Polar Bear Status Assessment Review: Proposed Rule to List as a Threatened Species

CHRONOLOGY OF EVENTS

- **February 16, 2005 – Center for Biological Diversity petitions FWS to list polar bears throughout their range as a threatened species**

- **January 9, 2007 – the proposed rule is published in the *Federal Register***

  A 90-day public comment period begins; comment period ends - April 9, 2007

  Public hearings conducted in Anchorage, Barrow, and Washington, D.C.

- **Additional analyses conducted by USGS**

- **Peer review of the proposed rule**

- **January 2008 – statutory deadline to make a final listing determination**

ESA Definitions

- **“threatened species” - any species that is likely to become an endangered species within the “foreseeable future” throughout all or a significant portion of its range**

- **“endangered species” - any species that is in danger of extinction throughout all or a significant portion of its range**

“Foreseeable Future” For Polar Bears

- 3 generations based on population dynamics of species and environmental changes
- Generation definition (IUCN 2001)
  - Age of sexual maturity + 0.5 x (length of reproductive life cycle)
  - 5yrs. + (0.5 x 20 years) = 15 yrs./generation
- Foreseeable future (defined on a species by species basis) = 45 years

ESA 5 Factor Threat Analysis

A The present or threatened destruction, modification, or curtailment of habitat or range

B Overutilization for commercial, recreational, scientific, or educational purposes

C Disease or predation

D Inadequacy of existing regulatory mechanisms; or

E Other natural or manmade factors affecting continued existence

Ursus maritimus

Latin for “sea bear”

Polar bears are not adapted to survive in an entirely aquatic environment and are reliant on the presence of sea ice in the marine system for life functions.

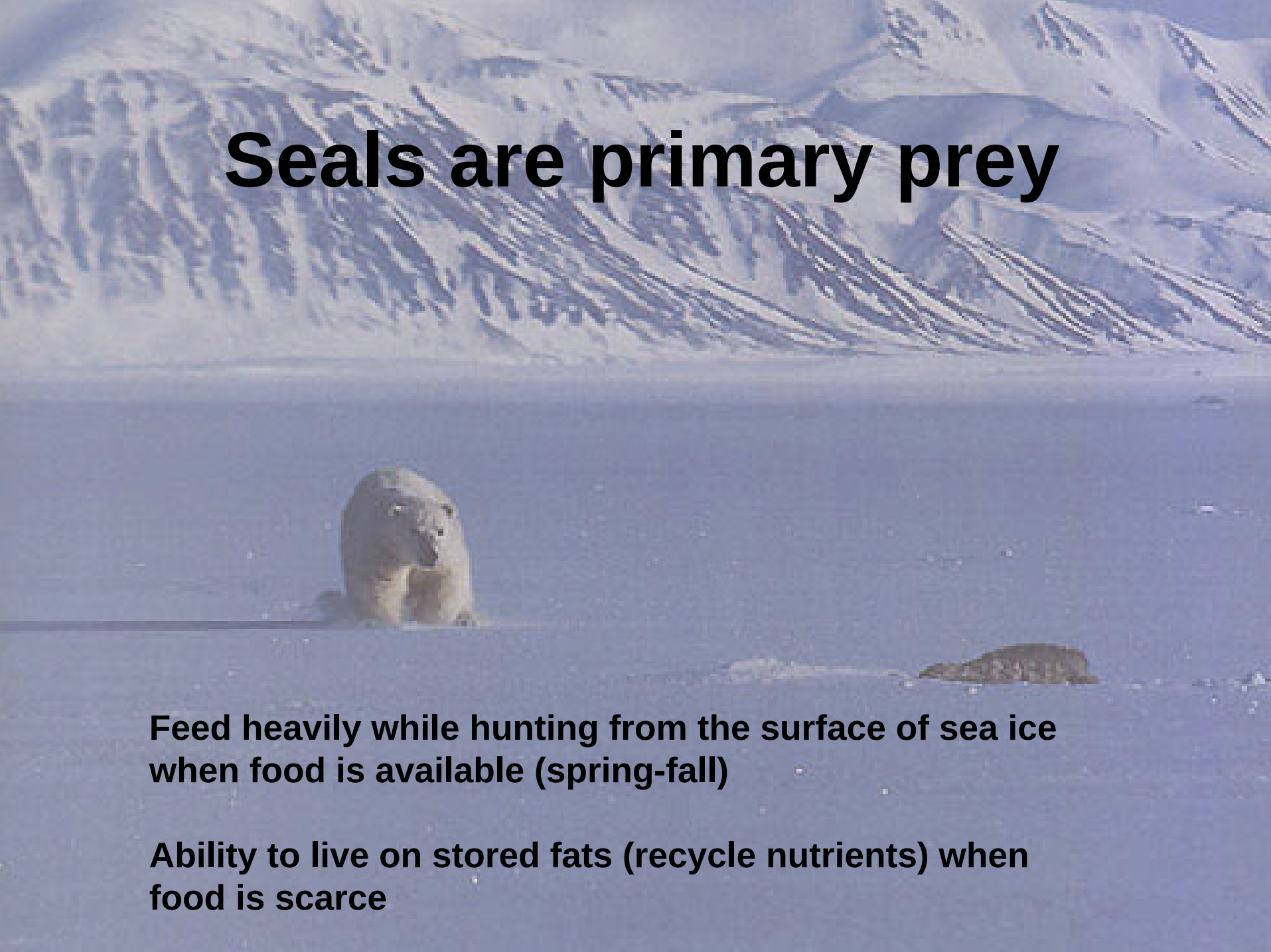
Current distribution of polar bears

LOW REPRODUCTIVE RATE

- Sexually mature 5-6 yrs
- Born in Dec/Jan
- Less than 2 lbs.
- Average litter size = < 2
- Cubs stay with mother > 2yrs
- Mothers breed every 3-4 yrs.

