

# TWENTY GOOD REASONS

## *Not to worry about polar bears: an update*

Susan J. Crockford

WHAT DO YOU MEAN TOO BIG?



TOO FAT FOR CLIMATE FASHION



# **TWENTY GOOD REASONS**

## ***Not* to worry about polar bears: an update**

Susan J. Crockford



# Contents

About the author	vii
Executive summary	ix
Introduction	1
1 A conservation success story	1
2 Fewer populations in decline	1
3 Abrupt summer sea ice decline has not affected polar bear numbers as predicted	4
4 Chukchi Sea population is thriving	5
5 More prey means healthier polar bears	5
6 Polar bears are adaptable	6
7 Southern Beaufort numbers have rebounded	6
8 Barents Sea numbers have increased	6
9 Low sea ice in 2012 had no harmful effect on Southern Beaufort bear numbers	7
10 Other species impacted by high polar bear numbers	7
11 Western Hudson Bay population numbers are stable	7
12 Hudson Bay sea ice is not changing much	10
13 Problem bears in Churchill are not lean or starving	10
14 Churchill Manitoba had the most problem bears in 1983 and 2016	10
15 Marginal sea ice declines during the feeding period	11
16 No evidence that subsistence hunting is affecting bear populations	12
17 Stressful research methods have been curtailed	12
18 No recent reports of polar bear cannibalism	13

<b>19</b>	<b>Polar bears appear unaffected by pollution</b>	<b>14</b>
<b>20</b>	<b>Polar bears have survived past warm periods</b>	<b>14</b>
	<b>Conclusion</b>	<b>14</b>
	<b>Notes</b>	<b>16</b>

## About the author

Dr Susan Crockford is an evolutionary biologist and has been working for 35 years in archaeozoology, paleozoology and forensic zoology. She is an adjunct professor at the University of Victoria, British Columbia, but works full time for a private consulting company she co-owns (Pacific Identifications Inc). She is the author of *Rhythms of Life: Thyroid Hormone and the Origin of Species*, *Eaten: A Novel* (a polar bear attack thriller), *Polar Bear Facts and Myths* (for ages seven and up, also available in French and German), *Polar Bears Have Big Feet* (for preschoolers), and the fully referenced *Polar Bears: Outstanding Survivors of Climate Change*,<sup>1</sup> as well as a scientific paper on polar bear conservation status.<sup>2</sup> She has authored several earlier briefing papers and videos for GWPF on the subjects of polar bears and walrus.<sup>3,4,5,6,7,8</sup> Susan Crockford blogs at [www.polarbearsience.com](http://www.polarbearsience.com).





## **Executive summary**

1. Polar bears are still a conservation success story: there are more polar bears now than there were 40 years ago.
2. Fewer populations are in decline than in 2010 (only one, officially) and only six are data deficient (down from nine).
3. Abrupt summer sea ice decline has not affected polar bear numbers as predicted: even though sea ice levels dropped to mid-century levels in 2007, the expected decimation of polar bears failed to occur.
4. The Chukchi Sea population is thriving, despite a pronounced lengthening of the ice-free season since 2007.
5. Less sea ice in the summer in the Chukchi Sea has meant a healthy prey base for polar bears because ringed seals feed primarily in the ice-free season.
6. Polar bears have shown themselves to be adaptable to changing ice conditions in several regions.
7. Southern Beaufort numbers have rebounded since the last survey count.
8. Barents Sea numbers have probably increased since 2005 and have definitely not declined, despite much less sea ice cover.
9. There is no evidence that record-low summer sea ice in 2012 had a harmful effect on Southern Beaufort bear numbers.
10. Other species are being negatively impacted by high polar bear numbers, especially nesting sea birds and ducks.
11. Western Hudson Bay population numbers have been stable since 2004, despite what scientists are telling the media.
12. Hudson Bay sea ice has not changed since about 1999: the breakup dates and freeze-up dates are highly variable but the ice-free period was not any longer in 2015 than it was in 2004. However, this fall freeze-up is shaping up to be the earliest in decades.
13. Problem bears in Churchill are not lean or starving.
14. Churchill Manitoba had the most problem bears in 1983 and 2016, which were late freeze-up years, but many of the incidents in 2016 can be attributed to increased vigilance on the part of patrol officers after an attack in 2013.
15. There have been only marginal sea-ice declines during the feeding period in spring, when polar bears need sea ice the most.
16. There is no evidence that subsistence hunting is affecting bear populations.
17. Stressful research methods have been curtailed in much of Canada.

18. There have been no reports of polar bear cannibalism since 2011.
19. Polar bears appear unaffected by pollution: studies suggest only that harm is theoretically possible, not that it has happened.
20. Polar bears have survived past warm periods, which is evidence they have the ability to survive future warm periods.

## **Conclusion**

- Polar bears are thriving: they are not currently threatened with extinction.
- Tens of thousands of polar bears did not die as a result of more than a decade of low summer sea ice, as was predicted.
- Polar bears don't need sea ice in late summer/early fall as long as they are well-fed in the spring.

## Introduction

Just in time for Polar Bears International's self-proclaimed<sup>9</sup> fall Polar Bear Week (5–11 November 2017),<sup>10</sup> here is a new resource for cooling the polar bear spin. I've updated my 2015 summary of reasons not to worry about polar bears, which is now more than two years old.<sup>11</sup> In this new version, you will find links to supporting information, including published papers and fully referenced blog posts of mine that provide background, maps and bibliographies, although some of the most important graphs and maps have been reproduced here. I hope you find it a useful resource for refuting the pessimism<sup>12,13</sup> and prophecies of catastrophe<sup>14</sup> about the future of polar bears. Please feel free to share it. As global leaders meet in Bonn for COP23 (6–17 November 2017),<sup>15</sup> it's time to celebrate the proven resilience of polar bears to their ever-changing Arctic environment.

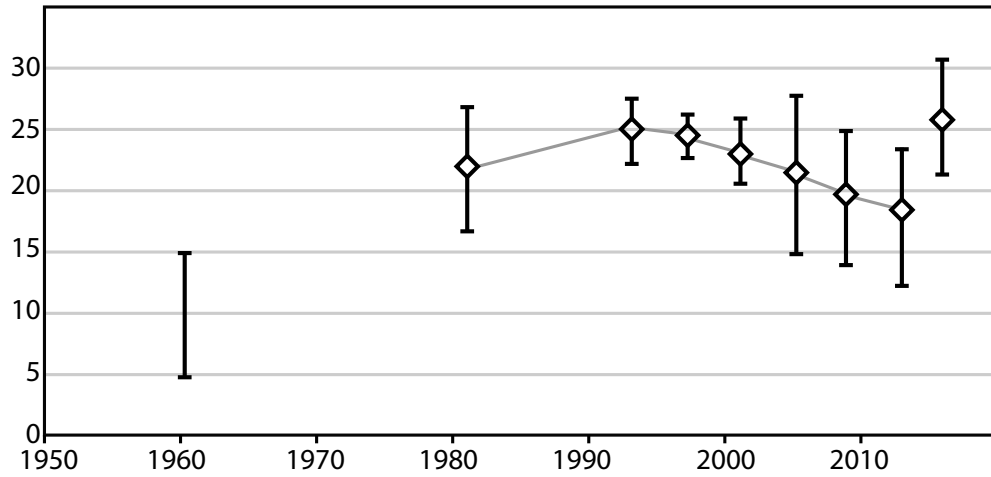
## 1 A conservation success story

Polar bears are still a conservation success story.<sup>16</sup> With the estimated global population almost certainly greater than 28,000,<sup>17</sup> we can say for sure that there are more polar bears now than there were 40 years ago (Figure 1).<sup>18</sup> Sadly, although completing a global survey was one of the primary objectives of the Polar Bear Specialist Group (PBSG) at its inception 49 years ago, it has so far been unable to do so because at least four subpopulations have never been counted. The PBSG global estimate was listed in July 2014 as 'approximately 25,000' bears.<sup>19</sup> This number has not been revised,<sup>20</sup> even though the estimate PBSG members provided the International Union for the Conservation of Nature (IUCN) for its 2015 assessment was 22,000–31,000, or about 26,000.<sup>21</sup> Surveys completed or published since bring the total higher still.<sup>2</sup>

