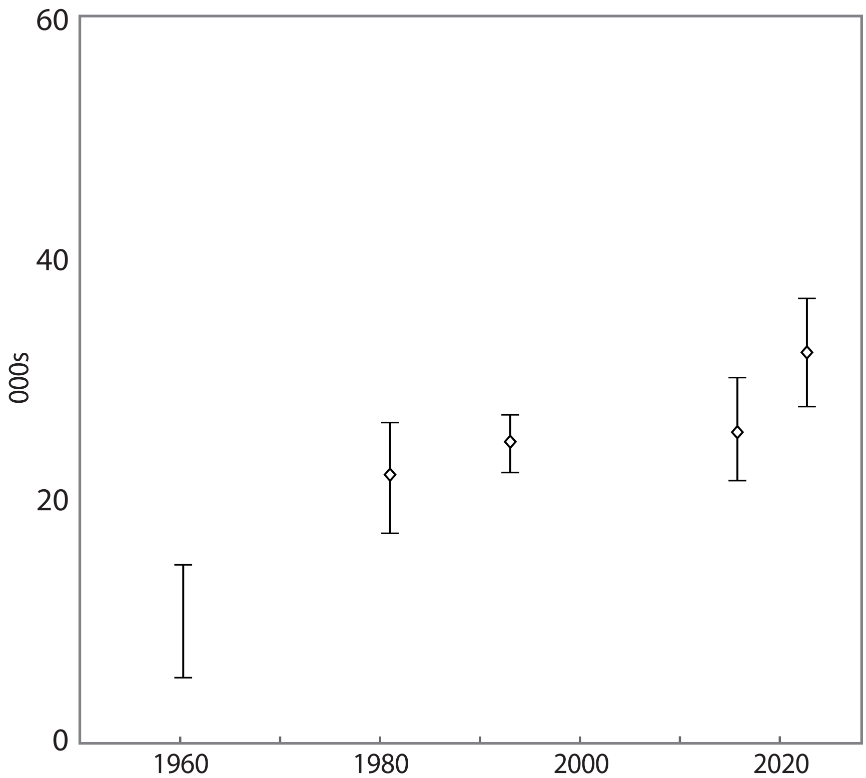
The latest official estimate for the global population, from 17 October 2023, is the PBSG estimate of 26,000 (range 22,000–31,000), arrived at in 2015 and unadjusted since then. In their 2023 assessment, the PBSG has failed to increase this estimate, even to account for undisputed, statistically-significant increases in two subpopulations and the addition of a newly-discovered subpopulation, which should reasonably boost their very conservative mid-point estimate to about 26,600: Kane Basin is up by 133, Southern Hudson Bay is up by 223, and newly-discovered SE Greenland adds another 234.[9]

However, survey results postdating preparation of the 2015 assessment, including those made public after July 2021 (for Davis Strait, Chukchi Sea, SE Greenland, Western Hudson Bay, and Southern Hudson Bay), plausibly brought the mid-point total to just over 32,000 (Figure 1).[10]

A plan to survey all Russian polar bear subpopulations between 2021 and 2023 seems to have been put on hold. In addition, an abundance estimate for the Viscount Melville subpopulation in the western Canadian Arctic has still not been released, even though a three-year survey completed in 2014 has produced other published data.[11] Surveys of Lancaster Sound and East Greenland were completed in spring 2023, and these results, when released, may put the global population mid-point estimate well above 32,000.[12] While there is a wide margin of potential error attached to this number, it is nowhere near the figure of 7,493 (6,660–8,325), implicit in the prediction that two thirds of the global population of polar bears would be gone by now, given the sea ice conditions prevailing since 2007.[13]

Note that the 2023 USFWS Status Report did not include the Kara Sea estimate of 3,200 bears, the Laptev Sea estimate of 1,000 bears, or the East Greenland estimate of 2,000 bears, figures that were used for the 2015 IUCN assessment. It also used the lowest of three available 2016 estimates for the Chukchi Sea, as discussed in the *State of the Polar Bear Report 2021*.[14] Although the USFWS report was published in August 2023, it also did not include results of the 2021 assessments of the Western and Southern Hudson Bay subpopulations that were published in November 2022, or the newly-discovered subpopulation of South East Greenland reported in June 2022.[15.]

Figure 1: Estimates of the global polar bear population, 1960 to date.



Subpopulation survey results published in 2022

For detailed discussions of the changing status and abundance issues over time for all 19 subpopulations, see the *State of the Polar Bear Report 2018*.[16]

Western Hudson Bay (WH)

An aerial survey conducted in September 2021 generated a new subpopulation estimate of 618 (range 385–852), an apparent decline of 27% since the 2016 estimate of 842 (range 562–1121) and about a 40% decline from a 2011 estimate of 949 (range 618–1280) that used similar survey methods. However, the WH 2021 report authors stated categorically that this apparent decline since 2011 was *not* statistically significant, in part due to evidence that some bears moved into neighbouring subpopulations combined with the large margins of error. While it seems inconceivable that a decline of 40% over 10 years could be statistically insignificant, recall that a similar conclusion was reached in 2015 regarding the 42% increase in abundance of Svalbard bears. Since the estimate calculated in 2004 was 935 (range 794–1076), it seems the abundance of WH polar bears has not changed since 2004.[17] Note that a more comprehensive survey was conducted in 2011, generating an estimate of 1030 (range 754–1406). This became the official WH estimate used by the PBSG.[18]

Given the conclusions of the 2021 survey that the 2016 and 2021 estimates were not statistically different from the 2011 estimate, it appears that the 2021 comprehensive estimate of 1030 may still be the most valid figure for WH.

The 2021 WH survey authors also made it clear that the most recent population estimate was not associated with poor ice conditions, since sea-ice levels had been as good as the 1980s in four out of the five years between 2017 and 2021. Confoundingly, they could not explain why adult females and subadults were underrepresented in the population.

No evidence was provided for lack of prey, and although emigration to neighbouring Southern Hudson Bay was largely dismissed as an explanation, the possibility of a movement north into Foxe Basin was not explored.