Denning

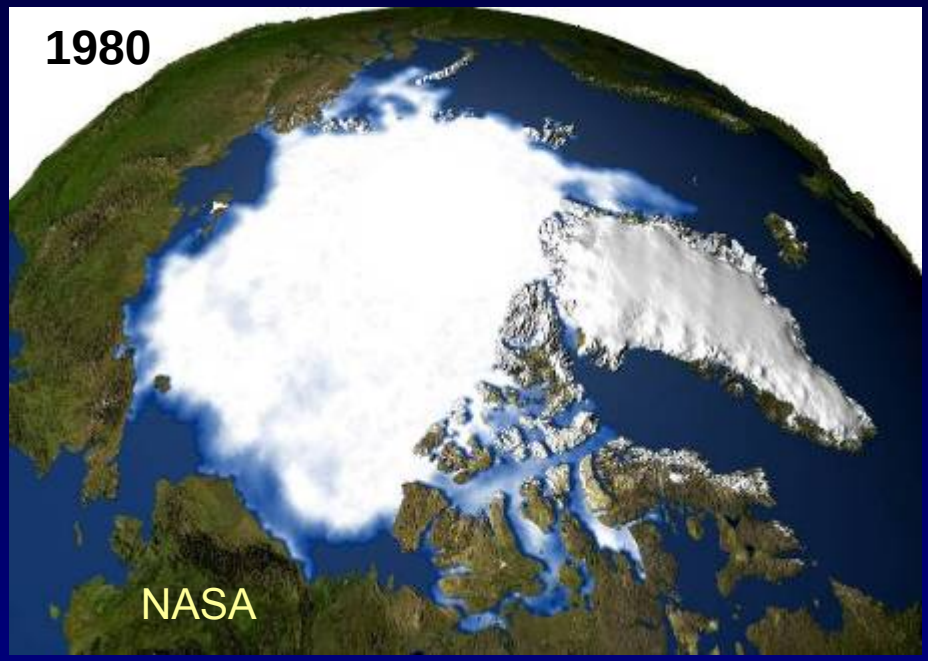
- Rely on snow drifts
- Enter dens in Oct/Nov/Dec
- Emerge in March/April



Seals are primary prey

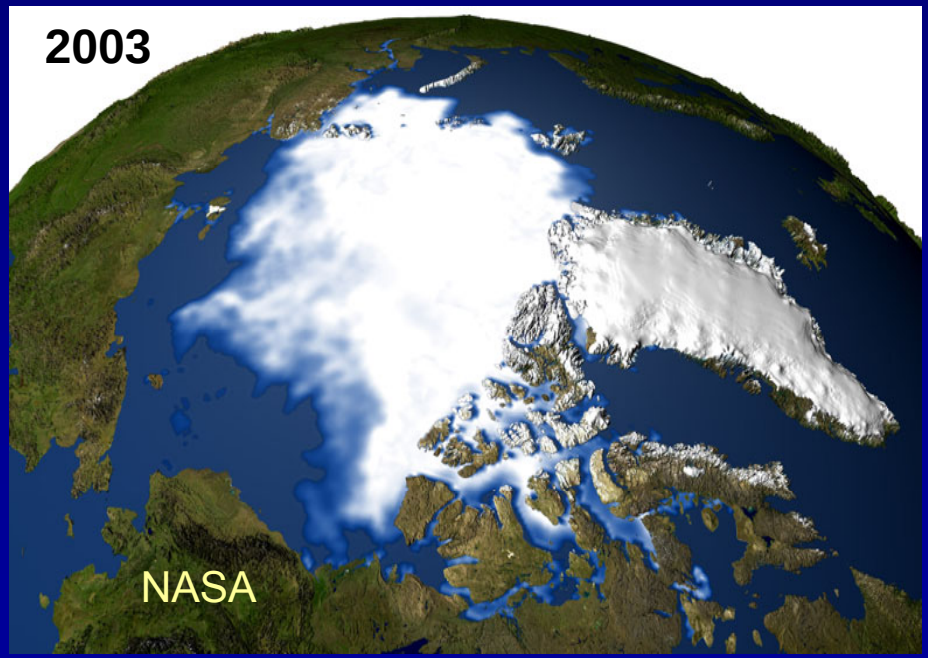
Feed heavily while hunting from the surface of sea ice when food is available (spring-fall)

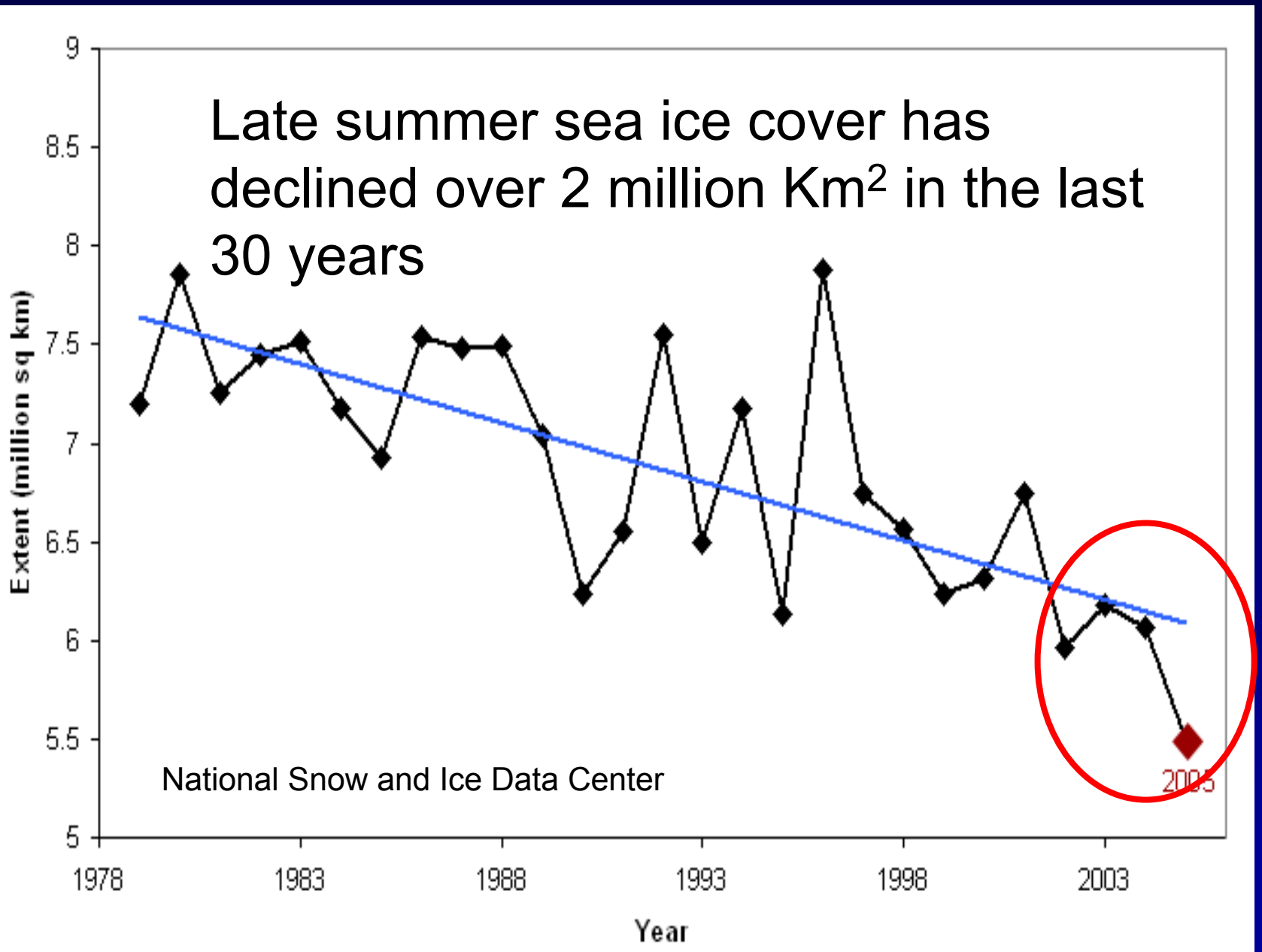
Ability to live on stored fats (recycle nutrients) when food is scarce