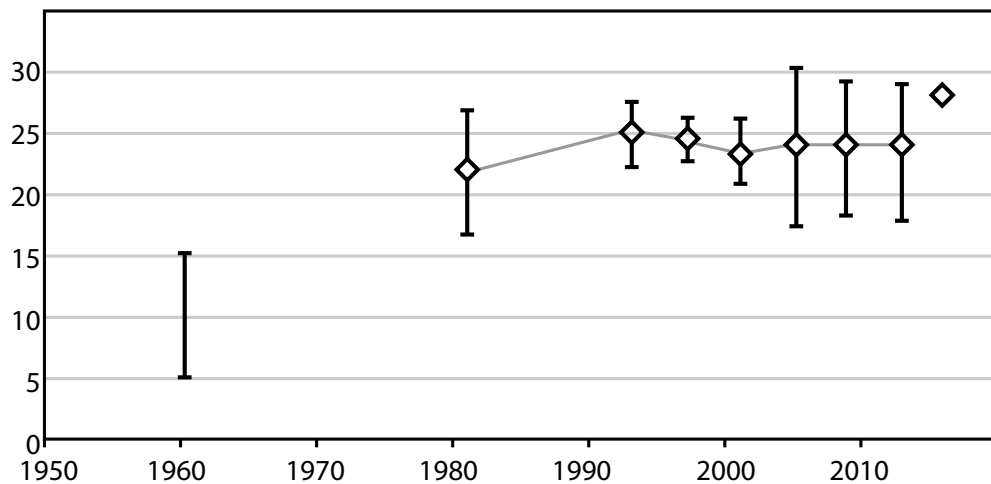
Even with the lack of precision inherent in these estimates, global numbers are still too high to qualify the polar bear as 'vulnerable' to, or 'threatened' with, extinction based on current population levels.<sup>22</sup> Polar bears today are also well distributed throughout their available habitat (winter sea ice),<sup>23</sup> which is a recognized characteristic of a healthy species. All concerns expressed regarding polar bear survival are about the future.<sup>24</sup>

## 2 Fewer populations in decline

A recent status assessment for polar bears, published by Environment Canada in May 2014,<sup>26</sup> showed only two subpopulations are 'likely declining', down from four listed by the PBSG as declining in 2013 and seven in 2010 (Figure 2).<sup>27</sup> Baffin Bay, which earned its 'likely declining' status due to suspicions of overharvesting (not sea ice decline), was reported in 2017 to be likely stable.<sup>28</sup> Kane Basin, assessed as 'declining' in 2010 and 2013 (but 'data deficient' in 2014), was reported in 2017 to be 'stable' or



(a) Official estimate



(b) Unofficial estimate

### Figure 1: Official estimates of polar bear numbers

Upper graph uses totals reported in PBSG status tables (to 2013), with min/max; lower graph uses the same figures, but adds back in the so-called 'inaccurate' estimates dropped between 2005 and 2013 (in 2014, the PBSG finally did the same).<sup>25</sup> The 1960 figure is a ballpark estimate. Further detail can be found at my website<sup>18</sup> and Crockford 2017.<sup>2</sup>

'likely increasing'<sup>28</sup> (but see Section 10). This leaves only the Southern Beaufort bear population as 'likely declining' and even this is a highly questionable assessment (see Section 7). Note also that the number of subpopulation considered 'data deficient' (Figure 2, areas in brown) has been reduced from nine in 2014 to six in 2017: three bear populations (Barents Sea, Kara Sea and Kane Basin) have recently been surveyed and now have population estimates showing probable increases.

For example, a first-ever Kara Sea population estimate, completed in late 2014, potentially adds another 3200 or so bears to the global total.<sup>29</sup> This estimate (range 2700–3500), derived by Russian biologists, was added to the official global count published in 2015 by the IUCN Red List.<sup>21</sup> A former ball-park estimate was about 2000,<sup>18</sup> suggesting an increase may have taken place.

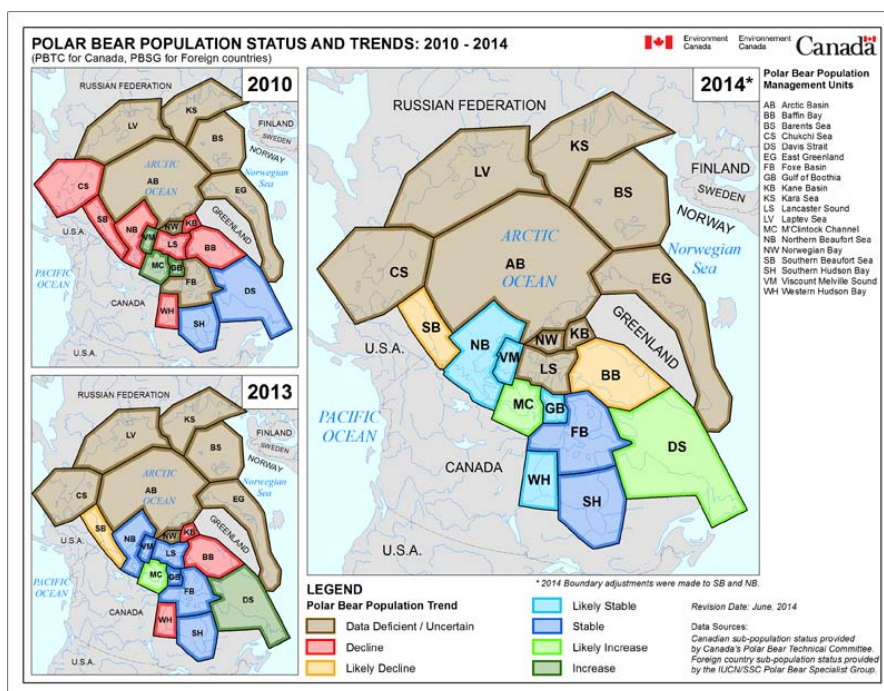


Figure 2: Global polar bear population status assessment even better than this.

Figures from the IUCN Polar Bear Specialist Group assessment (2013) and Environment Canada (May 2014).<sup>30</sup> Brown, data deficient; red, declining; yellow, likely decline; light blue, likely stable; dark blue, stable; light green, likely increase; dark green, increase.

More recent surveys show BB, BS, KB, and KS are stable or likely increasing.<sup>2</sup>

### 3 Abrupt summer sea ice decline has not affected polar bear numbers as predicted

Arctic sea ice has declined since satellite records began in 1979, but polar bears have so far adjusted well to this change, especially to the sudden decline to reduced summer sea ice levels that have been the norm since 2007. The degree of abrupt drop in summer sea ice that occurred in 2007 was not predicted by experts to occur until mid-century. However, the predicted decimation of polar bears worldwide expected under mid-century conditions (Figure 3)<sup>31</sup> – which entailed a loss of 2/3 of the global total (to only about 6660–8325 bears), as well as the total extermination of 10 entire subpopulations – not only failed to occur, it did not come even close to happening.<sup>32</sup> If the experts had been right back in 2007, there would be no polar bears at all in the Southern Beaufort or Western Hudson Bay this year.<sup>33</sup> There is also evidence that less summer ice in the Central Canadian Arctic has already been beneficial for polar bears,<sup>34</sup> an advantage not expected until later this century. This is due in part to the fact that less summer ice is good for ringed seals - on which polar bears prey – which feed primarily during the ice-free season (see Section 5) and which do best with first-year ice cover during the spring birthing and mating seasons.

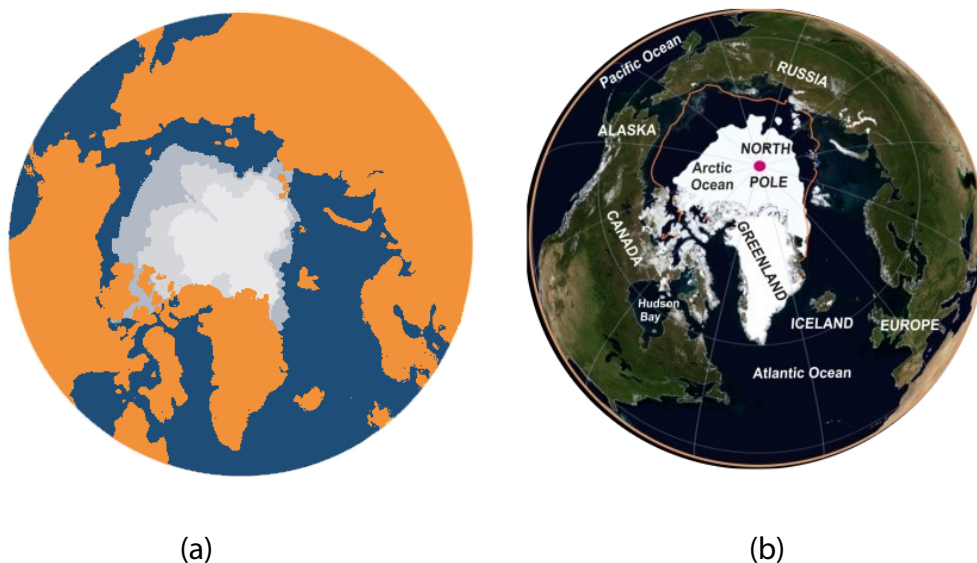


Figure 3: Predicted sea ice changes versus outturn.