This is odd, since a 2016 genetic study suggested that the northern boundary for WH polar bears should be moved to the north of Southampton Island (a major denning area currently included in FB) and the SH boundary to the north of Akimiski Island in James Bay, adding the entire southern Hudson Bay coast in Ontario, as well as the Belcher Islands, to WH (currently included in SH), leaving only James Bay to represent SH.[19]

In 2023, the PBSG indicated the WH subpopulation was 'likely decreasing', based on the 2021 estimate of 618 bears. However, they did not include the caveat from the survey report that this apparent decline was not statistically significant, and also did not incorporate the conclusion of the 2022 Canadian Polar Bear Technical Committee (PBTC) that indigenous knowledge (IK) assessed this subpopulation as 'increased'. Similarly, the 2023 assessment by the

USFWS listed WH as 'likely decreased', based on the 2016 survey only (2021 survey results were not included). It acknowledged that in 2022 IK considered this subpopulation to have 'increased'.[20]

Southern Hudson Bay (SH)

An aerial survey conducted in September 2021 generated a new subpopulation estimate of 1119 (range 860–1454), which represented a 30% increase over five years. The result was considered robust, and reflective of the true size of the population. However, another estimate, of 1003 (range 773–1302), was generated based on the same data. This was considered more comparable to the 2016 estimate of 780 (range 590–1029). While the authors did not explicitly address the issue of statistical significance, they concluded that a natural increase in numbers, via increased cub production and survival, must have taken place in conjunction with good sea ice conditions from 2017 to 2020, perhaps in addition to immigration from another unidentified subpopulation.[21.]

In their 2023 assessment, the IUCN PBSG discussed the apparent increased abundance of SH bears, but did not unequivocally state that the subpopulation had increased, instead only implying that an increase may have been possible ('years of relatively good ice conditions, combined with comparatively reduced harvest from 2016–2021 may have buffered the population against further decline or allowed for recovery'). They also did not include the 2022 assessment by the PBTC that IK considered the SH subpopulation was 'stable/likely increased' (i.e. stable in the James Bay portion, likely increased in southeastern Hudson Bay).[22.]

The 2023 assessment by the USFWS listed SH as 'likely decreased', based only on 2016 survey results (2021 survey results were not included), but did acknowledge that in 2022, IK considered this subpopulation to be 'stable/likely increased.'[23.]

Southeast Greenland (SG)

As part of a multiyear project on the status of SG polar bears that began in 2011, surveys were conducted during mid-March and mid-April of 2015–2017 for bears that lived below 64°N latitude. The results were compared with data from bears living in EG further north, which had been collected up to 2021. This southern region of Greenland had not previously been surveyed, or even visited by polar bear scientists, and there are no permanent human inhabitants. Few Inuit hunters even venture into the region.[24]

Based on capture-recapture data, a population estimate of 234 (range 111–462) was generated for SG. Weight (indicating body condition or fatness) of almost two dozen females captured in SG averaged 186 kg, which was similar to females in Svalbard in the western Barents Sea (185 kg) in the 1990–2000 period and in EG in recent years (186 kg).

Most surprisingly, there was strong evidence that these SG polar bears are the most genetically distinct subpopulation in the Arctic, indicating a lack of interbreeding with bears in EG for at least 200 years.[25.]

Much emphasis was given by study authors Kirstin Laidre and colleagues to their interpretation that bears in these SG fjords frequently used glacier ice to hunt seals during the summer; in other locations bears only do so occasionally. Seals feed in such 'glacier-front' habitats in summer because primary productivity is high: melting glaciers in the fjords attract fish because their food – marine plankton – is plentiful. However, the only evidence provided of seal-hunting behaviour by polar bears in summer in SG is one photo, taken by an unidentified photographer, of a bear on glacier ice beside a seal kill taken in September 2016. As noted above, the SG polar bear surveys were conducted in March and April and therefore, *frequent* summer hunting of seals could not have been observed by the authors, but was simply assumed to have happened.

In addition, although the authors imply that glacier-front habitat is rare, it is in fact rather common across the Arctic and widely used by polar bears year-round because the sea ice covering such fjords in late winter and spring (including those in SG) are used by ringed seals as a birthing platform. Moreover, newborn seals are the preferred prey of polar bears, making up roughly two thirds of their diet. Fjords with glacier ice are present all along both coasts of Greenland, in Svalbard, Novaya Zemlya and Franz Josef Land in Russia, and in Baffin and Ellesmere Islands in the Canadian Arctic.[26]

The authors concluded their report with a recommendation that SG be officially recognized by the IUCN PBSG as a polar bear subpopulation distinct from EG for management and conservation purposes. However, despite the fact that Dr Laidre is currently the co-chair of the PBSG, and that in March 2023 the government of Greenland declared SG a protected 'new and separate management unit', the PBSG declined to add it as a distinct subpopulation. The 2023 USFWS assessment cited the 2022 Laidre report and its abundance estimate for SG, but regarding a change in boundaries for EG, it stated only that, 'ecoregion and subpopulation status will likely be re-evaluated by PBSG in 2023'.[27]

4. Population trends

In Canada, where roughly two thirds of the world's polar bear population live, a 2022 update from the PBTC for the first time included assessments based on Inuit IK for each of the 13 subpopulations for which Canada has sole or joint management responsibility. While the 'scientific' assessments for trends in abundance for these subpopulations are simply the widely varying ones provided by the PBSG in 2021, those based on IK were either 'increased' or 'stable'.[28]

Later in 2022, the Government of Canada published updated global polar bear population trend maps based on 2021 PBSG 'scientific' data: no provision was made for the conflicting information from IK discussed above, calling into question whether IK assessments are actually given any weight in assessing current conditions.[29] And while the 2023 USFWS assessment included the 2022 Canadian IK trend information in their status table, it gave priority to 2021 PBSG scientific data.[30]

Figure 2 shows a more realistic representation of current polar bear population trends based on all available information (scientific survey results, IK, and studies on health and survival status published up to 31 December 2023, extrapolated to regions lacking recent survey data). This gives the following subpopulation classifications at 2023, including the new subpopulation of SE Greenland (SG):

- seven 'increasing' or 'likely increasing' [KB, DS, MC, GB, CS, BS, SH].
- four 'stable' or 'likely stable' [BB, SB, WH, SG].
- nine 'presumed stable or increasing' [EG, LS, LP, KS, VM, NB, GB, FB, NW].