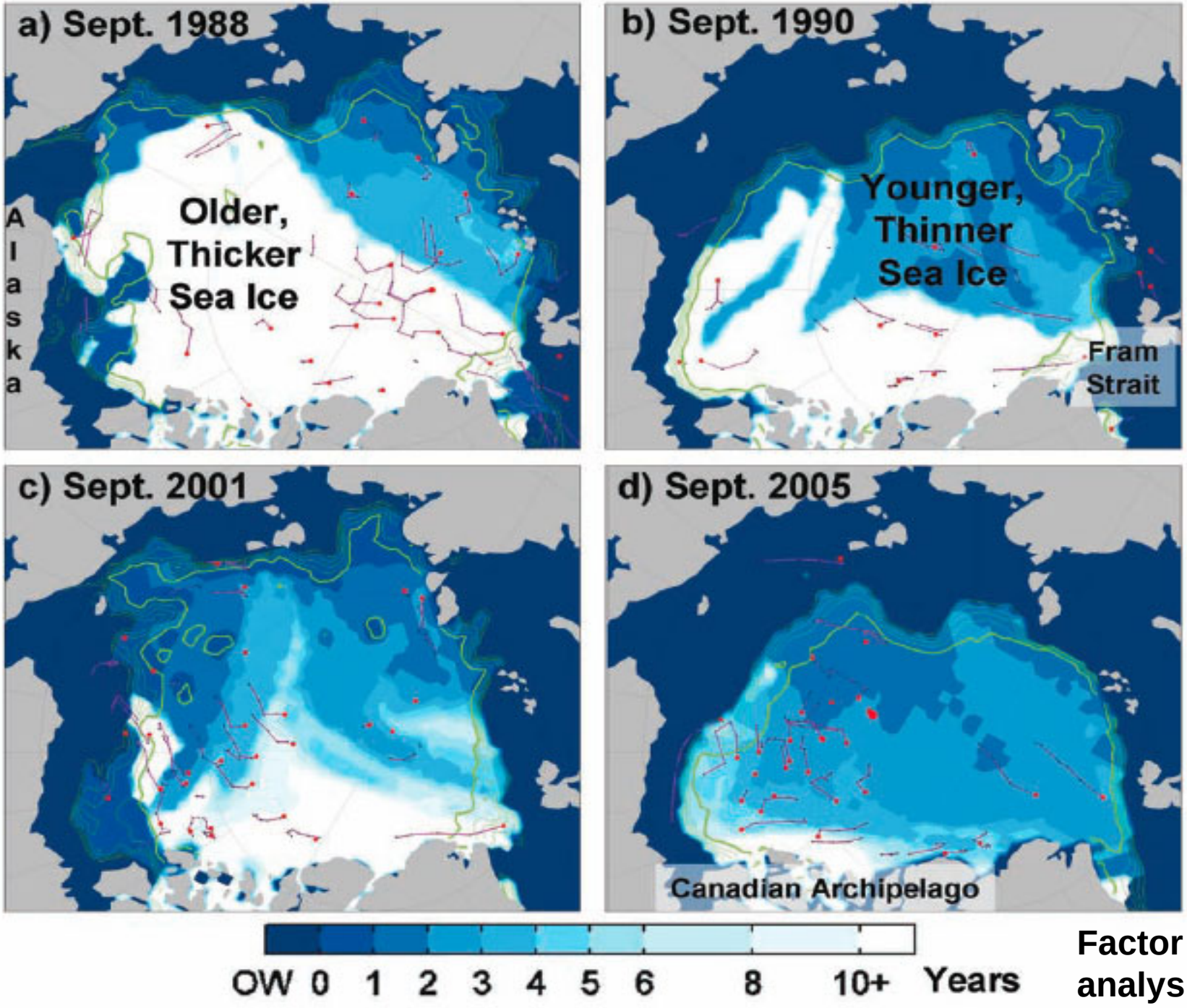


Recent Observations of Sea ice and Polar Bears

USGS

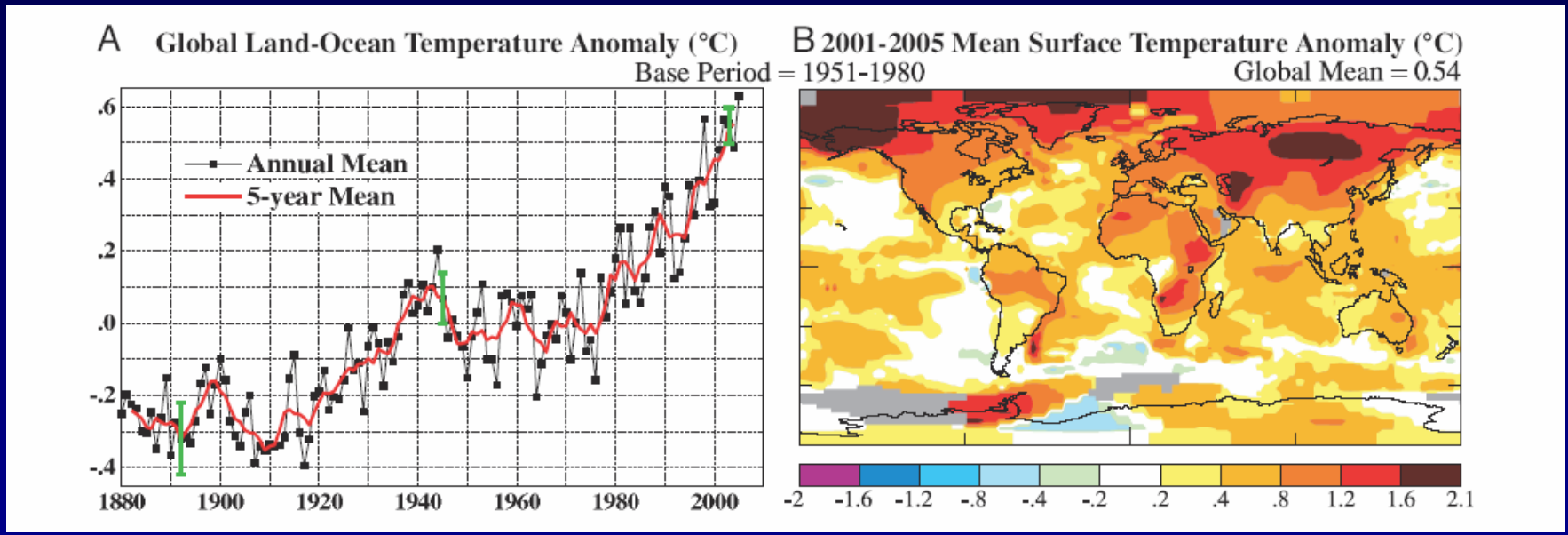



Late summer sea ice cover has declined over 2 million Km2 in the last 30 years
Extent (million sq km)
9
8.5
8
7.5
7
6.5
6
5.5
5
1978
1983
1988
1993
1998
2003
Year
National Snow and Ice Data Center
2005