(a) Predictions, based on 2004 data, for 2020 (light grey), 2050 (mid grey), and 2080 (dark grey). These were used in 2007 to predict a 66% decline in global polar bear numbers. (b) Situation as at 10 September 2012, an example of the sea ice extent experienced in since 2007.<sup>35</sup> See Crockford 2017 for details.<sup>2</sup>

## **4 Chukchi Sea population is thriving**

The results of a new study published in 2013 were a direct contradiction of the repeated message that recent large sea-ice declines in late summer had put these bears in peril.<sup>36</sup> The paper showed that Chukchi polar bears are doing better than they were in the 1980s,<sup>37</sup> and better than any others, except the bears of Foxe Basin (northern Hudson Bay), who are doing exceptionally well.<sup>38</sup>

There is still no official population estimate for the Chukchi Sea: the population is officially listed as zero, but was previously estimated at about 2000 individuals. However, it appears that record-breaking sea-ice levels in September 2007, the lowest since 1979, had no discernible effect on Chukchi Sea polar bears,<sup>39</sup> as confirmed by research up to 2016.<sup>2,40</sup> As a result, the status of this population was upgraded from 'declining' to 'data deficient' by the PBSG in 2013.<sup>41</sup> Despite the gloomy predictions, a longer-than-average ice-free period has actually been good for Chukchi polar bears.<sup>42</sup>

## **5 More prey means healthier polar bears**

The reason Chukchi Sea polar bears did so well with an extended open-water season was because ringed seals, their primary prey, do most of their feeding in ice-free summer waters. More fat seals mean more fat seal pups the following spring for polar bears. A recent study found that in recent years, with extensive September sea-ice minimums, the summer feeding period for seals was extended and they became extra fat.<sup>43</sup> This meant that some seals provided a more energy-rich food source for polar bears over the following fall and winter, an immediate benefit to the bears. In addition, well-fed female ringed seals produced fat healthy pups the next spring, which meant more food for polar bears when they needed it the most.

Between 2008 and 2011, both ringed seals and polar bears did better than either had done in the 1980s, when summer sea ice coverage was more extensive. Oddly, in March 2013, less than six months after ringed seals were placed on the American list of species 'threatened' with extinction,<sup>44</sup> ringed seal biologists were reporting to their peers that the results of their Chukchi Sea research contradicted their dire predictions.<sup>45</sup> Surprisingly to them, less summer sea ice was better for ringed seals, not worse. In July 2014, a judge decreed that the 2012 decision to list bearded seals in Alaska as 'threatened' was deficient and that there were no near-term threats. The judge called it 'an abuse of discretion.'<sup>46</sup>

The USA stands out as the only nation that insists that Arctic seals have been (or will be shortly) harmed by recent declines in summer sea ice,<sup>47</sup> which made it all the more surprising that in September 2017, the US Fish and Wildlife Service announced it would not pursue a plan to list Pacific walrus as 'threatened' with extinction under the Endangered Species Act.<sup>48</sup> Their experts concluded there was no evidence of ongoing harm or an imminent threat to walrus survival.

## **6 Polar bears are adaptable**

Polar bears have been shown to move from areas with unsuitable ice to areas with better ice conditions, even over the short term. This is strong evidence of their ability to adapt to changing sea ice. Recently, it was noted that a number of bears from the Barents Sea, where sea-ice coverage is strongly influenced by variations in the Atlantic Multidecadal Oscillation,<sup>49</sup> moved to the islands of the Franz Josef Land archipelago in the Kara Sea, where there has been more predictable ice cover.<sup>50</sup> This is just one example of polar bear flexibility. A past example was the movement of Southern Beaufort bears into the Chukchi Sea during the catastrophic 1974–1976 episode of thick spring ice in the Eastern Beaufort. Flexibility in choosing maternity dens (onshore vs sea ice), as well as variability in feeding areas (nearshore vs offshore),<sup>51</sup> give polar bears the resilience they need to survive as a species.

## **7 Southern Beaufort numbers have rebounded**

According to a preliminary US Fish & Wildlife Service survey, Southern Beaufort bear numbers were higher in the fall of 2012 than they had been in the previous ten years,<sup>52</sup> indicating a recovery from the dramatic decline (25–50%) that occurred between 2004 and 2006 because of the effects of thick spring sea ice.<sup>53</sup> For unknown reasons, the newly-developed models used to estimate Southern Beaufort population size used only data up until 2010, even though mark-recapture data up until 2012 were available.<sup>54</sup> This is known because the data was used for another study; see Section 8. The failure of thick spring ice conditions to recur in recent years and the early formation and expansion of spring polynyas in the eastern Beaufort have likely been beneficial for polar bears and seals,<sup>55</sup> resulting in the rare sighting of at least one set of healthy triplet cubs in 2016.<sup>56</sup>

## **8 Barents Sea numbers have increased**

The Svalbard portion of the Barents Sea subpopulation was surveyed in 2015 and was initially reported to have increased by 42% over the count performed in 2004.<sup>57</sup> The just-published paper confirms that a 42% increase in abundance indeed occurred (685 bears in 2004 versus 973 bears in 2015).<sup>58</sup> However, due to the large uncertainty (broad error ranges) in the estimates involved, even a 42% increase was not statistically significant. This point was strongly emphasized by the PBSG<sup>59</sup> in their recent status update for the Barents Sea:

Because of the overlapping confidence intervals, it cannot be concluded that the BS subpopulation has grown.<sup>60</sup>

The authors of the Svalbard survey, however, had this to say:



There is no evidence that the fast reduction of sea-ice habitat in the area has yet led to a reduction in population size. The carrying capacity is likely reduced significantly, but recovery from earlier depletion up to 1973 may still be ongoing.

## **9 Low sea ice in 2012 had no harmful effect on Southern Beaufort bear numbers**

The dramatically low September sea ice of 2012 apparently had no effect on Southern Beaufort Sea polar bear numbers, or at least we have heard nothing to indicate any adverse effects.<sup>61</sup> Even though 2012 had the longest open-water period in the Southern Beaufort since at least 1979 (see Figure 4), researchers doing mark-recapture work in the area did not report large numbers of starving bears during the summer of 2012 or in the spring of 2013.<sup>62</sup> Instead, an aerial survey conducted in the fall of 2012 reported that numbers were higher than they had been in a decade (see Section 7). That is because the extent of sea ice in early summer and late fall means little to polar bears, in part because most bears eat very little then, even if they are on the ice.<sup>63</sup>

## **10 Other species impacted by high polar bear numbers**

There are so many polar bears in the Foxe Basin<sup>64</sup> and the southern Davis Strait<sup>65</sup> (Figure 5) that they may be decimating some nesting sea bird colonies.<sup>66</sup> If so then this would represent a downside of there being too many bears. And in Western Hudson Bay, polar bears have been reported eating record numbers of caribou and snow geese because populations of these prey animals are higher than they have been in decades.<sup>67</sup> Such welcome food sources for eastern Canadian bears provide a little relief from their summer fast, as whale carcasses do for western bears<sup>68</sup> (such as those at Kaktovik<sup>69</sup> in the Beaufort Sea or on Wrangel Island in the Chukchi Sea<sup>70</sup>). However, all evidence suggests that such terrestrial foods are not necessary for bears that have fed well during the previous spring:<sup>71</sup> whether on land or out on the ice, most polar bears eat very little over the late summer/early fall months.<sup>72</sup>

## **11 Western Hudson Bay population numbers are stable**

Western Hudson Bay polar bear numbers have stabilized.<sup>73</sup> Numbers have not continued to decline precipitously as predicted after a modest decline between 1987 and 2004.<sup>74</sup> Different methods of calculating an estimate, including which portions of the region were surveyed, have generated numbers that look like a large population de-

