



Polar Bears: Outstanding Survivors of Climate Change

**[Polar Bears Thriving
in a Warming World]**



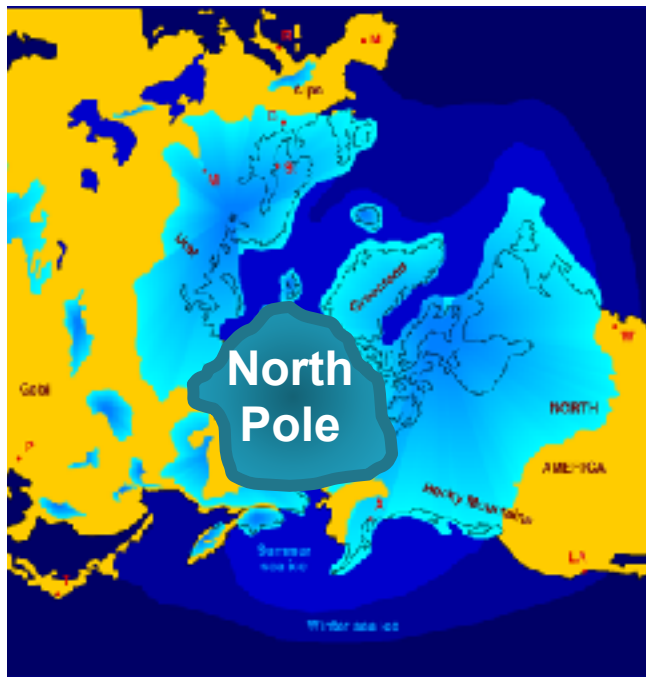
November 19, 2019
Lyceum Voerburg, The Hague

Dr. Susan J. Crockford
Zoologist, Victoria, Canada

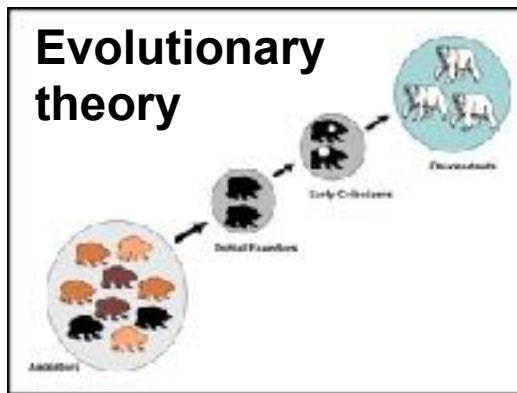
I am a zoologist with specialties in the identification of ancient animal bones and the evolution of new species



I've never been to the Arctic but I bring a big picture perspective to contemporary polar bear issues



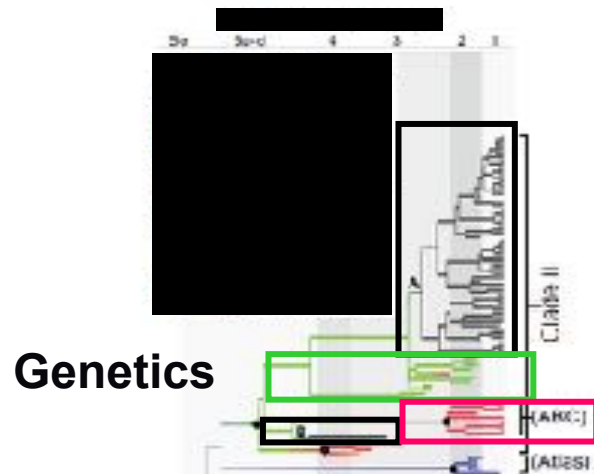
Geological history of Arctic sea ice



Paleoecology and Zoogeography



Fossil and Archaeological record



Genetics



Vancouver Zoo, Canada
1972/73 (photo by me)



Blijdorp Zoo, Rotterdam 17
November 2019

I've learned most of what I know about polar bears from the scientific papers and reports written by the biologists who have gone to the Arctic to study these bears