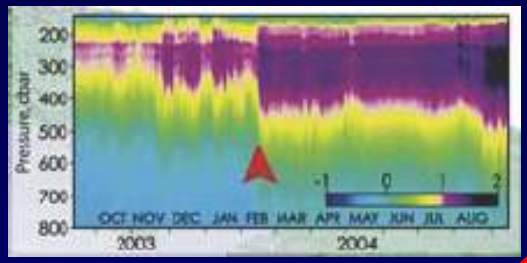
Factor A - analysis

WARMER GLOBAL TEMPERATURES

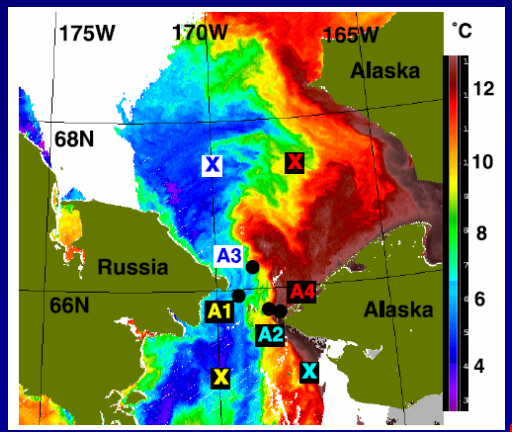


Source: Jim Hansen, NASA

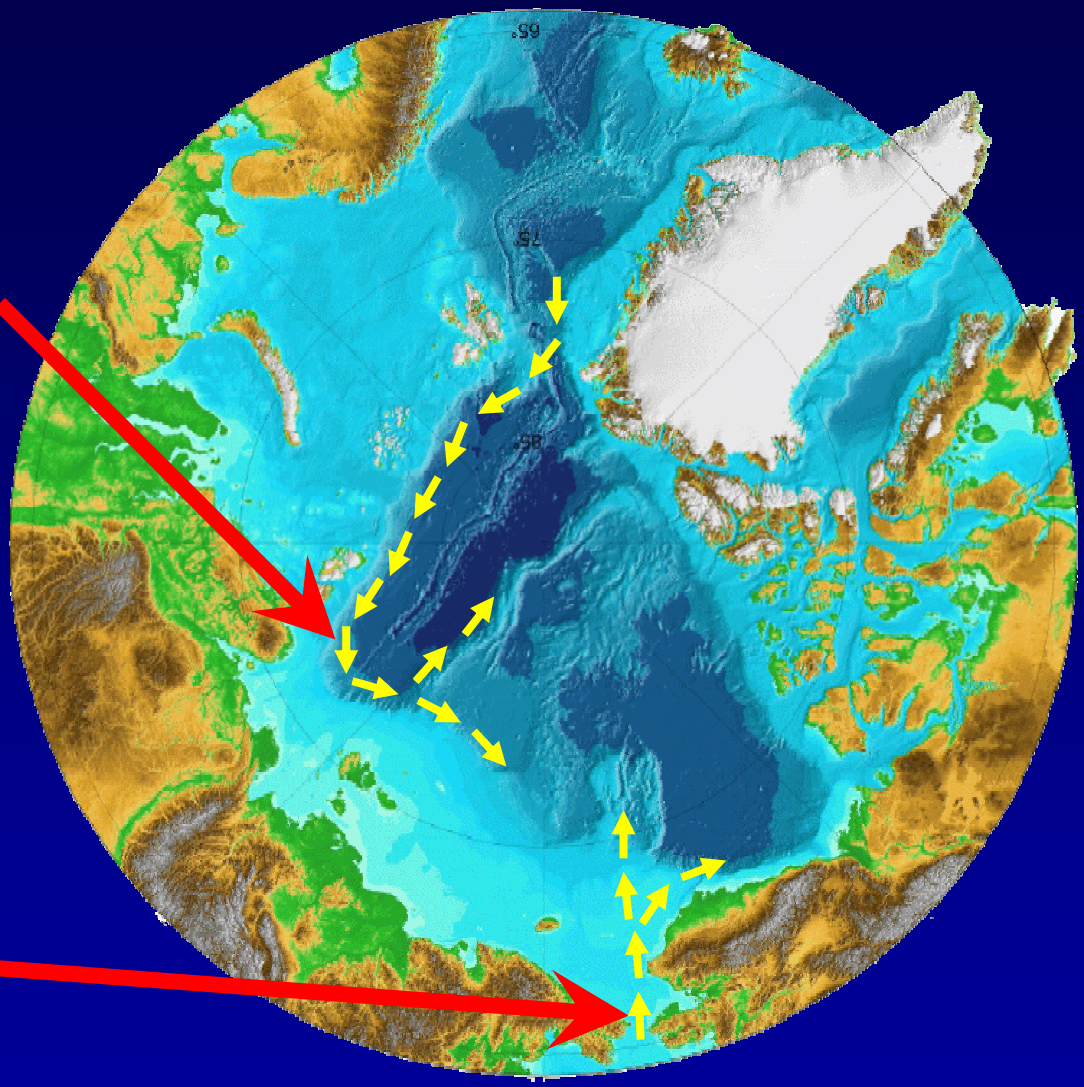
WARMER OCEAN WATER



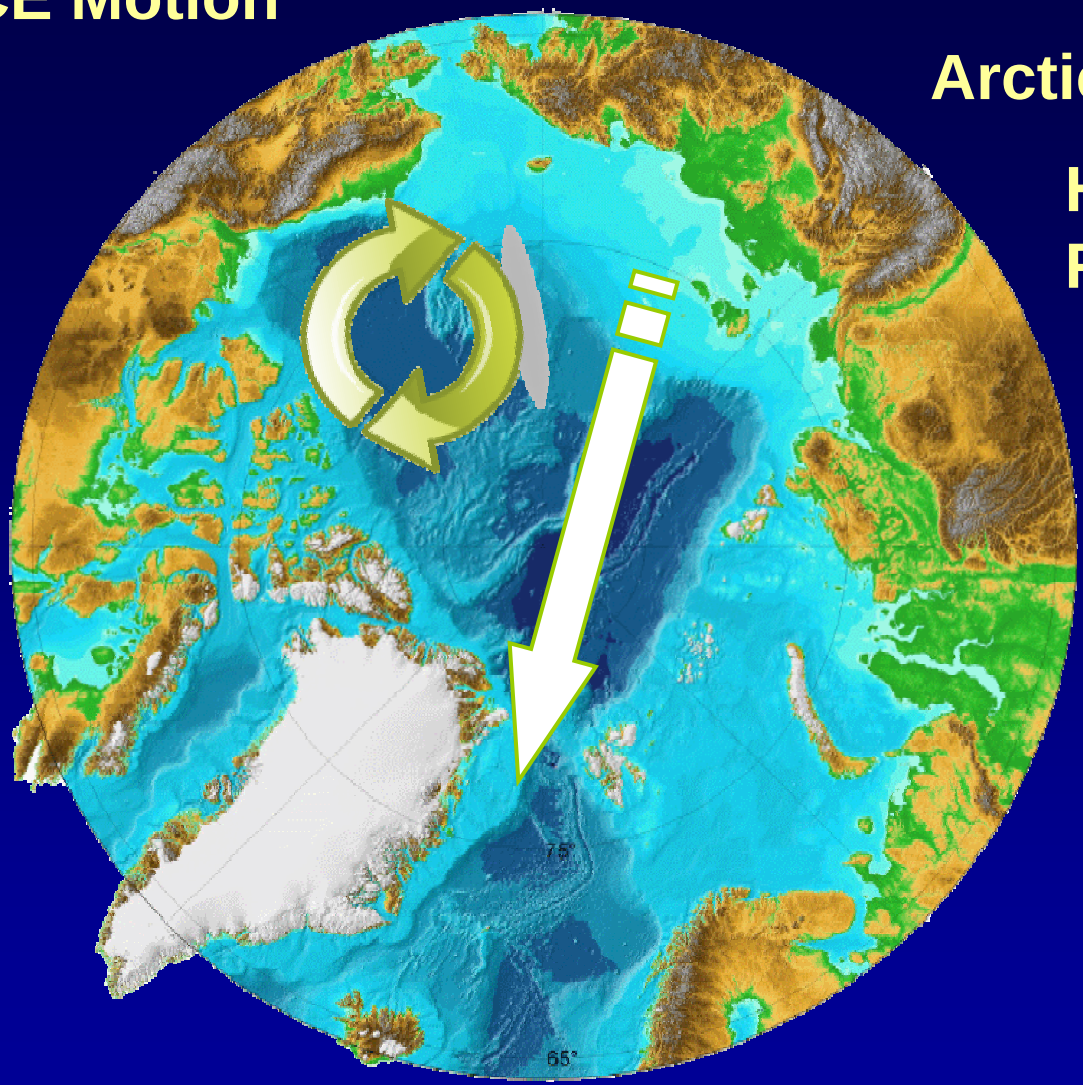
Polyakov et al., 2005
Geophys. Res. Lett.



Woodgate et al., 2006
Geophys. Res. Lett.