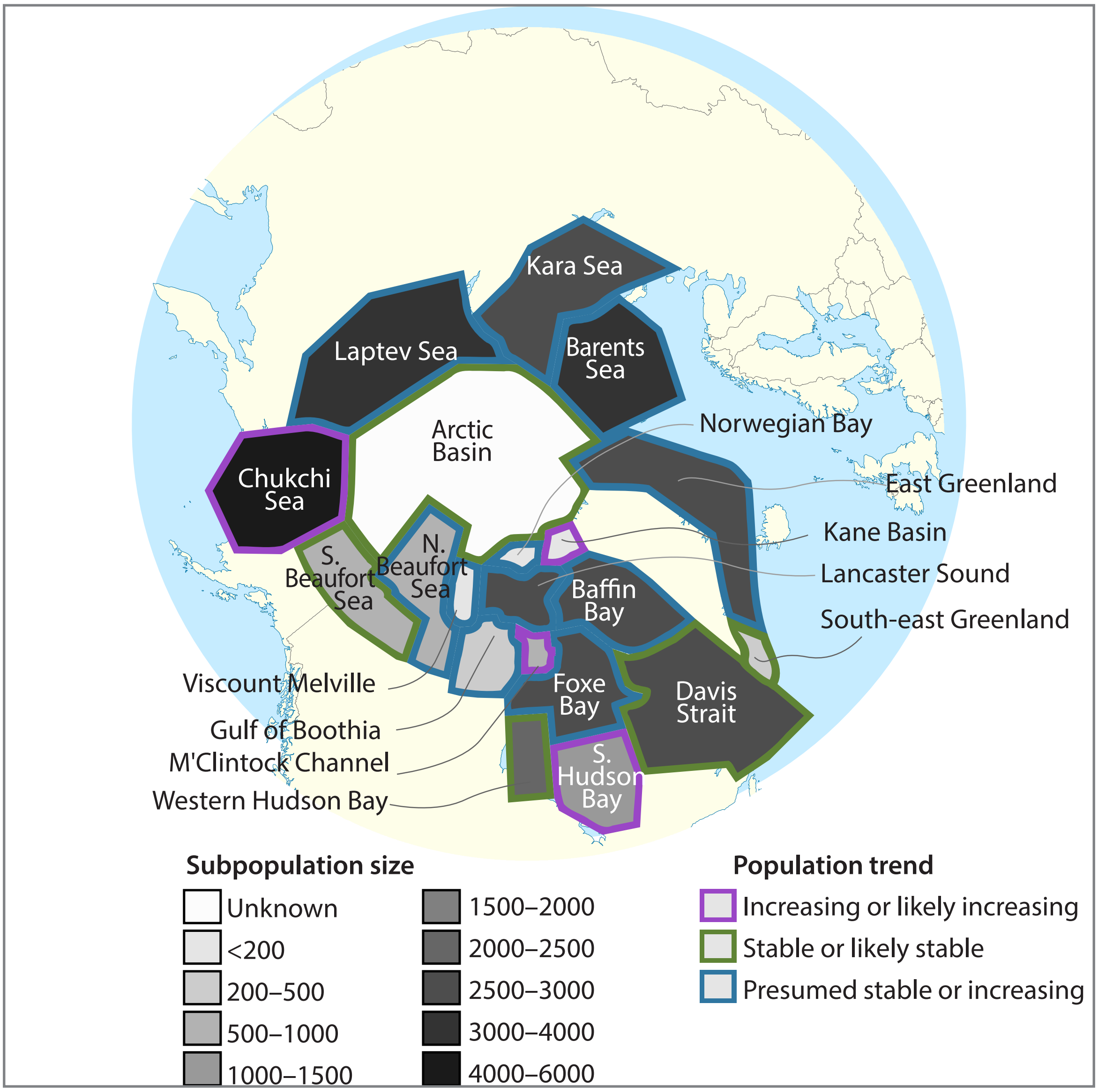


Figure 2: Number of bears per subpopulation, including South-east Greenland (SG).

Many regions considered 'data deficient' by the PBSG are marked 'likely stable or increasing' to reflect current research on studied populations, extrapolated where necessary to those regions without data. SG is shown as a separate subpopulation, although it is yet to be officially confirmed as such.

5. Habitat and primary productivity

Experts at NOAA determined that by 2023, average summer sea-ice extent (at September) had declined 43.1% since 1979, but winter ice levels (at March) had declined only 10.2% (Figure 3).[31] Contrary to predictions, however, the trend in September sea ice coverage since 2007 has been virtually flat (Figure 4), and there has seemingly been a minimal response, if any, of Arctic sea ice to the massive injection of water vapour into the atmosphere caused by the eruption of the Hunga-Tonga-Hunga Ha'apai volcano on 15 January 2022 in the Southern Hemisphere.[32]

As a consequence of continued low summer sea-ice extent and reduced ice thickness (which allows beneficial under-ice phytoplankton blooms in summer), studies show primary productivity in many regions inhabited by polar bears has risen between 2003 and 2023, especially in the Barents and Chukchi/Bering Seas. Even production of bottom-dwelling phytoplankton has been increasing in some regions. These phytoplankton blooms provide abundant food for all organisms in the Arctic food chain, including zooplankton ('krill'), benthic invertebrates (such as clams), fish, and marine mammals, such as seals, small whales, and walrus, that are food for polar bears.[33]

Although it has been argued that polar bears consume primarily ringed seals, which in turn feed almost exclusively on organisms that utilise under-ice algae, bears from regions where summer phytoplankton blooms have increased most dramatically since 2003 (the Barents and Chukchi Seas), and where polar bears are doing unexpectedly well despite reduced summer ice, have not yet been examined. In one study, tissue samples from bears in Baffin Bay and two regions of Hudson Bay (WH and SH) were examined to determine how much ice-associated carbon they consumed in the seals they were eating. In these three areas, the average amounts of pelagic carbon from open-water-associated algae are quite low (range 13–18%) but some individuals had levels as high as 67–80%, suggesting that seals that had fed on pelagic algae

Figure 3: Arctic sea ice extent, 1979–2023.