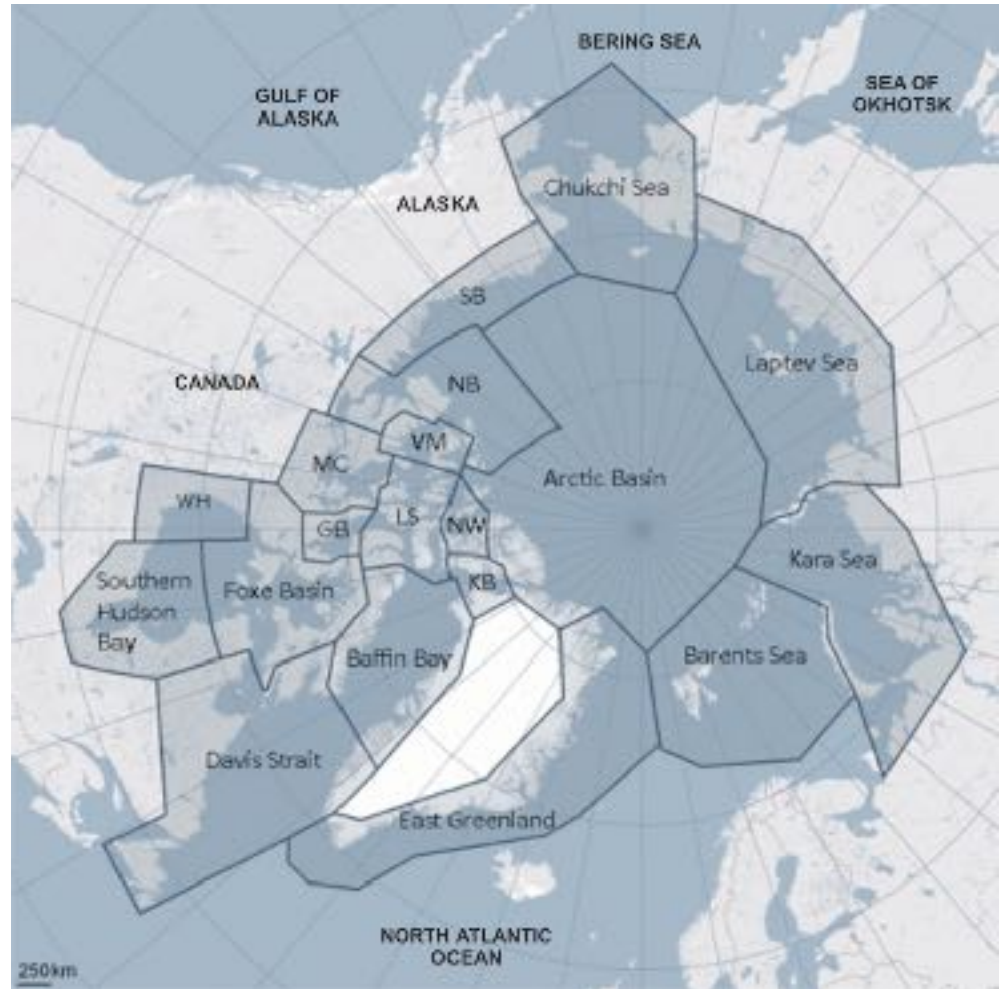
Area of polar bear habitat =
~ extent of ice
in March (max),
with a few
exceptions

Sea Ice Extent
Mar 1985

Satellite Image of sea ice extent



Polar bears today
are well
distributed
throughout
their available
habitat, with
19 subpopulations
recognized