SEA ICE Motion

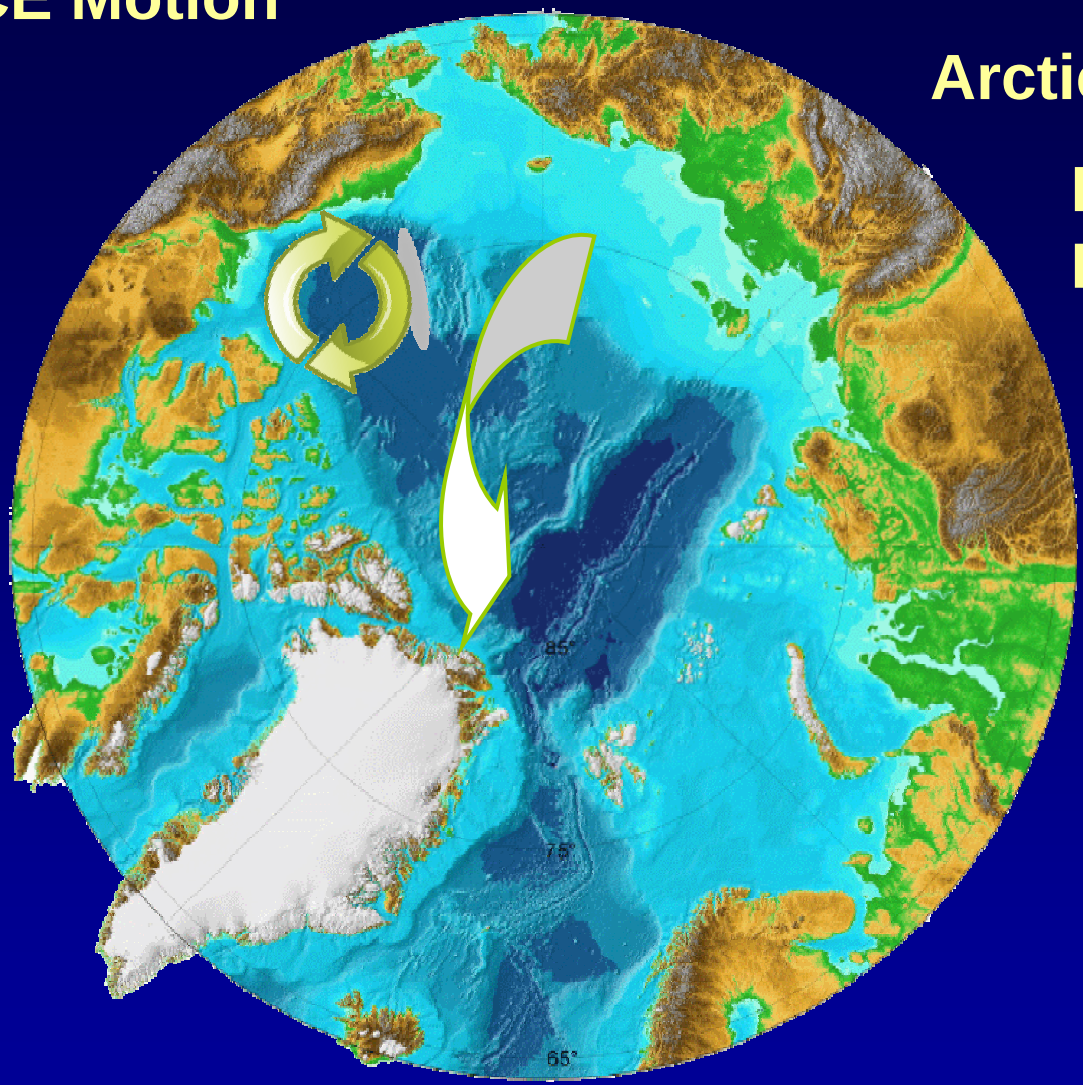


Arctic Oscillation

High Pressure Regime

Rigor et al., 2002, J. Climate

SEA ICE Motion



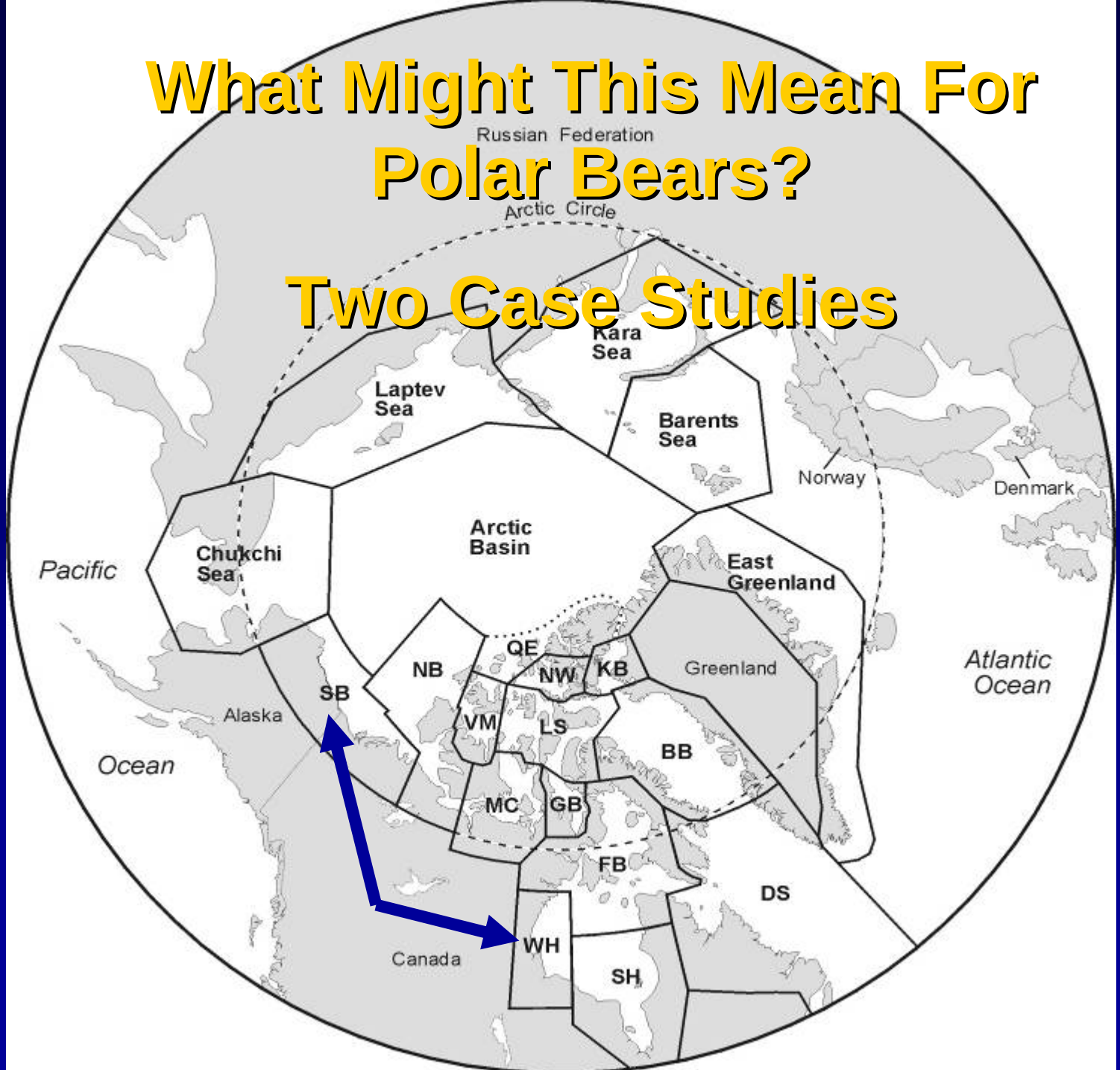
Arctic Oscillation

Low Pressure Regime

Rigor et al., 2002, J. Climate

What Might This Mean For Polar Bears?