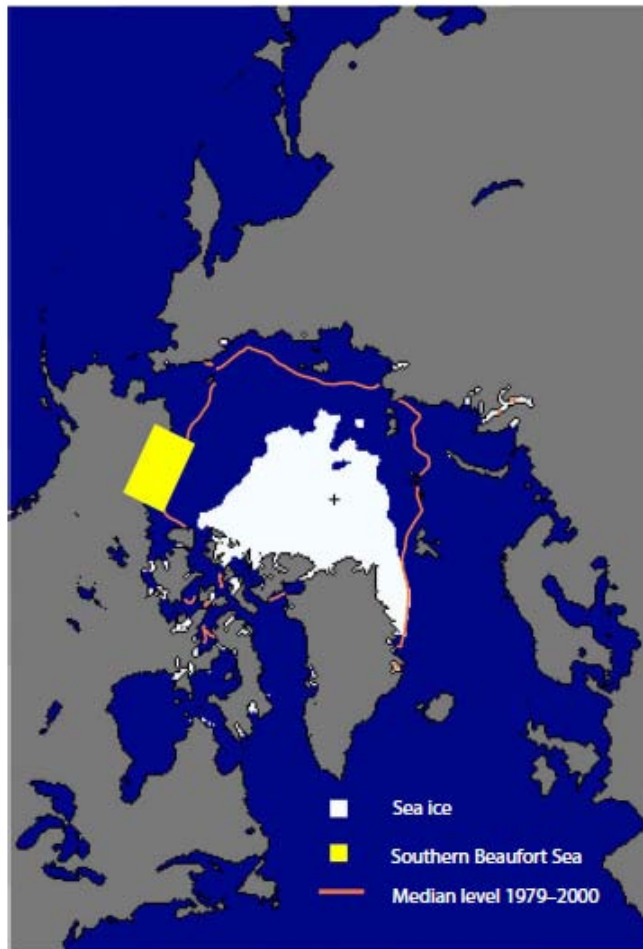


Figure 4: Sea ice extent at the 2012 late summer minimum As at 16 September 2012.  
Source: NSIDC

cline has taken place when no such change has actually happened.<sup>75,76,77,78</sup> In short, while there may have been a slight decline in numbers since 2004, there has not been a statistically-significant decline<sup>79</sup> and the just-released results of a 2016 survey confirm this conclusion.<sup>75</sup> There were 949 bears in 2011 (range 618–1280) and 842 bears in 2016 (range 562–1121), a statistically insignificant decline of about 11%. You may still find people saying that Western Hudson Bay polar bear numbers have dropped from about 1200 (in 1987) to about 800 now (a 33% decline).<sup>80</sup> However, it is not scientifically appropriate to compare these figures because they were based on different types of surveys conducted over different portions of the region.<sup>81</sup> The official Western Hudson Bay estimate accepted by the PBSG in 2014, and by the IUCN in 2015, is 1030 bears (range 754–1406; about 10% higher than, but not statistically different



Figure 5: Some polar bear assessment areas.

SB, Southern Beaufort Sea; BB, Baffin Bay; FB, Fove Basin; WH, Western Hudson Bay; DS, Davis Strait.

from, the 935 bears estimated in 2004, because the ranges overlap).<sup>82</sup> Environment Canada (2014) considered the population 'likely stable' (see Section 2), an assessment upheld by the latest survey.

## **12 Hudson Bay sea ice is not changing much**

For the last three years, break-up dates for Western Hudson Bay have been somewhat later than the recent average: in 2016<sup>83</sup> and 2017,<sup>84</sup> bears came off the ice from mid- to late-July, while in 2015 some bears did not come ashore until early August.<sup>85</sup> On the other hand, freeze-up in 2016<sup>86</sup> – an official El Niño year – was quite late (early December), as it was during the El Niño year of 1998. However, freeze-up was also just as late in 1983, 1999, 2003, and 2010. Surprisingly, 2017 looks headed for an early freeze-up.<sup>87</sup> In other words, freeze-up dates are quite variable year to year, and so are breakup dates.<sup>88</sup>

All of this suggests that in Western Hudson Bay, some years have been good for polar bears and others have been not so good, but there has not been a relentless, continuing decline in sea-ice breakup dates over the last thirty years that has forced bears onshore for ever-lengthening periods of time.<sup>89</sup> This has allowed polar bears to adapt via natural selection.<sup>90</sup> A paper published in 2017 showed that, between 2004 and 2015, polar bears spent about three weeks longer on shore than they did in the 1980s. The step-change in the length of the ice-free period occurred in the late 1980s,<sup>91</sup> and it appears that polar bears have adapted to it.<sup>92</sup>

## **13 Problem bears in Churchill are not lean or starving**

The Canadian Broadcasting Corporation recently produced a relatively balanced documentary about some of the controversies involved in polar bear conservation, called *The Politics of Polar Bears*.<sup>93</sup> It included an interview with the head conservation officer in Churchill, who noted that virtually none of the ‘problem bears’ (see Section 14) captured over the last five years were starving or lean. Churchill Polar Bear Alert reports for 2016<sup>94</sup> and 2017<sup>95</sup> stated that bears coming off the ice at mid-summer were in ‘great shape.’ This suggests that many of the polar bear problems experienced by Western Hudson Bay communities in recent years are due to higher numbers of bears (or a redistribution of bears, especially of sub-adult males) – as predicted by polar bear biologist Ian Stirling in the 1970s<sup>96</sup> – combined with other factors (such as increased numbers of residents and tourists and their associated attractants). Sea-ice changes are unlikely to be a cause.

## **14 Churchill Manitoba had the most problem bears in 1983 and 2016**

The first of the two worst years for problem bears in Churchill that could be correlated with lack of sea ice happened back in 1983, when the last human fatality from a polar bear attack occurred. Ironically, 1983 was a year when breakup of sea ice was later than usual, so the bears had more time on the ice to feed. Unfortunately, freeze-up

was also much later than usual, leaving many bears in a very lean state and unable to resume hunting until early December. Similar conditions prevailed for the second worst year (2016), which also had late breakup and late freeze-up. Hundreds of problem bears had to be dealt with in 2016, although the high number was partly an effect of ice conditions and partly the result of a zero-tolerance policy for bears close to town<sup>97</sup> implemented after an attack on a resident in 2013.<sup>98</sup> Breakup and freeze-up dates for Western Hudson Bay are highly variable (see Section 12) and do not correlate well with high or low Arctic sea-ice levels in September (Figure 6). In some years, the number of problem bears in Churchill does not correlate well with breakup and/or freeze-up dates because critical ice and snow conditions during the spring are never taken into account.<sup>99</sup> As of late October, there have been fewer problem bears in Churchill in 2017 than in 2016.<sup>100</sup>

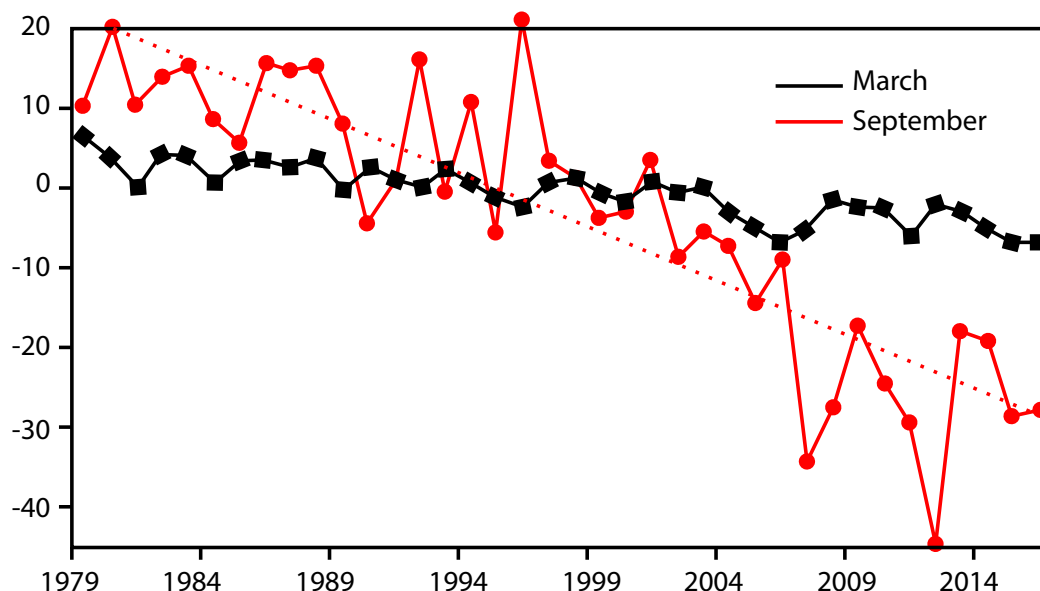


Figure 6: Arctic sea-ice levels 1978–2014

Source: NOAA's 'Arctic Report Card 2014'. Note the lack of error bars indicating the estimated accuracy of each value, which should be present on a scientific graph.