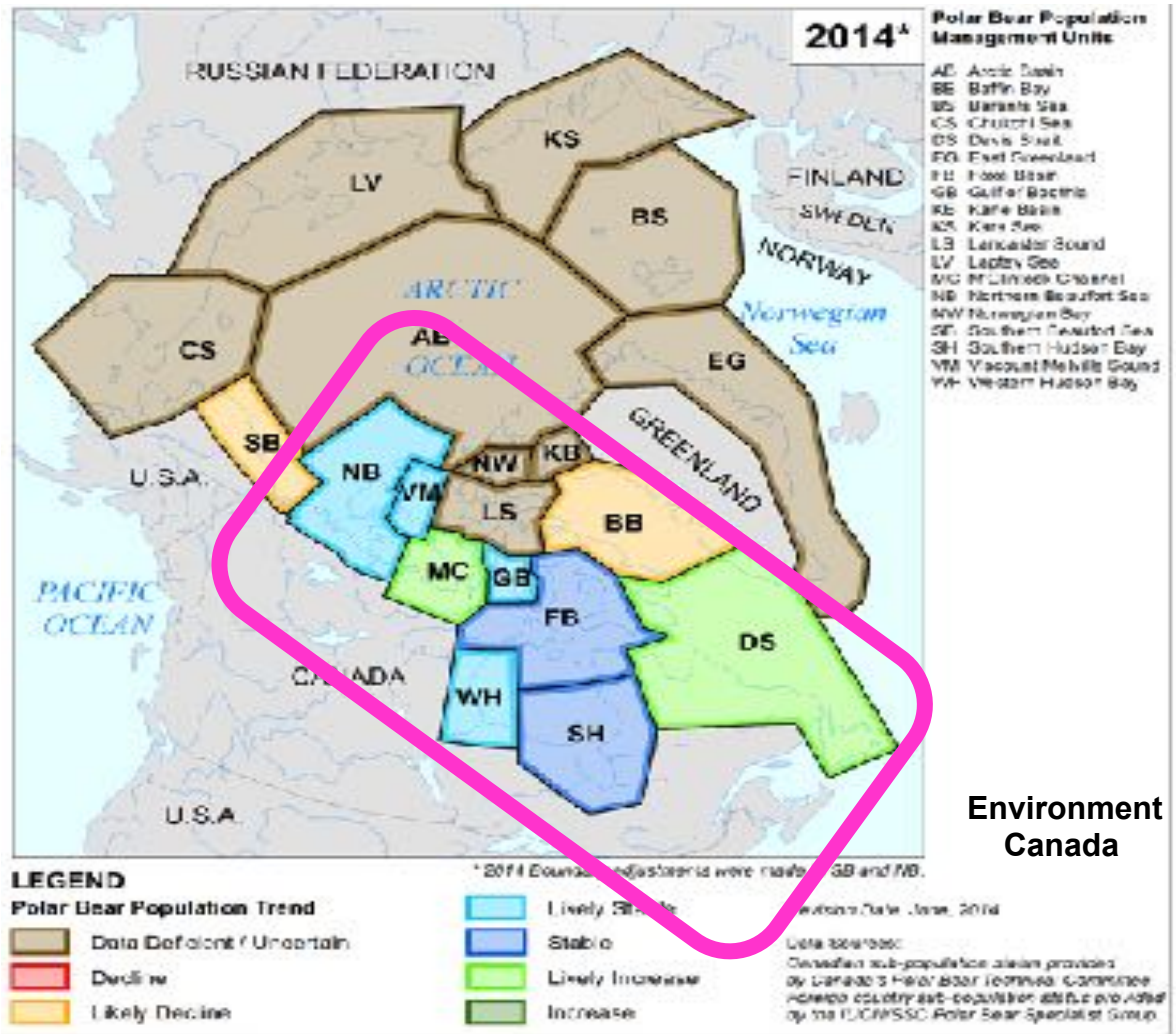


Most polar bears live on ice that is near land (dark pink)





By numbers,
about half
of the
world's
polar bears
live in
Canada!



Polar bears travel & hunt on sea ice



- Polar bears do not need thick ice to hunt seals
- The ice only needs to be about 8 cm thick



Many polar bears spend their entire lives on the sea ice, where they hunt, mate, and give birth



Polar bears are great swimmers



Polar bears can swim 100s of kms



Even cubs are good swimmers



Very young cubs hitch a ride



Photo by Kevin Schaler Barcroft USA

Kevin Schaler Barcroft USA

It is a myth that polar bears become fat to stay warm during cold Arctic winters



Polar bears need fat to survive months when there is no food to eat, which happens in summer *and* winter.



Polar bears eat 8 months worth of food in spring (April-early June)



Pregnant female in July 1984

**She put on almost
700 lbs – more than
300 kg - in only 8
months!**

218 lbs (99 kg) in November 1983

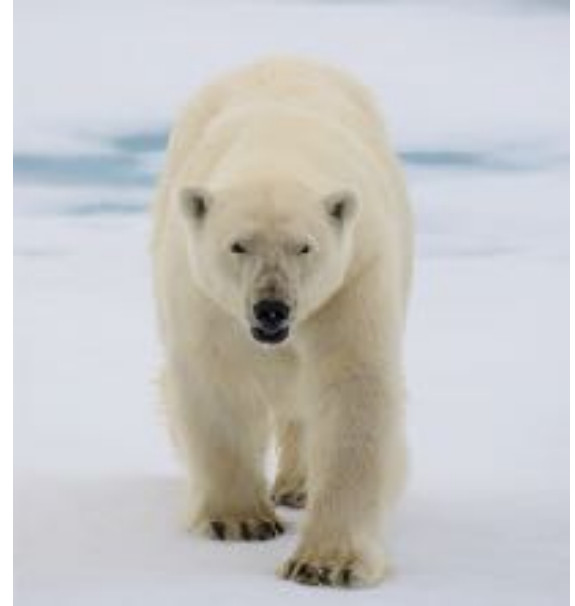


Polar bears eat cute baby seals and teach their cubs to do the same

This is a fact of life in the Arctic – it is
not pretty but it's true



Most polar bears are fattest at the beginning of summer (July) and leanest at the end of winter (Feb/March), when it is still very cold



Fat healthy bears on shore in summer (Alaska)



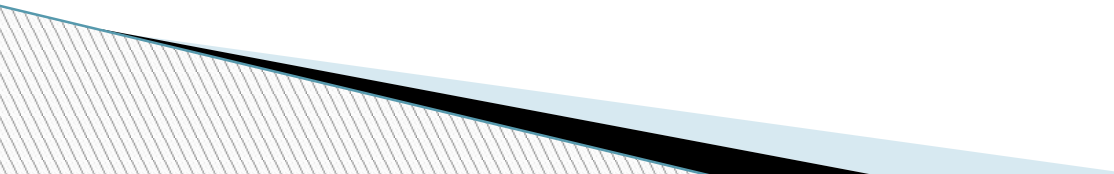
Early September 2019



Fat healthy bear on the sea ice from a US Icebreaker in August 2015



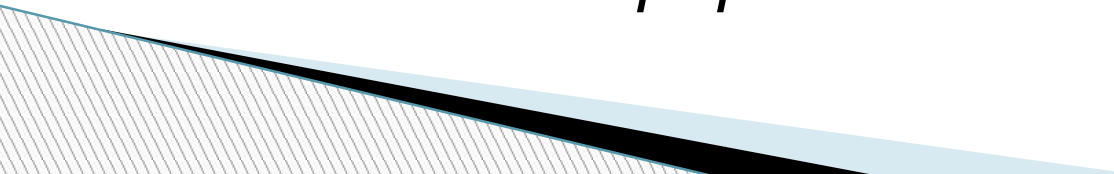
Fasting (not eating for long periods) is entirely normal for polar bears

- Most polar bears fast for 2-5 months every summer
 - Many pregnant females fast at least 8 months (4 months before giving birth, then another 4 months nursing cubs before they can eat again)
 - Most bears also fast for 2-3 months during the darkest & stormiest part of the winter
- 