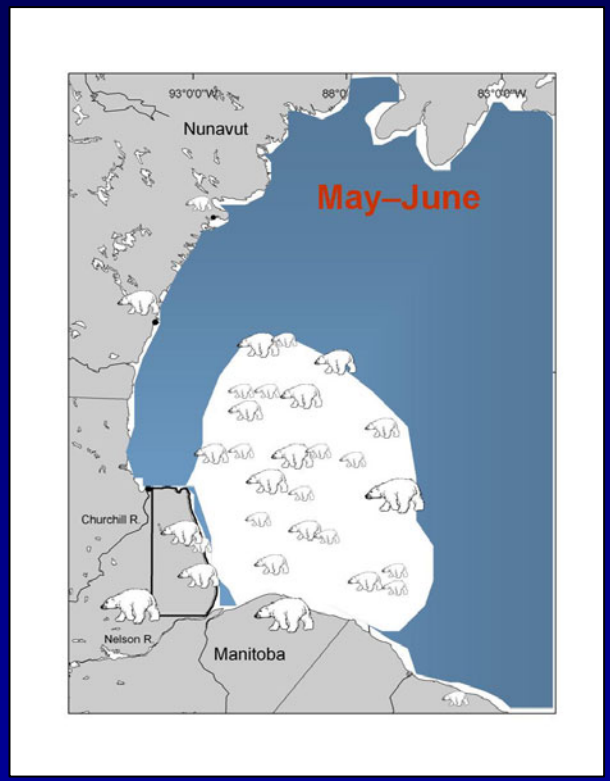
Two Case Studies



To see what changing ice means to bears let's first look at the southern end of their range in Hudson Bay

Western Hudson Bay

Polar bears are food deprived for approx. 4-8 months



Complete melting and freezing of the ice each year

Western Hudson Bay

- 3 weeks earlier sea ice break-up since 1970s

  Stirling et al. 1999. *Arctic* 52:294-306; Lunn & Stirling unpublished data

- bears come ashore earlier

  Stirling et al. 1999. *Arctic* 52:294-306

- reduced body condition

  Stirling et al. 1999. *Arctic* 52:294-306; Lunn & Stirling unpublished data

- poorer survival of COY, subadults and old

  Regehr et al. 2006. *J. Wildl. Manage* (in review)

- Declining population size (22% since 1987)