Winter (March) vs. summer (September). Redrawn from Meier et al. 2023

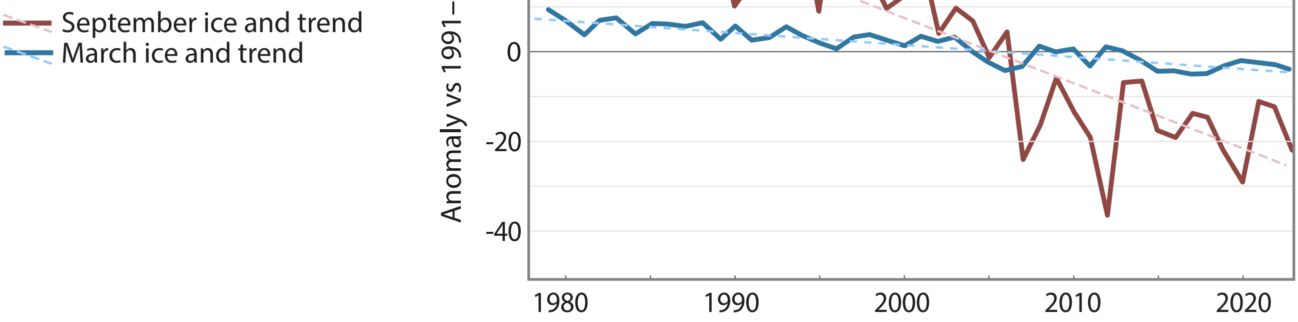
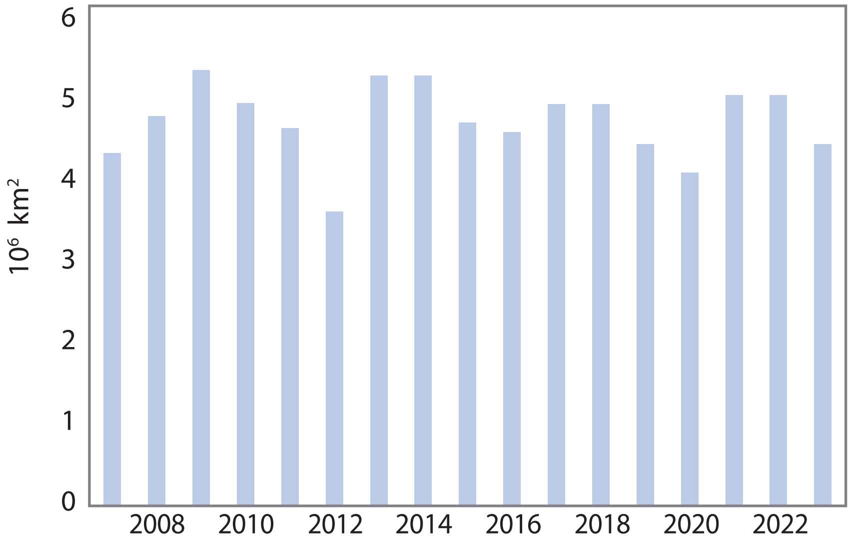


Figure 4: Arctic sea ice extent, 1979–2023.

The trend in Arctic sea ice extent in summer (September) has been virtually flat since 2007 (redrawn from Astrup-Jensen 2023)



over the summer may have contributed strongly to the diets of individual bears, resulting in a health and survival benefit. Another study, from Lancaster Sound in the central Canadian Arctic, where summer algae blooms have also not increased, examined carbon isotopes from bones of polar bears from archaeological sites up to 4000 years old and compared these to samples from recent, living animals. While recent samples were found to contain more carbon from open-water algae sources than ancient ones, there was no evidence that suggested this difference was detrimental to living bears, or that ancient bears benefitted preferentially from having consumed more carbon from sea-ice algae sources.[34]

6. Health and survival

Current conditions: maternity dens

Polar bear families – sows with newborn cubs, called 'cubs-of-the-year,' as well as those with yearling or even two-year-old cubs – had been protected from hunting in all nations by 1970, even before the international treaty was enacted in 1973 (see Section 1). Identifying the locations of maternity dens of pregnant sows and determining how well bears were reproducing (including determining litter sizes and cub survival) were considered critical objectives in the early days of polar bear research 50 years ago, and these topics continue to be important in monitoring the survival of the species today.[35.]

In areas where sea ice melts completely in the summer, such as Hudson Bay and Davis Strait, maternity dens are always made on land, usually before late November or so, ahead of the birth of cubs in late December or early January. Elsewhere in the Arctic, pregnant sows either make their maternity dens on the sea ice or on offshore islands, and can switch from sea ice to land denning (and back) when necessary. Except for the Southern Beaufort Sea, and in some parts of the central Canadian Arctic and the Barents Sea, where dens are constructed on thick first-year or multi-year ice, polar bear sows seem to prefer to make their maternity dens on isolated offshore islands that can be reached only by swimming or walking over sea ice. This preference makes monitoring the accessibility of suitable offshore land denning areas a top conservation concern.[36] Major offshore land denning areas have long been known on Wrangel Island in the Chukchi Sea, the Franz Josef Land archipelago in the eastern Barents Sea, and on the East Siberian Islands and Severnaya Zemlaya archipelago in the Russian Arctic. Previously important but now less-critical denning areas are located in eastern Svalbard (Figure 5). Only about 300 bears now reside year-round in Svalbard, which means that relatively few pregnant sows in the Barents Sea depend on land denning sites being available nearby: the bulk of the Barents Sea polar bear population now make dens on the sea ice or in Franz Josef Land to the east, indicating a flexibility of denning behaviour formerly thought impossible.[37]

Figure 5: Major and minor offshore polar bear land denning areas.