Starving bears in summer/fall



National Geographic said “this is what climate change looks like”

- But they had to retract that statement and apologize because it wasn't true
 - Bears starve when they are sick or injured
 - Young inexperienced bears and old weak bears may have trouble catching seals and defending them from bigger, stronger bears
 - **Starvation is the leading natural cause of death for polar bears**
 - A single starving bear does not tell you anything about how *the population* is doing
- 

Conservation History



IUCN Polar Bear Specialist Group



2008 – Vulnerable (VU)

2006 – Vulnerable (VU)

1996 – Lower Risk/conservation dependent (LR/cd)

1994 – Vulnerable (V)

1990 – Vulnerable (V)

1988 – Vulnerable (V)

1986 – Vulnerable (V)

1982 – Vulnerable (V)



1973 International protection

Red List status changes



Experts: Polar bears, hippos on extinction path

Global survey also warns of overfishing, decline in wetlands

Temporarily closed

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2006

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RED LIST

Guiding Conservation for 50 Years

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GENEVA — Polar bears and hippos have joined the ranks of species threatened with extinction from climate change, unregulated hunting, habitat destruction and other man-made dangers, leading researchers said Tuesday in a listing of the world's wildlife.

The World Conservation Union, or IUCN, said more than 16,000 species of animals and plants are at risk of disappearing, including one in three amphibians, one in four mammals and one in eight birds.

The IUCN added 330 species to its "Red List" of endangered species since the last version released two



Mike Hootner / Reuters/Wo

For the first time ever, hippos were listed as a threatened species by the World Conservation Union.

May 2008

Polar bears were classified as 'threatened' on US Endangered Species List based on a computer model study

More about this in a minute

NEWS

NATURE, 22 May 2008

Polar bear numbers set to fall

In a long-anticipated decision hailed as a victory by environmental groups, the United States last week declared the polar bear (*Ursus maritimus*) a 'threatened' species. But this heightened protection status may have little bearing on the animals' ultimate fate.

The listing, announced by secretary of the interior Dirk Kempthorne on 14 May, connects the continuing retreat in Arctic sea ice due to global warming with large potential reductions in the polar-bear population. Last autumn, the US Geological Survey concluded that the animals are likely to lose 42% of their summer sea ice habitat by mid-century, cutting the world's polar-bear population — estimated at 25,000 — by two-thirds.

Despite this dramatic projection, researchers note that polar bears range across a variety of nations, each with its own conservation approaches, and a variety of habitats, each of which will be affected differently by climate change. Their fates may vary from place to place, too. "I don't believe the polar bear will go extinct, but in some areas they will be heavily reduced and may disappear," says veterinary biologist Christian Sonne of the National Environmental Research Institute in Roskilde, Denmark. Factors other than global warming compound stress on the bears, including the accumulation in fat of polychlorinated biphenyls and other pollutants that lower reproductive capacity and weaken the immune system.

Projecting the fate of a creature that ranges

POLAR BEARS THE WORLD ROUND
Populations of least concern are two (top down), but an International Union for Conservation of Nature group has compiled data on their latest numbers. The year(s) the data were recorded are given in parentheses.

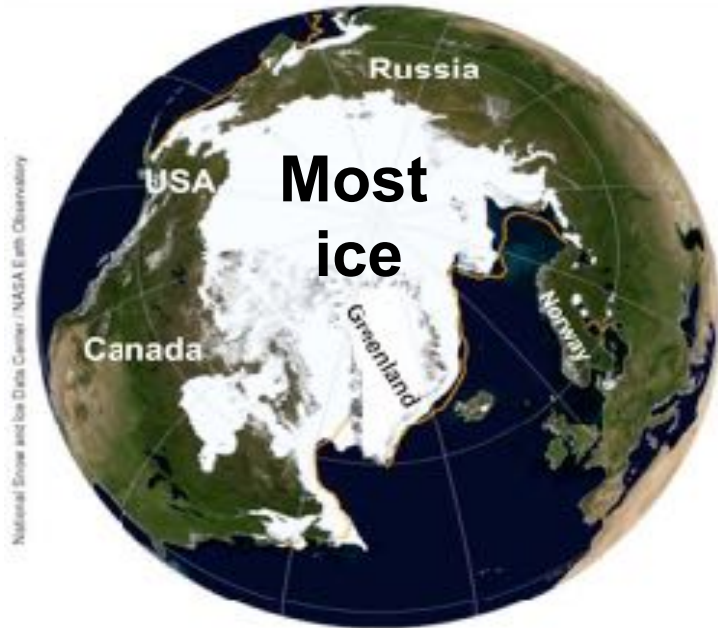


SOURCE: IUCN/SSC Polar Bear Specialist Group/US Geological Survey

The big question: Are polar bears dying because of melting sea ice?