Southern Hudson Bay - Canada

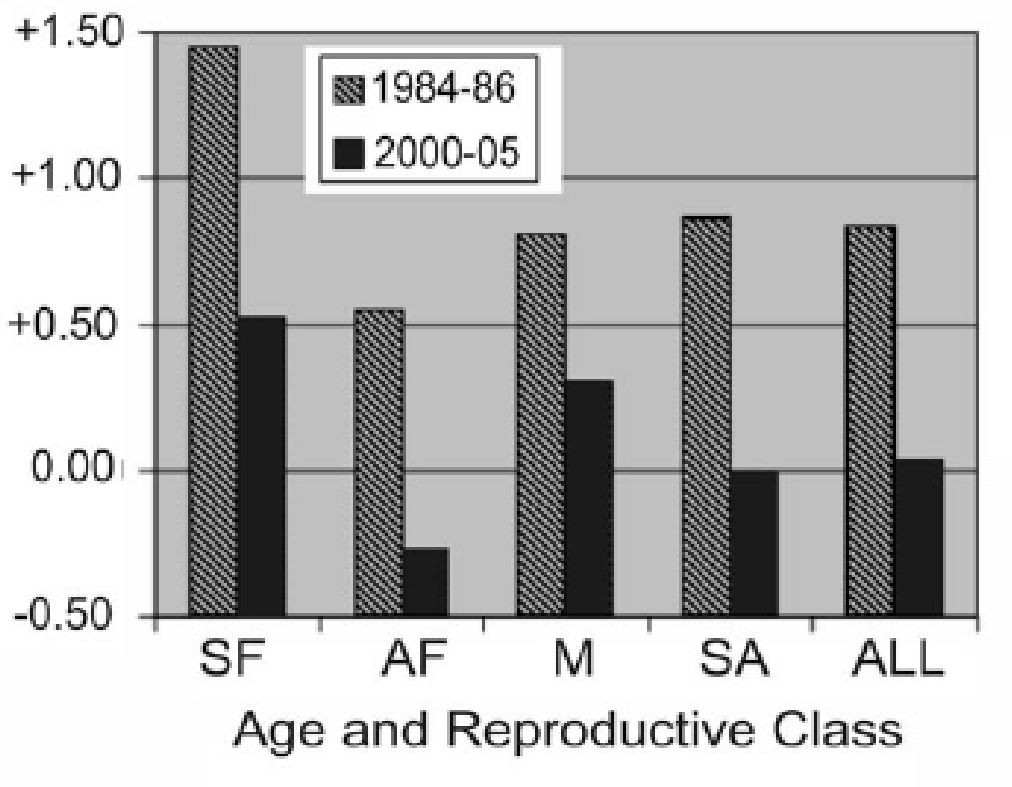