## 15 Marginal sea ice declines during the feeding period

Across the Arctic, there has been only a marginal decline in total sea ice extent (Figure 6) between March and June, the critical spring feeding period when polar bears require the ice as a hunting platform for gorging on young, fat seals. Polar bears con-

sume two-thirds or more of their yearly food intake during this time: they generally eat little during the summer,<sup>101</sup> whether on land or on the ice. Feeding picks up again in the fall but declines over the winter, explaining why polar bears everywhere are leanest at the end of winter,<sup>102</sup> just before Arctic seals pups are born, and fattest in early summer.<sup>103</sup>

In 2017, sea ice levels during the spring were higher than usual in the Labrador Sea (home to Davis Strait polar bears)<sup>104</sup> and, as a consequence, communities in coastal Labrador and Newfoundland saw record-breaking numbers of bear sightings,<sup>105</sup> including a scary encounter that resulted in a bear being shot.<sup>106</sup>

## **16 No evidence that subsistence hunting is affecting bear populations**

There is no plausible evidence that regulated subsistence hunting is causing polar bear numbers to decline, despite suspicions harboured by PBSG biologists. The one region where overhunting was suspected, but not proven,<sup>107</sup> to have caused a difference to population numbers is Baffin Bay.<sup>108</sup> However, results of a recent population survey refute that assumption: the population did not decline due to overhunting but instead increased 36% over the previous estimate (see Section 2).<sup>28</sup>

## **17 Stressful research methods have been curtailed**

Many polar bear biologists have stopped putting satellite radio collars on polar bears and have turned to other methods to gather population size data, a step that means less handling stress for the bears. In some regions, such as the Barents and Chukchi Seas, large-scale mark-recapture studies would be logistically impractical, although some small projects are conducted in the Barents Sea.<sup>109</sup> In other areas, repeated capture, each involving a helicopter chase and use of tranquilizer guns, is seen by Arctic residents as stressful for the bears, especially females with young cubs. Also, the drug residues are potentially bad news for aboriginal hunters and their families, who eat the meat.<sup>110</sup> Oddly, polar bear biologists chose to dispel the serious concerns over invasive research by presenting the outputs of computer models.<sup>111</sup>

At the moment, in most regions of Canada with polar bears (Figure 7), including Nunavut, the Northwest Territories and Quebec, permits are no longer being approved for mark-recapture work.<sup>112</sup> Invasive research does continue in other areas within Canada,<sup>113</sup> especially Western and Southern Hudson Bay, Labrador and Newfoundland, and beyond, particularly in the Southern Beaufort<sup>114</sup> and East Greenland.<sup>115</sup>



Figure 7: Polar bear research regimes in Canada  
 Red: permits no longer issued; green: mark-recapture still permitted.

## 18 No recent reports of polar bear cannibalism

As of 2017, there have been no further reports of polar bear cannibalism since at least 2011 and no reports of den collapses due to unusually warm winter or early-spring temperatures since 1990,<sup>116</sup> even though 2012 had the lowest summer ice extent since 1979. Even in regions where bears are reportedly under stress (such as the Southern Beaufort, Western Hudson Bay, and the Barents Sea), we have not had any further reports of cannibalism<sup>117</sup> or den-collapse deaths, either through the media or in the published literature.

## 19 Polar bears appear unaffected by pollution

So-called 'toxic' chemicals cycle from human use into the environment move up the food chain, especially through animal fat. As top Arctic predators that consume lots of fat, polar bears have the potential to retain more of these toxins than other animals. However, most of the papers published so far on this topic fail to demonstrate that any damage to polar bear health – or even alterations to established biochemistry – have taken place.<sup>118</sup> The effects discussed are virtually all theoretical.

East Greenland bears appear to be the most 'polluted' of all polar bears tested so far,<sup>119</sup> yet they seem to be doing well. Even their penis bones are holding up:<sup>120</sup> reports that polar bear penis bones have been breaking due to weakening bone structure caused by retained toxic environmental chemicals have sensationalized the original report,<sup>121</sup> which only said the bones could *perhaps* break. The same caveats apply to a just-published paper on toxic chemicals found in Hudson Bay polar bears:<sup>122</sup> although such chemicals could perhaps affect their health, no empirical evidence for any harmful effects has been shown.

## 20 Polar bears have survived past warm periods

One of the most recent genetic studies published emphasized that polar bears, as a species, survived more than one previous warm period when there was virtually no summer sea ice.<sup>123</sup> Sea ice has varied both over the short term (i.e. decades-long climate oscillations) and the long term (glacial-to-interglacial cycles of thousands of years). Over the last 100,000 years, for example, there have been periods of much less ice than today, but also periods with much, much more.<sup>124</sup> Polar bear population numbers probably fluctuated up and down in conjunction with these sea ice changes<sup>125</sup> but the polar bear as a species survived,<sup>126</sup> and so did all of the Arctic seal species they depend on for food, including Pacific walrus (a species limited by food,<sup>127</sup> not sea ice). Their survival indicates that these Arctic species, in an evolutionary sense, are very well-adapted to their highly-variable habitat,<sup>128</sup> despite their low genetic diversity.<sup>129</sup>

## Conclusion

These are all good reasons to feel good about the current status of the polar bear. Polar bears are not threatened<sup>130</sup> with extinction due to declining sea ice, despite the hue and cry from activist scientists<sup>131</sup> and environmental organizations.<sup>132</sup> Indeed, because the polar bear is doing so well,<sup>133</sup> those who would like to see polar bears listed as 'vulnerable' on the IUCN Red List depend entirely upon emotional prophecies of summer sea-ice declines, decades from now, to make their case.<sup>134</sup> They want publicity but they certainly don't want the public to realize how poor were their pre-



vious pessimistic predictions about the response of polar bears to low summer sea ice;<sup>135</sup> or to notice how nearly all polar bear photos published in recent years show fat healthy animals;<sup>136</sup> or to observe that healthy triplet cubs (a rare phenomenon that supposedly no longer exists in Western Hudson Bay,<sup>137</sup> where they used to be common<sup>138</sup>) have been photographed in Western Hudson Bay (2017),<sup>139</sup> the Southern Beaufort Sea (2016)<sup>140</sup> and the Chukchi Sea.<sup>141</sup> Tens of thousands of polar bears did not die as a result of more than a decade of low summer sea ice, for one simple reason: polar bears don't need sea ice in late summer/early fall as long as they are well-fed in the spring.

## Notes

1. [https://www.amazon.com/s/ref=dp\\_byline\\_sr\\_book\\_1?ie=UTF8&text=Susan+J+Crockford&search-alias=books&field-author=Susan+J+Crockford&sort=relevancerank](https://www.amazon.com/s/ref=dp_byline_sr_book_1?ie=UTF8&text=Susan+J+Crockford&search-alias=books&field-author=Susan+J+Crockford&sort=relevancerank) and <https://susancrockford.com>.
2. Crockford, S. 2017. Testing the hypothesis that routine sea ice coverage of 3–5 million km<sup>2</sup> results in a greater than 30% decline in population size of polar bears (*Ursus maritimus*). PeerJ Preprints 2 March 2017. Doi: 10.7287/peerj.preprints.2737v3
3. Crockford, S. August 2017. The death of a climate icon [http://www.thegwpf.org/gwpftv/?tubepress\\_item=XCzwFall8OQ](http://www.thegwpf.org/gwpftv/?tubepress_item=XCzwFall8OQ).
4. Crockford, S. February 2017. Polar bear scare unmasked: the saga of a toppled global warming icon [http://www.thegwpf.org/gwpftv/?tubepress\\_item=z6bcCTFnGZ0](http://www.thegwpf.org/gwpftv/?tubepress_item=z6bcCTFnGZ0).
5. Crockford, S. October 2014. The walrus fuss: walrus haulouts are nothing new [http://www.thegwpf.org/gwpftv/?tubepress\\_item=cwaAwsS2OOY&tubepress\\_page=2](http://www.thegwpf.org/gwpftv/?tubepress_item=cwaAwsS2OOY&tubepress_page=2).
6. Crockford, S. October 2014. On the beach: walrus haulouts are nothing new <http://www.thegwpf.org/susan-crockford-on-the-beach-2/>.
7. Crockford, S. July 2015. The Arctic fallacy: sea ice stability and the polar bear <http://www.thegwpf.org/susan-crockford-the-arctic-fallacy-2/>.
8. Crockford, S. April 2015. Twenty reasons not to worry about polar bears (2015) <http://www.thegwpf.org/20-reasons-to-be-cheerful-on-international-polar-bear-day-2015-2/>.
9. Polar Bear Week (Amstrup, S.):

...an event created by my colleagues at Polar Bears International to draw attention to sea ice loss in the Arctic and the urgent need to halt the global rise in temperatures causing the ice to melt. This year, Polar Bear Week coincides with the COP23 climate change conference in Bonn, Germany. The overlap is fitting. Polar bears are the premier symbol of global warming, with their very survival threatened by melting habitat.