Sea ice changes with the seasons



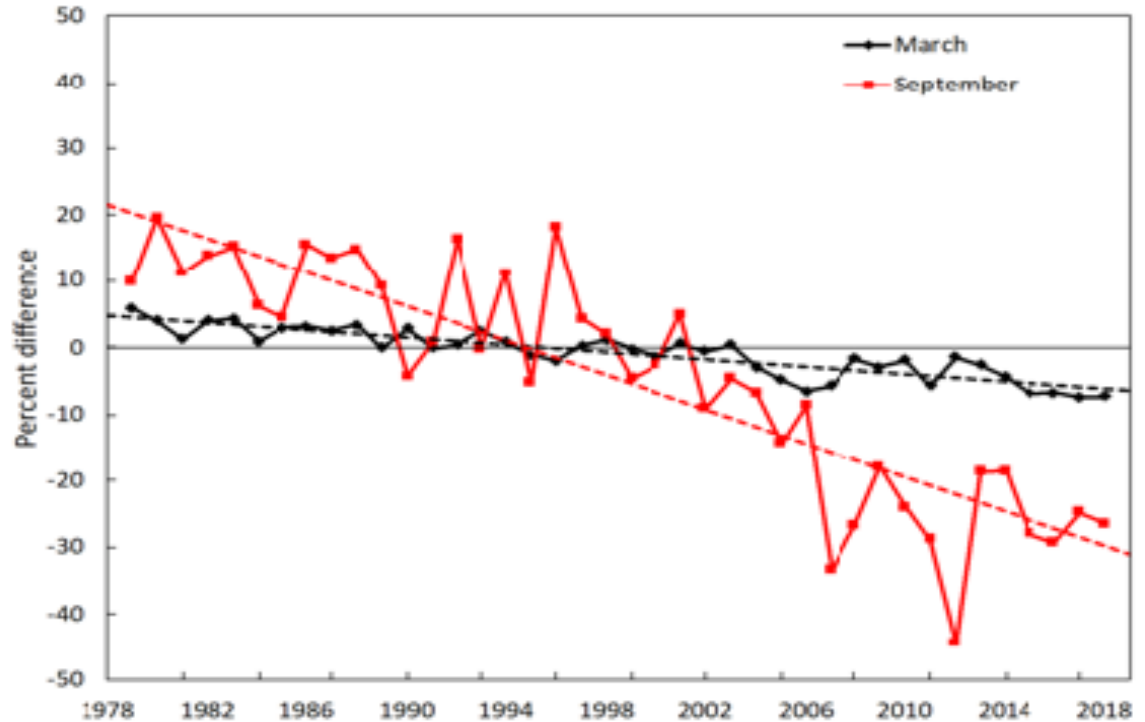
Daily Sea Ice Extent for: Mar 15, 2015

**Spring maximum
late March**

**Summer minimum
September**




Only *summer* ice is melting fast



You might have heard:

No sea ice = no polar bears

- Polar bear specialists who say this are referring to their prediction that without any *summer* sea ice, polar bears might go extinct
 - However, research on polar bear health and population sizes since the major summer ice decline in 2007 suggests this is unlikely
 - Also, not a single sea ice prediction suggests the disappearance of sea ice *in winter or spring* due to human-caused global warming, even by 2100
- 

Sea ice is a *seasonal* requirement for polar bears

- Polar bears only need sea ice from late fall to late spring:
from early summer to early fall, sea ice is optional
- Ice always returns in the fall



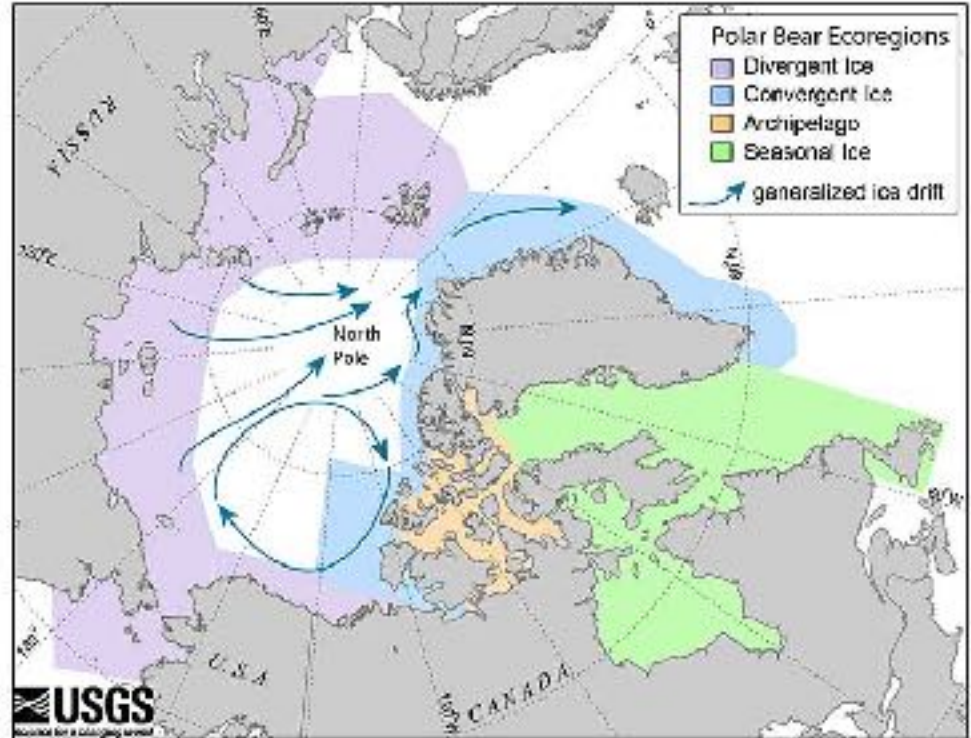
The future survival of polar bears

In 2007, US biologists used computer models to predict that a massive decline in polar bear numbers would happen when summer sea ice declined by almost 50% (expected at 2050)