1. North-west Greenland
2. North-east Greenland
3. Eastern Svalbard
4. Franz Josef Land
5. Novaya Zemlya
6. Severnaya Zemlya
7. Taimyr Peninsula
8. New Siberian Islands
9. Bear Islands
10. Wrangel Island
11. Chukchi Peninsula
12. Southern Banks Island
13. Simpson Peninsula
14. Eastern Southampton Island
15. Eastern Baffin Island

Contrary to predictions, a recent study found that on Wrangel Island, the snow necessary for successful den construction had not changed between 1980 and 2020, despite marked summer sea-ice declines since 2003. In also noted that, 'availability of denning habitat is not an immediate limiting factor for the CS subpopulation'.[38] Moreover, in the European Arctic, where pregnant sows have recently been unable to access some areas previously used for denning around Svalbard, due to lack of autumn sea ice, sea-ice levels giving access to the abundant denning sites in Franz Josef Land and the snow depths once there have not changed since 1980, explaining why this region is now favoured by Barents Sea sows as a safe haven.[39] Unfortunately, there was, inexplicably, no official update by Norwegian polar bear specialists regarding Svalbard polar bear health and survival for 2023, as had been provided every year for the last decade or so.[40] However, as in 2022, sea ice over the winter and spring months in 2023 was abundant in the area, and Norwegian biologist Jon Aars made several public statements in 2023 confirming that polar bears continued to fare as well as they have done in recent years, despite the largest decline in *summer* sea ice of all subpopulations.[41]

Current conditions: litter sizes

Table 1 adds fall estimates of litter sizes for recently surveyed subpopulations in WH, SH, SG, and EG (see Section 3) compared to other subpopulations previously surveyed, updated from the *State of the Polar Bear 2018*.[42] Overall, SG and EG had the highest litter sizes.

Past conditions: survival during warm periods

Several interesting studies published in 2023 addressed the issue of polar bear survival during previous warm periods, when the Arctic was essentially ice-free in summer. According to a recent analysis, ice-free conditions in summer in the so-called 'Last Ice

Table 1: Litter sizes for cubs of the year

Subpopulation	Litter size	Year	Reference
WH	1.46	2021	Atkinson et al. 2022
WH	1.63	2016	Dyck et al. 2017
WH	1.43	2011	Dyck et al. 2017
WH	1.50	1985–1992	Derocher and Stirling 1995
WH	1.62	1980–1984	Derocher and Stirling 1995
WH	1.56	1966–1979	Derocher and Stirling 1995
SH	1.57	2021	Northrup et al. 2022
SH	1.46	2016	Obbard et al. 2018
SH	1.56	2011	Dyck et al. 2017
FB	1.54	2009/2010	Dyck et al. 2017
BB	1.55	2011–2013	SWG 2016:301, 321
KB	1.60	2012–2014	Laidre et al. 2023:82
KB	1.67	1992–1997	SWG 2016:552
SG	1.75	2015–2017	Laidre et al. 2022b
EG	1.75	2007–8, 2015–19	Laidre et al. 2022b
SV (BS)*	1.63	2022	NPI 2022b

Data estimated from recent autumn surveys. *SV (BS) indicates the Svalbard region of the Barents Sea subpopulation.

Area', which sits north of the Central Canadian Arctic and Greenland, lasted about 1600 years during the early Holocene – around 11.3–9.7 thousand years ago (kya), a period that polar bears obviously survived. Previous studies have shown that lack of summer ice-cover probably lasted about 10,000 years at the height of the Eemian interglacial (ca. 130–120 kya), which was markedly warmer than today, but we have until recently had little evidence regarding how well polar bears fared during this period.[43.]

However, a 2023 genetic study by Michael Westbury and colleagues examined samples from living polar bears inhabiting eastern (EG) and western Greenland (BB and KB). They determined that population abundance seemed to have been stable throughout the very warm Eemian interglacial and the cooler period that followed (about 120–50 kya), but experienced a sudden 50% decline in population numbers at the height of the Last Glacial Maximum (LGM), about 20 kya. This suggests that cold glacial conditions were more detrimental to polar bear survival than warm interglacials, and not the other way around.[44]

However, these authors also found evidence for another decline in numbers between about 13 kya (for East Greenland bears) and 11 kya (for West Greenland bears), during the Holocene Thermal Maximum (11.7–8.2 kya), when, according to a comprehensive review of Greenland data by Yarrow Axford and colleagues, temperatures were about 3–5°C warmer than today. A further decline in polar bear numbers appeared to have occurred at about 4.5 kya in the Late Holocene in East Greenland, when it may have been 1–3°C warmer than today (with less sea ice in summer but more in winter). In contrast, a further decline in polar bear numbers was inferred for West Greenland about 2.5 kya, when most records show it was generally colder in summer than it is today. Overall, there did not seem to be a clear correlation between polar bear population declines and warmer conditions in the past, as had been expected. However, the results may have been compromised by the use of data from a relatively small number of bears (< 20), and because the calculation of past population sizes from genetic data may bring errors associated with the many assumptions required.[45.]

7. Human/bear interactions

In recent years, conservation concerns seem to have switched from starving bears and declining populations to increased human/bear interactions on land. Problems with polar bears, which include aggressive behaviour, attacks causing death or injury, destruction of property, and theft of stored food, are said to have become more of a problem in recent years across the Arctic. Since 2022, polar bear specialists and others have published several essays and reports predicting that these problems will increase over time because of declining sea ice due to human-caused global warming; that is, polar bears will spend more time on land because of increased melting of sea ice, resulting in increased numbers of conflicts with humans.[46]

This viewpoint has meant that virtually every problem bear incident in recent years has been blamed on lack of sea ice, even if there was no evidence to support such a claim. For example, by mid-March 2023, one polar bear biologist told the media that the now-common influx of polar bears in Newfoundland 'might' be due to reduced sea ice off Labrador, even though by that time the province had not had unusually high numbers of visiting bears (usually 30–60 per year) and sea ice was only slightly below average. Oddly, similar claims were made in the spring of 2017, when there were many more polar bear sightings than usual in Newfoundland and southern Labrador and sea ice was thicker and much more extensive than usual.[47]

In Churchill, Manitoba, near an area where Western Hudson Bay polar bears congregate over the summer waiting for sea ice to form in the fall, local conservation officers reported to the media in August that problem bear incidents were unusually high due to an earlier-than-usual breakup of sea ice. However, by the end of the season in November, after bears had spent 164 days ashore – the fifth longest on record – published reports showed only 265 incidents, more than 100 less than the late freeze-up year of 2016, when 386 incidents were reported.[48.]