See [https://www.huffingtonpost.com/entry/and-now-germany-must-lead\\_us\\_59f740dfe4b06ae9067aba61](https://www.huffingtonpost.com/entry/and-now-germany-must-lead_us_59f740dfe4b06ae9067aba61).

10. Polar Bear Week 2017: <https://polarbearsinternational.org/get-involved/polar-bear-week/>.
11. <https://www.thegwpf.org/content/uploads/2015/06/20reasons.pdf>.
12. <https://www.nytimes.com/2016/12/18/science/polar-bears-global-warming.html>.
13. <http://www.cbc.ca/news/multimedia/polar-bears-in-churchill-face-bleak-future-researchers-warn-1.4380568>.
14. [https://www.washingtonpost.com/news/energy-environment/wp/2017/01/09/without-action-on-climate-change-say-goodbye-to-polar-bears/?utm\\_term=.7bbf4040d6f9](https://www.washingtonpost.com/news/energy-environment/wp/2017/01/09/without-action-on-climate-change-say-goodbye-to-polar-bears/?utm_term=.7bbf4040d6f9).
15. <http://newsroom.unfccc.int/cop-23-bonn/>.
16. <http://polarbearscience.com/2015/01/01/iucn-polar-bear-specialist-group-out-lived-its-usefulness-20-years-ago/>.
17. <https://polarbearscience.com/2017/04/12/global-polar-bear-population-size-is-about-28500-when-updates-are-included/>.

18. <http://polarbearscience.com/2014/02/18/graphing-polar-bear-population-estimates-over-time/>.
19. <http://pbsg.npolar.no/en/status/pb-global-estimate.html>.
20. <https://polarbearscience.com/2017/05/01/iucn-specialist-group-now-rejects-polar-bear-numbers-it-used-for-2015-iucn-red-list-review/>.
21. Wiig, Ø., Amstrup, S., Atwood, T., Laidre, K., Lunn, N., Obbard, M., et al. 2015. *Ursus maritimus*. The IUCN Red List of Threatened Species 2015: e.T22823A14871490. <http://www.iucnredlist.org/details/22823/0>.
22. <http://polarbearscience.com/2014/07/05/are-polar-bears-really-endangered/>.
23. <http://polarbearscience.com/2015/01/28/claim-of-range-contraction-of-polar-bears-due-to-declines-in-summer-sea-ice-doesnt-hold-up/>.
24. <http://www.bbc.com/earth/story/20141107-will-polar-bears-become-extinct>.
25. <http://polarbearscience.com/2014/12/19/challenging-noaas-arctic-report-card-2014-on-polar-bears/> <http://pbsg.npolar.no/en/status/pb-global-estimate.html>.
26. [https://www.ec.gc.ca/nature/default.asp?lang=En&n=F77294A3-1#\\_fig04](https://www.ec.gc.ca/nature/default.asp?lang=En&n=F77294A3-1#_fig04).
27. <http://polarbearscience.com/2014/10/28/status-of-canadian-polar-bear-populations-has-been-changed-more-good-news/>.
28. <https://polarbearscience.com/2017/02/15/baffin-bay-and-kane-basin-polar-bears-not-declining-concludes-new-report/>.
29. <http://polarbearscience.com/2014/12/30/kara-sea-first-ever-polar-bear-count-suggests-about-3200-bears-live-there/>.
30. [https://www.ec.gc.ca/nature/default.asp?lang=En&n=F77294A3-1#\\_fig04](https://www.ec.gc.ca/nature/default.asp?lang=En&n=F77294A3-1#_fig04).
31. <https://polarbearscience.com/2017/01/19/new-paper-asks-has-recent-sea-ice-loss-caused-polar-bear-populations-to-crash/>.
32. <https://polarbearscience.com/2017/07/14/abrupt-summer-sea-ice-decline-has-not-affected-polar-bear-numbers-as-predicted/>.
33. <http://polarbearscience.com/2016/12/21/as-polar-bear-populations-fail-to-decline-with-sea-ice-message-of-doom-intensifies/>.
34. <https://polarbearscience.com/2017/04/26/experts-vision-of-an-ice-free-summer-is-already-wrong-benefitting-polar-bears/>.
35. <https://polarbearscience.com/2017/01/19/new-paper-asks-has-recent-sea-ice-loss-caused-polar-bear-populations-to-crash/>.
36. <http://polarbearscience.com/2013/07/07/chukchi-polar-bear-status-contradicts-the-message-new-details/>.
37. <http://polarbearscience.com/2013/09/08/how-and-why-great-news-about-chukchi-polar-bears-has-been-suppressed/>.
38. <http://polarbearscience.com/2014/02/12/foxe-basin-polar-bear-status-another-stable-population/>.
39. <http://polarbearscience.com/2013/09/15/record-sea-ice-loss-in-2007-had-no-effect-on-polar-bears-chukchi-study-confirms/>.
40. Rode et al. 2017. Spring fasting behavior in a marine apex predator provides an index of ecosystem productivity. *Global Change Biology* <http://onlinelibrary.wiley.com/doi/10.1111/gcb.13933/full>.

41. [https://polarbearscience.files.wordpress.com/2014/02/summary-of-polar-bear-population-status-per-2013-pbsg\\_npolar\\_no\\_en\\_status\\_status-table\\_htm\\_feb-14-2014.pdf](https://polarbearscience.files.wordpress.com/2014/02/summary-of-polar-bear-population-status-per-2013-pbsg_npolar_no_en_status_status-table_htm_feb-14-2014.pdf).
42. <http://polarbearscience.com/2015/01/12/if-summer-ice-was-critical-for-s-beaufort-polar-bears-2012-would-have-decimated-them/>.
43. <http://polarbearscience.com/2013/07/11/chukchibering-sea-ringed-seals-doing-better-despite-declines-in-ice-and-snow-new-study/>.
44. <http://polarbearscience.com/2012/12/30/bearded-and-ringed-seals-join-the-polar-bear-as-threatened-by-a-computer-modeled-future/>.
45. <http://polarbearscience.com/2013/07/11/chukchibering-sea-ringed-seals-doing-better-despite-declines-in-ice-and-snow-new-study/>.
46. <http://polarbearscience.com/2014/07/27/bearded-seals-in-alaska-face-no-serious-threat-of-reduction-let-alone-extinction-judge-rules/>.
47. <http://polarbearscience.com/2014/12/31/threatened-arctic-species-comparison-shows-usa-most-assertive-about-global-warming/>.
48. <https://polarbearscience.com/2017/10/04/breaking-pacific-walrus-is-not-threatened-with-extinction-says-us-fish-wildlife/>.
49. <http://polarbearscience.com/2014/03/10/barents-sea-polar-bear-condition-varies-with-amo-and-spring-sea-ice-conditions/>.
50. <http://polarbearscience.com/2014/04/14/polar-bears-move-around-as-sea-ice-habitat-changes-this-is-what-resilience-looks-like/>.
51. <http://polarbearscience.com/2014/08/20/summer-sea-ice-melt-and-polar-bear-maternity-dens/>.
52. [https://polarbearscience.files.wordpress.com/2014/03/usfws-2013-2014-polar-bear-newsletter\\_sm.pdf](https://polarbearscience.files.wordpress.com/2014/03/usfws-2013-2014-polar-bear-newsletter_sm.pdf); see p. 17 lower right. See also <http://polarbearscience.com/2014/11/19/polar-bear-researchers-knew-s-beaufort-population-continued-to-increase-up-to-2012/>.
53. <https://polarbearscience.com/2017/06/11/usgs-treadmill-paper-repeats-bogus-claim-that-ice-loss-harmed-polar-bears/>.
54. <http://polarbearscience.com/2014/12/17/recent-s-beaufort-polar-bear-count-was-a-cherry-picked-result-new-evidence/>.
55. <https://polarbearscience.com/2017/05/22/southern-beaufort-sea-ice-melt-in-may-good-news-for-polar-bears-or-catastrophe/>.
56. <https://www.nytimes.com/2016/12/18/science/polar-bears-global-warming.html>.
57. <https://polarbearscience.com/2015/12/23/survey-results-svalbard-polar-bear-numbers-increased-42-over-last-11-years/>.
58. Aars, J., Marques, T.A, Lone, K. et al. 2017. The number and distribution of polar bears in the western Barents Sea, *Polar Research*, 36:1, 1374125. See Table 3
59. <https://polarbearscience.com/2017/05/01/iucn-pbsg-insists-the-2015-barents-sea-polar-bear-count-was-not-an-increase>.
60. <http://pbsg.npolar.no/en/status/populations/barents-sea.html>.
61. <http://polarbearscience.com/2015/01/12/if-summer-ice-was-critical-for-s-beaufort-polar-bears-2012-would-have-decimated-them/>.
62. <http://www.usgs.gov/newsroom/article.asp?ID=4075#.VJCA2Xt5Yvy>.