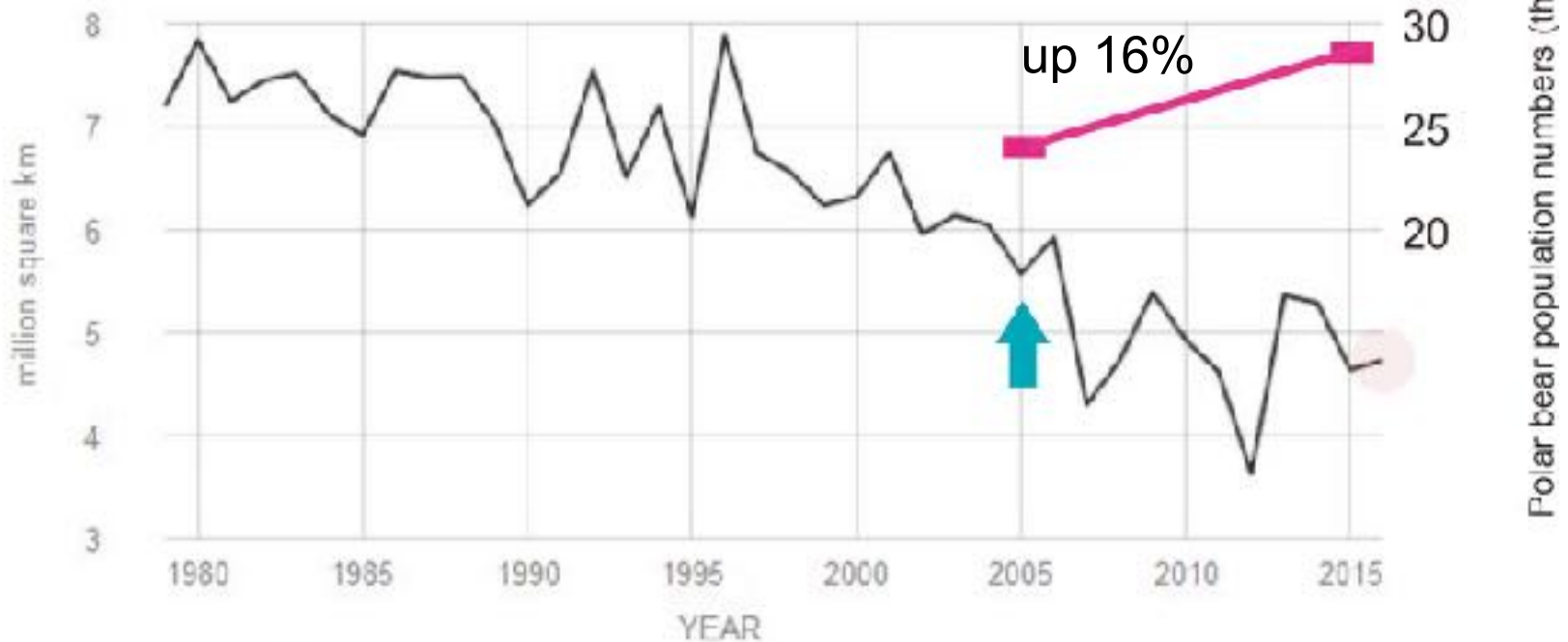
All bears in green and purple areas were expected to disappear

Even though the summer ice declined far ahead of schedule (by 2007) polar bear numbers did not plummet



Summer sea ice vs. polar bear numbers since 2005

Sea ice down, polar bear numbers up



September ice extent NSIDC/NASA

Why were the models so wrong?