Inuit in Canada generally interpret higher numbers of polar bear attacks and sightings near communities as a reflection of increased bear numbers.[49] Most human communities in the Arctic have increased in size over the last six decades and, as a result, the number of garbage dumps and other polar bear attractants has grown too.[50] However, Arctic residents are at risk outside of communities too: attacks by bears have also happened while people have been travelling, participating in recreational activities such as camping, and engaging in subsistence hunting.[51.]

Aside from the knowledge that there are now more bears and more people in the Arctic than there were 60 years ago, there is also the likelihood – which polar bear specialist Ian Stirling warned of decades ago – that hunting restrictions and total bans on hunting would increase human/bear conflicts because of intra-species competition. This warning reflected Stirling's knowledge that large adult males are dominant in polar bear social hierarchy and often steal seal kills from young and very old bears, leaving them food deprived. Since hunters tend to target large adult males, reduced hunting over decades should result in more adult males in the population, leading to more food stress for young and old bears.[52] Not surprisingly, the data show that the largest proportion of 'problem' bears across the Arctic are young (3–5 years of age), followed by very old bears in poor condition.[53]

For example, the highly-publicised December 2019 polar bear invasion of the small village of Ryrkaypiy in the Russian Far East was said by locals to have been precipitated by bears congregating to feed on the carcasses of walrus that had fallen off the cliff at nearby Cape Schmidt, after being spooked by the presence of the bears. According to locals quoted in one news report, adult male bears chased off young bears, who wandered the 1 km or so to the village dump, and then into the village itself. Although a few older bears were involved, including a few sows with cubs, the bulk of the 'invaders' were young bears looking for food. Although reports about the incident claimed the bears were 'skinny' or 'starving,' photos show only fat healthy bears. Similarly, while polar bear experts and others claimed lack of sea ice was to blame, charts of the area showed enough cover for ice-edge seal hunting, suggesting that consuming fat from already-dead walrus was preferred by the bears over more energy-intensive hunting of live seals.[54]

A more recent example comes from an incident on 26 July 2023 in northern Quebec (within the Davis Strait polar bear region), which almost cost two Inuit residents their lives. A family of three were staying at an overnight camp site as they travelled by boat up the coast to another community. A young bear, probably less than 4–5 years old, mauled two family members at 3 a.m. while they slept in their tent. A third family member killed the bear at close range. Government charts revealed the sea ice had only recently cleared the shoreline, which means the bear had probably spent at most a few weeks onshore. In other words, if the bear was starving, it was already starving when it left the ice, not because it had come ashore earlier than usual. There was no description given of the fatness of the bear, but such young bears are often in less-than-ideal condition.[55]

Despite concerns that continued low summer sea-ice coverage would precipitate more severe conflicts between polar bears and people, there does not appear to have been any such increase. Relatively few serious incidents have been publicised since 2021 (the year covered by the last *State of the Polar Bear* report published in 2022).[56]

In the spring of 2022, there were numerous bear sightings in Newfoundland and Labrador, including a report of a bear on the roof of a woman's house, prompting the usual suggestion that this was due to lack of sea ice, even though the bears can't reach these areas without plenty of ice being present. Sea-ice conditions also allowed a fat polar bear to reach the Gaspé Peninsula on the south of the Gulf of St. Lawrence, one of several individuals that reached that far south before being stranded by melting ice. Later that year, a woman was injured after being attacked by a bear while sleeping in a tent in Svalbard in August (the ice-free season), resulting in the bear being killed.[57]In addition to the July 2023 attack in Quebec by a young bear, there was a horrific attack during the winter, on 17 January 2023: an old male bear in poor condition mauled to death a young mother and her one-year-old infant son in the village of Wales on the Bering Strait, Alaska. The woman was carrying her baby between buildings at about 2:30 pm during a blizzard, and a bear that had come into the village from the sea ice was able to make a surprise attack. The bear was killed soon after by local residents.[58]

The relative lack of recent reports of severe attacks are consistent with the results of a study published in 2023 about problem polar bears killed in defense of life or property in Svalbard over three decades (1987–2019). The study found no correlation with sea-ice conditions, despite the archipelago seeing the greatest decline in summer sea ice of all Arctic regions, especially over the last two decades (about six times the rate seen in WH since 1979).[59] In addition, it found that the number of bears killed due to conflicts with people had strongly declined over time, despite an increase in the number of human visitors to the archipelago. The authors suggested that this surprising outcome might be explained by increased government regulations restricting people from seeking out polar bears, but it nevertheless did not support the prediction that serious bear problems would increase due to lack of sea ice.

8. Discussion

Recent survey data collected from Hudson Bay are both surprising and concerning. WH numbers appeared to decline, while SH numbers increased, even though sea ice conditions were largely as they had been during the 1980s. The possibility that during 2017–2021, hundreds of bears may have been moving undetected between all Hudson Bay subpopulation boundaries, including Foxe Basin (FB) to the north, has broad implications. It not only means the WH population has not declined since 2004, but it also suggests that none of the three Hudson Bay subpopulations have been counted correctly or managed appropriately for decades. This presents a big problem for polar bear scientists and conservation organizations because WH bear data has been used as a proxy for the entire species in several computer modelled predictions of future conditions. It is also weighted heavily in other models used to assess species status.[60]

In other words, the results of these studies strongly undermine claims that WH data can be extrapolated to support a conclusion that polar bears worldwide are threatened with extinction due to future loss of sea ice.

Moreover, this adds yet another boundary issue to the list of all the others, which conservation specialists at the USFWS and PBSG have shown a particular reluctance to address. Both groups ignored a 2016 recommendation that the boundaries of the three Hudson Bay subpopulations (WH, SH, and FB) be adjusted to account for genetic distinctiveness, which might have pre-empted the problem brought to light by the 2021 surveys discussed above. They have also failed to re-calculate past subpopulation estimates for the Southern Beaufort (SB) and Northern Beaufort (NB) regions to reflect the new boundary between them; this was formally accepted by management authorities in 2014, based on known movements of bears over the old boundary. As the 2023 USFWS assessment report admits, the current boundary between SB and the Chukchi Sea (CS) to the west is also contentious, due to known movements of bears. This calls into question claims of population declines in the SB blamed on lack of sea ice.