63. <http://polarbears-science.com/2015/02/09/polar-bears-out-on-the-sea-ice-eat-few-seals-in-summer-and-early-fall/>.
64. <http://polarbears-science.com/2014/02/12/foxe-basin-polar-bear-status-another-stable-population/>.
65. <http://polarbears-science.com/2013/06/10/signs-that-davis-strait-polar-bears-are-at-carrying-capacity/>.
66. <http://polarbears-science.com/2014/02/09/thriving-foxe-basin-and-davis-strait-polar-bears-threaten-nesting-sea-birds/>.
67. <http://polarbears-science.com/2014/01/26/churchill-polar-bears-eat-more-caribou-and-geese-now-than-in-1968-because-there-are-more-caribou-and-geese-new-research-reveals/>.
68. <http://polarbears-science.com/2013/12/13/kaktovik-polar-bear-photos-again-no-starving-bears/>.
69. <http://polarbears-science.com/2013/09/30/polar-bears-at-kaktovik-alaska-not-stranded-due-to-retreating-ice/>.
70. <https://www.thesun.co.uk/news/4577222/incredible-moment-more-than-230-polar-bears-descend-on-a-russian-beach-to-feast-on-a-giant-whale-carcass/>.
71. <https://polarbears-science.com/2016/06/19/terrestrial-food-fight-amongst-polar-bear-researchers-reflects-political-differences/>.
72. <http://polarbears-science.com/2015/02/09/polar-bears-out-on-the-sea-ice-eat-few-seals-in-summer-and-early-fall/>.
73. <http://polarbears-science.com/2014/12/05/western-hudson-bay-polar-bear-population-is-stable-press-release/>.
74. <https://polarbears-science.com/2017/09/19/breaking-2016-w-hudson-bay-polar-bear-survey-shows-the-population-is-still-stable/>.
75. Dyck, M., Campbell, M., Lee, D., Boulanger, J. and Hedman, D. 2017. 2016 Aerial survey of the Western Hudson Bay polar bear subpopulation. Final report, Nunavut Department of Environment, Wildlife Research Section, Igloolik, NU. <http://www.gov.nu.ca/environnement/information/wildlife-research-reports#polarbear>.
76. Lunn, N.J., Servanty, S., Regehr, E.V., et al. 2016. Demography of an apex predator at the edge of its range – impacts of changing sea ice on polar bears in Hudson Bay. *Ecological Applications*, in press. DOI: 10.1890/15-1256
77. Regehr, E.V., Lunn, N.J., Amstrup, S.C. and Stirling, I. 2007. Effects of earlier sea ice breakup on survival and population size of polar bears in Western Hudson Bay. *Journal of Wildlife Management* 71:2673–2683.
78. Stapleton S., Atkinson, S., Hedman, D., and Garshelis, D. 2014. Revisiting Western Hudson Bay: using aerial surveys to update polar bear abundance in a sentinel population. *Biological Conservation* 170:38–47. <http://www.sciencedirect.com/science/article/pii/S0006320713004618#>.
79. <http://www.cbc.ca/news/multimedia/polar-bears-in-churchill-face-bleak-future-researchers-warn-1.4380568>.
80. <http://www.theguardian.com/environment/2013/nov/27/polar-bears-climate-change-canada-hudson-bay>. <http://www.upworthy.com/a-scientist-who-has-studied-polar-bears->

for-34-years-is-starting-to-get-really-worried <https://www.theatlantic.com/science/archive/2016/12/trouble-in-polar-bear-capital/510839/> <http://www.cbc.ca/news/thenational/polar-bears-in-steady-decline-in-northern-manitoba-researchers-find-1.4385480>.

81. <https://polarbearsociety.com/2017/05/29/polar-bear-counts-for-w-hudson-bay-core-area-numbers-are-not-comparable/>.

82. Because the 2011 and 2016 Western Hudson Bay aerial surveys used somewhat different methods, the only population size numbers that can be compared are these: 2011 (949, range 618–1280) and 2016 (842, range 562–1121). The slight decline apparent over 5 years (11%) was not statistically significant (Dyck et al. 2017, pg. 3, 37). When differences in methodology and assumptions are taken into account, there is no evidence to suggest the estimate for 2016 is different from the 2011 estimate of 1030 bears (Stapleton et al. 2014), which is not statistically different from the estimate of 935 calculated in 2004 (Regehr et al. 2007). See endnote 75-78 for full citations.

83. <https://polarbearsociety.com/2016/08/04/polar-bears-off-the-ice-in-w-hudson-bay-are-well-fed-and-in-great-shape-this-year/>.

84. <https://polarbearsociety.com/2017/07/24/churchill-polar-bear-report-17-23-july-20-these-ashore-appear-to-be-in-great-shape/>.

85. <http://polarbearsociety.com/2015/07/29/udson-bay-davis-strait-and-foxe-basin-sea-ice-highest-since-1992/>.

86. <http://polarbearsociety.com/2016/12/05/an-el-nino-year-late-start-to-freeze-up-on-hudson-bay-bears-gearing-up-to-hunt/>.

87. <https://polarbearsociety.com/2017/11/02/early-freeze-up-in-progress-on-hudson-bay-what-a-difference-a-year-makes/>.

88. <https://polarbearsociety.com/2016/11/15/no-correlation-between-freeze-up-dates-for-hudson-bay-total-arctic-ice-cover/>.

89. <https://polarbearsociety.com/2013/11/22/udson-bay-freeze-up-has-not-been-a-day-later-each-year-since-1981/>.

90. <http://polarbearsociety.com/2014/09/30/natural-selection-helps-polar-bears-adapt-to-sea-ice-variability-which-means-some-bears-die/>.

91. <https://polarbearsociety.com/2017/02/09/new-paper-updates-lack-of-trend-in-w-hudson-bay-breakup-freeze-up-dates-to-2015/>. <http://polarbearsociety.com/2015/06/17/when-was-the-earliest-ice-breakup-year-for-western-hudson-bay-polar-bears/>.

92. <https://polarbearsociety.com/2017/02/09/new-paper-updates-lack-of-trend-in-w-hudson-bay-breakup-freeze-up-dates-to-2015/>.

93. The long version of the program can be viewed online at <http://www.cbc.ca/player/Shows/Shows/Absolutely+Canadian/Absolutely+Manitoba/ID/2505861208/>, and a shorter (30 minute) version at <http://www.cbc.ca/news/technology/polarbears-threatened-species-or-political-pawn-1.2753645>. See also <http://www.cbc.ca/news/technology/polar-bears-threatened-species-or-political-pawn-1.2753645>.

94. <https://polarbearsociety.com/2016/08/04/polar-bears-off-the-ice-in-w-hudson-bay-are-well-fed-and-in-great-shape-this-year/>.