Summer hunting much less important



Less summer ice is good for seals



Spring hunting much more important



Spring sea ice conditions much more important



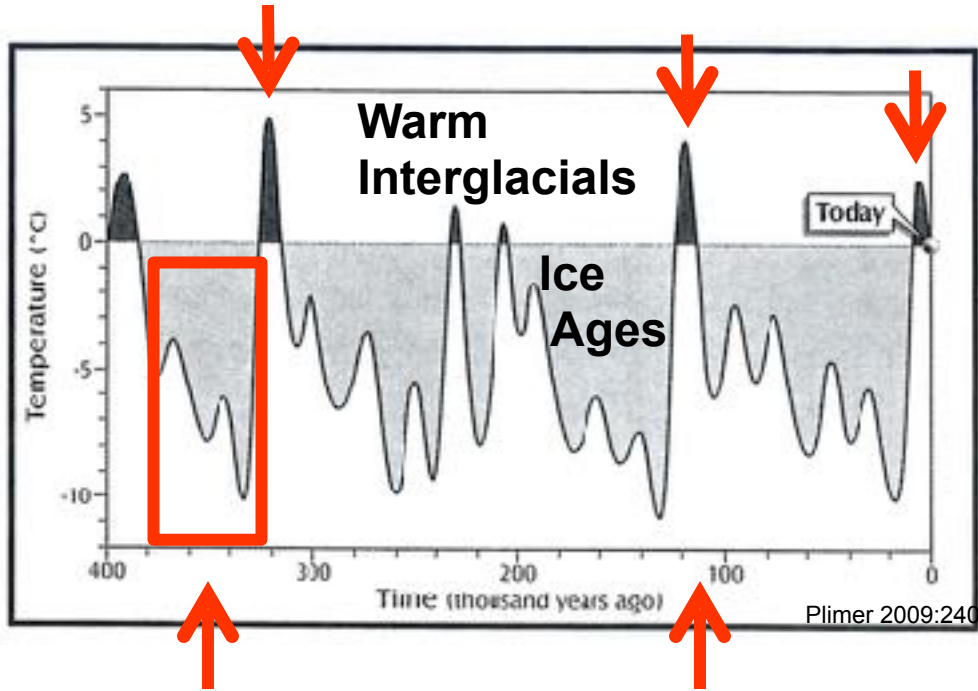
I wrote a scientific paper on the model failure

- My scientific paper tested the hypothesis proposed by US biologists that more than 16,000 bears would disappear if summer sea ice declined abruptly by almost 50%
- This is the appropriate scientific method to address the prediction, using evidence collected on bears and their prey since 2007 (the observations)
- My argument that the prediction failed is supported by data collected and published by polar bear and seal biologists: it's free to read online

This outcome should not have been a surprise: Arctic marine mammals have been around for a long time

- All *except the polar bear* have existed as we know them today for at least 2 million years
- Polar bears are quite recent arrivals to the Arctic: they evolved from a brown bear ancestor, probably between 600,000 & 400,000 years ago (studies vary)





Even if speciation occurred 350,000 YA



Age of oldest polar bear fossil




Ice Age History



Polar bears have lived through at least 2 Interglacials warmer than today that had no sea ice in summer!

How many polar bears are there?

- ▶ In the late 1960s, there were probably about 10,000 bears (5,000-15,000)
 - **The latest official count was 26,000 (22,000-31,000): IUCN Red List 2015**
 - Additional surveys since 2015 put the total even higher (average ~28,500)
 - There is good evidence to suggest this number is even higher
- 

What do abundant polar bears mean for Arctic residents?

More bears = more fatal attacks on people



Damage to property, including dogs



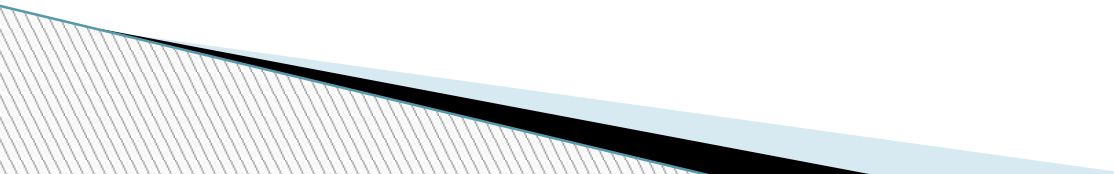
Polar bears are now a danger year round

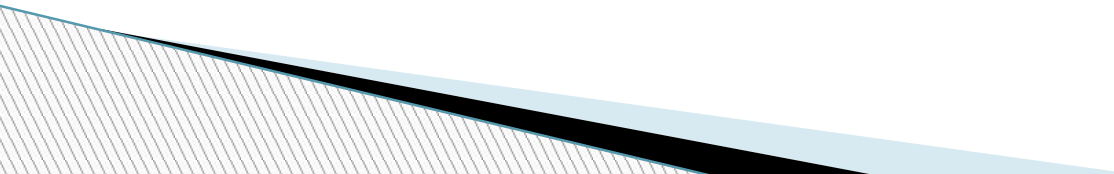
Not due to climate change or lack of ice but because there are many more bears and also more people across the Arctic than there were 50 years ago

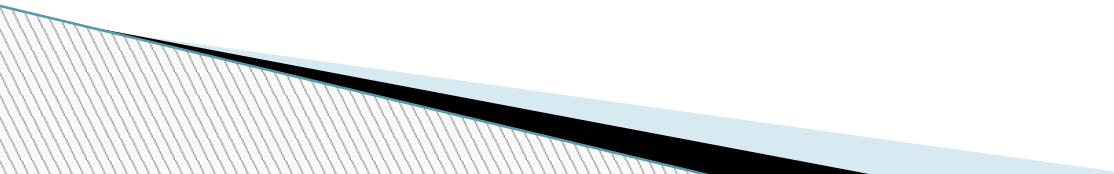


Russia, February 2019

Points to remember

- *Summer* sea ice is not crucial for polar bear health and survival – spring is the critical season
 - Less ice in summer is beneficial to ringed and bearded seals, the primary prey of polar bears
 - Even though sea ice dropped in 2007 to levels not predicted to occur until 2050, polar bear numbers did not plummet as expected
- 