Given the status of polar bears as an icon of the climate change emergency narrative, it cannot be a coincidence that these tenuous claims of climate change harm to WH and SB polar bears are associated with an apparent reluctance by polar bear scientists to deal swiftly with boundary issues known to impact population size estimates, especially since these two particular subpopulations are consistently touted as the best examples of declining survival due to climate change.

In what is perhaps a similar reaction to yet another boundary problem, in 2023, the USFWS and the PBSG failed to officially acknowledge the new SE Greenland (SG) population of polar bears as the 20th subpopulation, despite undisputed evidence it is genetically distinct and geographically isolated from EG bears to the north.

Overall, data provided to date indicate that polar bears are currently thriving and probably slowly increasing in abundance despite an almost 50% decline in summer sea ice extent since 1979. Contrary to predictions, there is no evidence that severe human/polar bear incidents have increased in recent decades because of deteriorating sea ice conditions. The international treaty to protect polar bears, which celebrated its 50th anniversary in 2023, represents a resounding success story, bringing about strong recovery from overhunting and on-going accomplishments in conservation. Efforts to paint polar bears as incapable of adapting quickly to the kinds of changes its Arctic habitat has endured for hundreds of thousands of years should be discounted.

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Notes

1. The author has published original peer-reviewed research results in related fields (most recently: Crockford 2018a; Leathlobhair et al. 2018; McKechnie et al. 2020), research on evolutionary theory that includes polar bears (Crockford 2003, 2004, 2006, 2023c, 2023d), research on evolutionary theory that includes geological and atmospheric processes (Crockford 2009, 2023c), and reviews and synthesis reports on Arctic climate and seals (Crockford 2008, 2012, 2022b, 2023b; Crockford and Frederick 2007, 2011).

2. https://susancrockford.com, all available through Amazon.

3. Crockford 2017, 2022b.

4. Crockford 2012; 2014a, b, Crockford 2015a, b, Crockford 2017; Crockford 2018b-e; Crockford 2019a-g; Crockford 2020a,b; 2021; 2022a; 2023a, b, e.

5. Schliebe et al. 2008:2; Vongraven et al. 2012:3; https://polarbearagreement.org/about-us/1973-agreement.

6. Dyck et al. 2021:76 on bears summering in northern Labrador and Ungava Bay vs. Smith et al. 1975; Stirling and Kiliaan 1980.

7. Amstrup et al. 2007; Crawford et al. 2023; Douglas and Atwood 2022; Marcot et al. 2023; Regehr et al. 2016; Rode et al. 2023; USFWS 2008; USFWS 2023; Wiig et al. 2015.

8. COSEWIC 2018.

9. Laidre et al. 2023; Laidre et al. 2022a; Northrup et al. 2022; PBSG 2023; Regehr et al. 2016; Wiig et al. 2015.

10. Crockford 2017, 2019b.

11. Florko et al. 2021; Pongracz 2014; https://arctic.ru/ecology/20200212/906958.html.

12. Dyck 2021; PBSG 2023.

13. Amstrup et al. 2007; Crockford 2017, 2019b.

14. Crockford 2022a.

15. Crockford 2022a; USFWS 2023.

16. Crockford 2019a.

17. Atkinson et al. 2022: v, 29, 85; For example, Atkinson et al. 2022: 29 stated (my emphasis):

> Estimates derived for the WH subpopulation indicate a *possible* decline in total bear abundance between 2011 and 2021…Although differences amongst these estimates [for 2011, 2016, and 2021] were not statistically significant, total abundance has declined *consistently* between successive surveys;

See also Lunn et al. 2013:18, in 'Demography and population assessment of polar bears in Western Hudson Bay, Canada,' Environment Canada Research Report, who stated (my emphasis):

> The estimate of abundance declined from 1184 polar bears (95% CI: 993–1411) in 1987 to 806 bears (95% CI: 653–984) in the final year of the study, 2011. Although there was variation in the annual abundance point estimates from 2004–2011 (range: 670 (95% CI: 531–834 in 2008) to 806 (95% CI: 653–984 in 2011)), *there was no significant trend*.

Regarding the Svalbard estimate, see Aars et al. 2017; Crockford 2019a.

18. Crockford 2019a. See also https://web.archive.org/web/20150710001330/http://pbsg.npolar.no/en/status/status-table.html [2014 PBSG assessment].

19. Atkinson et al. 2022:29, 33; see also BBC 2022; Crockford 2023e; Viengkone et al. 2016: Fig. 3; Viengkone et al. 2018: Fig. 1 and page 8.

20. PBSG 2023:40; USFWS 2023:12.

21. Northrup et al. 2022: 29, 31, 42.

22. PBSG 2023:36-37.

23. USFWS 2023:13.

24. Laidre et al. 2022a:1333; Laidre et al. 2022b:1-3; Laidre et al. 2015.

25. Derocher and Wiig 2002 [size of Svalbard bears]; Laidre et al. 2022a:1333-1334.

26. Laidre et l. 2022a; U. Washington press release, https://www.washington.edu/news/2022/06/16/se-greenland-polar-bears/; see news items https://www.theatlantic.com/science/archive/2022/06/greenland-polar-bear-extinction-climate-change/661300/ and https://www.washingtonpost.com/climate-environment/2022/06/16/greenland-polar-bears-sea-ice/; see also Hamilton et al. 2017; Kochtitzky and Copland 2022, Meire et al. 2017 and https://polarbearscience.com/2022/06/19/new-polar-bear-subpopulation-update-more-background-facts-and-details-from-the-paper/.

27. Laidre et al. 2022a:1337; PBSG 2023:22; USFWS 2023:12-13; https://polarjournal.ch/en/2023/03/16/greenland-publishes-revised-polar-bear-policy/.