95. <https://polarbearsociety.com/2017/07/24/churchill-polar-bear-report-17-23-july-20-these-ashore-appear-to-be-in-great-shape/>.

96. <http://polarbearsience.com/2013/11/17/human-polar-bear-conflicts-stirling-1974-vs-amstrup-2013/>.
97. <https://polarbearsience.com/2016/02/29/more-churchill-polar-bear-captures-due-to-increased-vigilance-not-global-warming/>.
98. <http://polarbearsience.com/2013/11/04/churchill-polar-bear-attack-shamelessly-used-to-advance-global-warming-agenda/>.
99. <http://polarbearsience.com/2015/05/14/snow-depth-over-spring-sea-ice-affects-polar-bear-feeding-success-and-ringed-seal-survival/>.
100. <https://polarbearsience.com/2017/11/02/early-freeze-up-in-progress-on-hudson-bay-what-a-difference-a-year-makes/>.
101. <http://polarbearsience.com/2015/02/09/polar-bears-out-on-the-sea-ice-eat-few-seals-in-summer-and-early-fall/>.
102. <https://polarbearsience.com/2017/03/28/recent-incident-in-foxe-basin-shows-the-danger-of-hungry-polar-bears-in-winter/>.
103. <https://polarbearsience.com/2017/08/23/fat-polar-bears-and-lots-of-them-drive-public-confidence-in-future-of-the-species/>.
104. <https://polarbearsience.com/2017/04/22/sea-ice-off-newfoundland-thickest-ever-yeet-another-polar-bear-comes-ashore/>.
105. <https://polarbearsience.com/2017/04/03/east-coast-crawling-with-polar-bears-since-early-march-thanks-to-the-pack-ice/>.
106. <https://polarbearsience.com/2017/04/10/newfoundland-conservation-officers-right-to-kill-polar-bear-in-hunting-mode/>.
107. <http://polarbearsience.com/2014/02/27/foxe-basin-aerial-survey-a-watershedmoment-for-polar-bear-research-part-2/>.
108. <http://polarbearsience.com/2013/11/11/baffin-bay-polar-bear-population-survey-done-results-due-end-2014/>.
109. <http://polarbearsience.com/2014/06/02/barents-sea-polar-bear-cubs-new-data-for-2014-made-to-sound-ominous/>.
110. <http://polarbearsience.com/2014/02/26/tranquilizing-polar-bears-and-meat-tainted-with-drugs/>.
111. <http://polarbearsience.com/2014/12/18/polar-bear-biologists-miss-the-mark-in-new-study-on-invasive-mark-recapture-effects/>.
112. Discussed at <http://polarbearsience.com/2014/02/24/foxe-basin-aerial-survey-a-watershed-moment-for-polar-bear-research-part-1/> and <http://polarbearsience.com/2014/02/27/foxe-basin-aerial-survey-a-watershed-moment-for-polar-bear-research-part-2/>.
113. <http://polarbearsience.com/2014/03/02/guest-post-invasive-research-is-alive-and-well-in-canada/>.
114. <http://polarbearsience.com/2013/08/29/ten-out-of-ten-polar-bears-being-tracked-this-summer-in-the-beaufort-sea-are-on-the-ice/>.
115. <http://polarbearsience.com/2015/02/04/east-greenland-polar-bears-said-to-be-the-most-polluted-but-appears-to-be-doing-just-fine/>.
116. <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2012.02753.x/abstract>.

117. <http://polarbearscience.com/2013/04/10/cannibalism-in-polar-bears-spin-and-misrepresentation-of-fact-galore/>.
118. <http://polarbearscience.com/2015/03/16/no-evidence-of-actual-damage-to-polar-bear-brains-from-environmental-contaminants/>.
119. <http://polarbearscience.com/2015/02/04/east-greenland-polar-bears-said-to-be-the-most-polluted-but-appears-to-be-doing-just-fine/>.
120. <http://polarbearscience.com/2015/01/28/polar-bear-penis-not-breaking-due-to-pcbs-new-paper-full-of-coulds-and-maybes/>.
121. <http://grist.org/list/we-are-literally-breaking-polar-bear-penises-now/>.
122. <http://nationalpost.com/pmnn/news-pmnn/canada-news-pmnn/new-chemical-cocktails-found-in-hudson-bay-polar-bears>.
123. <http://polarbearscience.com/2014/03/17/new-genetic-study-confirms-polar-bears-survived-several-warm-interglacials/>.
124. <http://polarbearscience.com/2015/06/08/my-new-arctic-fallacy-paper-sea-ice-stability-and-the-polar-bear/>.
125. <http://polarbearscience.com/2015/04/21/polar-bears-barely-survived-the-sea-ice-habitat-changes-of-the-last-ice-age-evidence-suggests/>.
126. <http://polarbearscience.com/2016/01/09/paleoclimate-genetic-study-confirms-arctic-species-adapted-to-sea-ice-changes/>.
127. <http://polarbearscience.com/2014/10/23/walrus-mass-haulout-hype-refuted-the-video/>.
128. <http://polarbearscience.com/2014/09/30/natural-selection-helps-polar-bears-adapt-to-sea-ice-variability-which-means-some-bears-die/>.
129. <http://polarbearscience.com/2016/01/14/genetic-similarity-of-polar-bears-does-not-make-them-vulnerable-to-global-warming/>.
130. <http://www.bbc.com/earth/story/20141107-will-polar-bears-become-extinct>.
131. <https://polarbearscience.com/2017/01/09/fake-news-on-polar-bear-survival-predictions-is-political-posturing/>.
132. <http://polarbearscience.com/2014/06/18/center-for-biological-diversity-provides-a-public-disservice-on-polar-bear-status/>.
133. <https://polarbearscience.com/2017/08/31/video-death-of-a-climate-icon-the-polar-bears-demise-as-a-useful-poster-child/>.
134. <https://polarbearscience.com/2016/12/07/polar-bears-that-didnt-die-from-recent-sea-ice-loss-will-die-in-35-yrs-say-sperfs/>.
135. <http://polarbearscience.com/2016/12/21/as-polar-bear-populations-fail-to-decline-with-sea-ice-message-of-doom-intensifies/>.
136. <https://polarbearscience.com/2017/08/23/fat-polar-bears-and-lots-of-them-drive-public-confidence-in-future-of-the-species/>. <https://polarbearscience.com/2017/10/01/fat-healthy-polar-bear-update-hundreds-of-not-starving-bears-attracted-to-dead-whale/>.
137. <http://www.cbc.ca/news/thenational/polar-bears-in-steady-decline-in-northern-manitoba-researchers-find-1.4385480>.
138. <http://polarbearscience.com/2012/09/26/western-hudson-bay-polar-bears-are-not-like-the-others-part-1/>.



139. <https://www.churchillwild.com/polar-bear-triplets-highlight-summer-at-seal-river-heritage-lodge/>.
140. <https://www.nytimes.com/2016/12/18/science/polar-bears-global-warming.html>.
141. <https://polarbearscience.com/2016/02/25/ten-dire-polar-bear-predictions-that-have-failed-as-global-population-hits-22-31k/>.



The Global Warming Policy Foundation is an all-party and non-party think tank and a registered educational charity which, while openminded on the contested science of global warming, is deeply concerned about the costs and other implications of many of the policies currently being advocated.

Our main focus is to analyse global warming policies and their economic and other implications. Our aim is to provide the most robust and reliable economic analysis and advice. Above all we seek to inform the media, politicians and the public, in a newsworthy way, on the subject in general and on the misinformation to which they are all too frequently being subjected at the present time.

The key to the success of the GWPF is the trust and credibility that we have earned in the eyes of a growing number of policy makers, journalists and the interested public. The GWPF is funded overwhelmingly by voluntary donations from a number of private individuals and charitable trusts. In order to make clear its complete independence, it does not accept gifts from either energy companies or anyone with a significant interest in an energy company.

**Views expressed in the publications of the Global Warming Policy Foundation are those of the authors, not those of the GWPF, its trustees, its Academic Advisory Council members or its directors.**

Published by the Global Warming Policy Foundation

For further information about GWPF or a print copy of this report, please contact:

The Global Warming Policy Foundation  
55 Tufton Street, London, SW1P 3QL  
T 0207 3406038 M 07553 361717  
[www.thegwpf.org](http://www.thegwpf.org)

Registered in England, No 6962749  
Registered with the Charity Commission, No 1131448