- Evidence collected since 2007 shows no harm has come to polar bears or the animals they eat (seals, walrus): in fact, they are all thriving
 - Polar bear populations are now the highest they have been in 50 years
 - Officially, that number is about 26,000 (22,000-31,000) but is probably much higher
- 

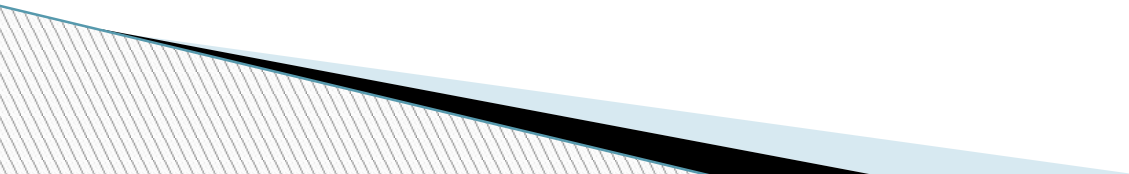
- Thriving polar bear populations put the safety of Arctic residents and visitors at risk
 - Even if the Arctic became ice-free in summer, it is very unlikely that it would have a devastating impact on polar bears
 - Only if sea ice declined significantly in *early spring* (April/May) would polar bears be at risk of extinction
- 

[Did you know that polar bears have a blue tongue?]



Thank you!

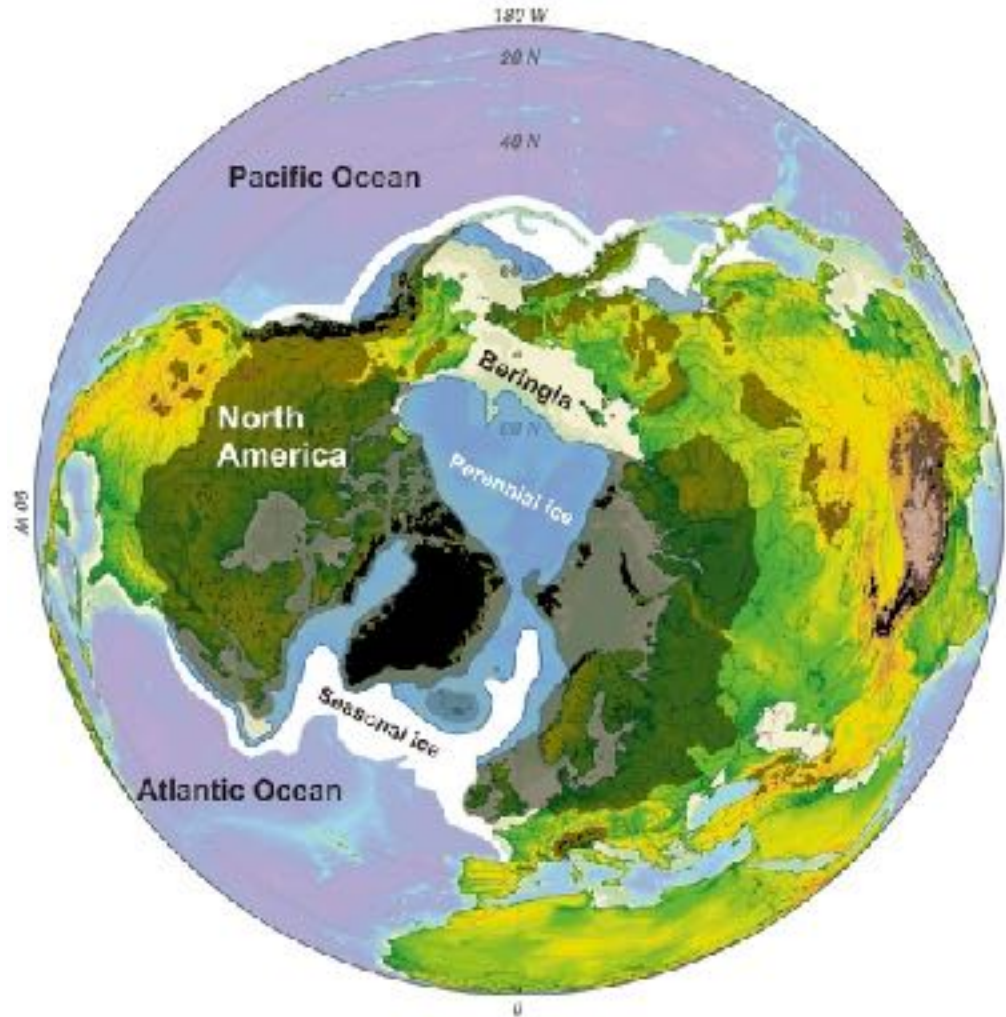
Extra slides



Where and when did the polar bear originate?



Ice Age sea ice
ca. 19,000 yrs ago



Natural vs. "unnatural" hybridization



♂ **Polar**

X



♀ **Brown**



CAPTIVITY



Because BB is dominant

♂ **Brown**

X



♀ **Polar**



WILD

This cross is by far the one most likely in the wild

Known brown bear/polar bear hybrids – in the wild



Where a polar bear was the mother

This hybrid was living
as a polar bear





All hybrids discovered since 2006 came from a single polar bear female who mated with two different brown bear males

Hunting belugas in summer