28. PBTC 2022; Langwieder et al. 2023; Singer et al. 2023.

29. Langwieder et al. 2023; Singer et al. 2023; Snook 2022.

30. Government of Canada 2023; PGSG 2021; USFWS 2023:12-13; PBTC 2022; Marcot et al. 2023.

31. Meier et al. 2023; Omrani et al. 2022.

32. Astrup-Jensen 2023; Meier et al. 2023; Meier 2019; Meier and Stewart 2019; Manney et al. 2023; Millan et al. 2023; Wilmouth et al. 2023.

33. Andersen et al. 2012, 2021; Ardyna et al. 2020a, b; Bengtsson et al. 2020, 2021; Crawford et al. 2015; Crockford 2022b, Frey et al. 2023; Lewis et al. 2020; Rode et al. 2021; Shiozaki et al. 2022; but see Farmer et al. 2021.

34. Brown et al. 2018; Crockford 2023b; Frey et al. 2023; Routledge et al. 2023; see also Koch et al. 2023.

35. Anonymous 1970, 1976; Harington 1968; see also https://polarbearsinternational.org/act-now/awareness-events/international-polar-bear-day/ [Feb 2024].

36. https://polarbearsinternational.org/act-now/awareness-events/international-polar-bear-day/ [Feb 2024].

37. Aars 2021:317-319; Aars et al. 2009, 2017; Amstrup and Gardner 1994; Anderson et al 2012; Ferguson et al. 2000; Olsen et al. 2017; https://polarbearsinternational.org/news-media/articles/svalbard-maternal-den-study-reflections-2023/ and https://mosj.no/en/indikator/fauna/marine-fauna/polar-bear/.

38. Chinn et al. 2023:1; Stirling and Derocher 2012.

39. Merkel and Aars 2022.

40. Norwegian Polar Institute 2022a-c.

41. Lippold et al. 2019; Regehr et al. 2016; USFWS 2023:83; Norwegian polar bear scientist Jon Aars, quoted in 2022, says Svalbard polar bears are thriving https://theworld.org/stories/2022-07-21/svalbard-s-polar-bears-persist-sea-ice-melts-not-forever and https://www.nhm.ac.uk/discover/news/2024/february/wildlife-photographer-of-the-year-59-peoples-choice-winner-announced.html [includes an interview with Jon Aars about Svalbard polar bears in Feb 2024].

42. Atkinson et al. 2022:84; Northrup et al. 2022:27; Laidre et al. 2022a:23.

43. Detlef et al. 2023; Helmens et al. 2015; Polyak et al. 2010.

44. Westbury et al. 2023; Crockford 2023c.

45. Amstrup et al. 2007; USFWS 2023; Westbury et al. 2023:2; Axford et al. 2021:297-299; see also Crockford 2022b and Crockford 2023c.

46. Abrahms et al. 2023; Atwood and Wilder 2021; Jacobo 2022; Miller et al. 2023; Rode et al. 2022; Smith et al. 2023; Wilder et al. 2017.

47. https://www.saltwire.com/prince-edward-island/news/take-the-warnings-seriously-polar-bear-expert-explains-why-starving-young-animals-are-roaming-around-newfoundland-in-unexpected-places-this-year-100834729/ [16 March 2023]; https://nationalpost.com/news/canada/polar-bear-spotted-outside-classroom-in-newfoundland [30 March 2023]; see also

Crockford 2019a.

48. https://www.cbc.ca/news/canada/manitoba/churchill-manitoba-bears-1.6937441 [16 Aug 2023]; https://www.cbc.ca/news/canada/manitoba/churchill-new-waste-facility-project-1.7049919 [9 Dec 2023]; https://polarbearscience.com/2023/12/12/churchill-end-of-season-problem-polar-bear-reports-finally-published/ [12 Dec 2023].

49. Environment and Climate Change Canada 2021; George 2022; Tomaselli et al. 2022.

50. Smith et al. 2023; Smith 2022.

51. Crockford 2019b, 2022a; Truett 1993; see also https://polarbearscience.com/2016/03/19/polar-bears-onshore-in-winter-will-more-bears-mean-more-deadly-attacks/.

52. Anonymous 1976:11.

53. Wilder et al. 2017.

54. https://www.thetimes.co.uk/article/climate-change-means-a-polar-bear-may-be-around-next-corner-6zb9899gd [14 Dec 2019]; see also http://polarbearscience.com/2019/12/05/ryrkaypiy-over-run-by-50-polar-bears-is-probably-due-to-more-chukchi-sea-bears/ and https://polarbearscience.com/2020/12/20/polar-bears-again-attracted-to-russian-town-by-dead-walrus-attenborough-blames-on-no-sea-ice/.

55. https://nunatsiaq.com/stories/article/3-survive-polar-bear-attack-near-kangiqsualujjuaq/ [27 July 2023] and https://www.cbc.ca/news/canada/montreal/polar-bear-attack-nunavik-trip-to-bury-repatriated-remains-nunavik-1.6933691 [13 Aug 2023]; see also Dyck et al. 2021; Stirling and Kiliaan 1980; https://polarbearscience.com/2023/07/30/repeat-of-2013-high-profile-sierra-club-polar-bear-attack-this-time-with-inuit-victims/.

56. Crockford 2022a.

57. https://www.cbc.ca/news/canada/newfoundland-labrador/nl-polar-bear-sightings-2022-1.6415937 [11 April 2022]; https://www.cbc.ca/news/canada/montreal/polar-bear-gaspe-1.6437187 [30 April 2022]; see also https://polarbearscience.com/2022/05/01/fat-polar-bear-killed-on-the-south-shore-of-the-gulf-of-st-lawrence-on-the-gaspe-peninsula/ ; https://thebarentsobserver.com/en/arctic/2022/08/polar-bear-shot-dead-after-attacking-tourist [8 Aug 2022].

58. https://apnews.com/article/animal-attacks-alaska-animals-polar-bears-f105961edcc204e284aacc58d7c6286a [6 Feb 2023]; see also https://polarbearscience.com/2023/01/18/two-dead-in-fatal-polar-bear-attack-in-alaskan-village-of-wales-on-the-bering-strait/.

59. Vongraven et al. 2023; Regehr et al. 2016.

60. Amstrup et al. 2007; Amstrup and Bitz 2023; Molnár et al. 2010, 2020; Marcot et al. 2023; Regehr et al. 2016; USFWS 2023.

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