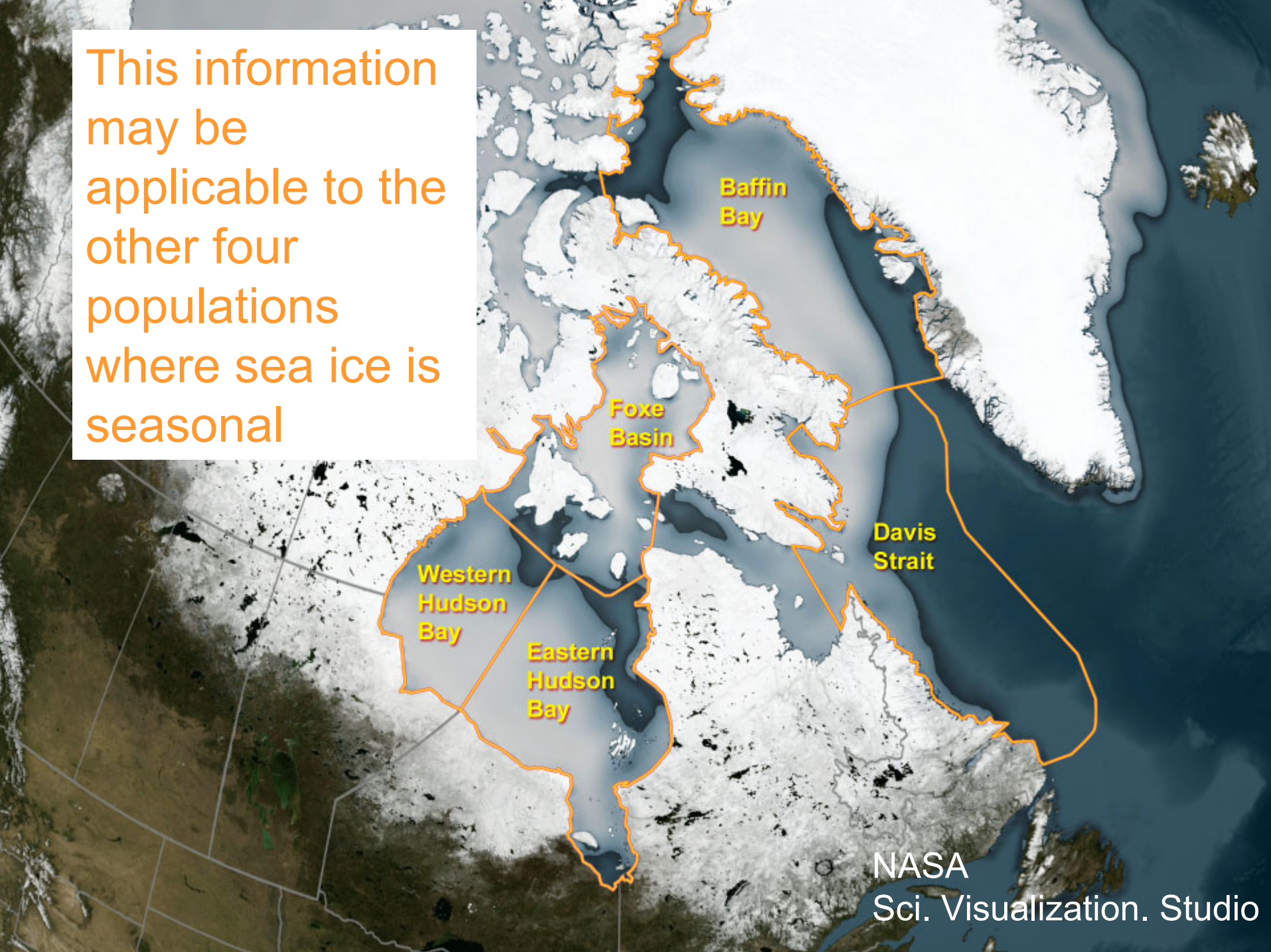
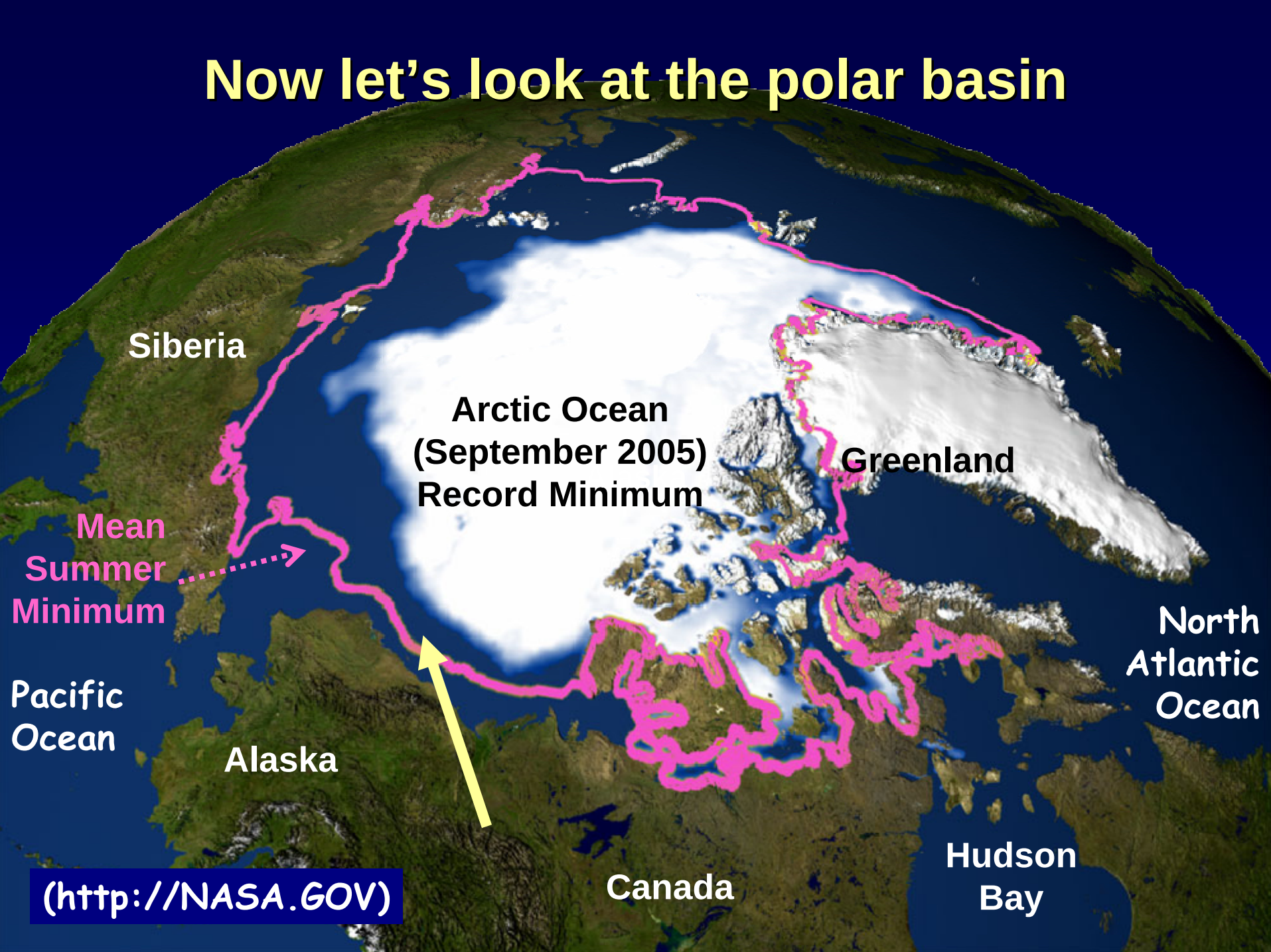


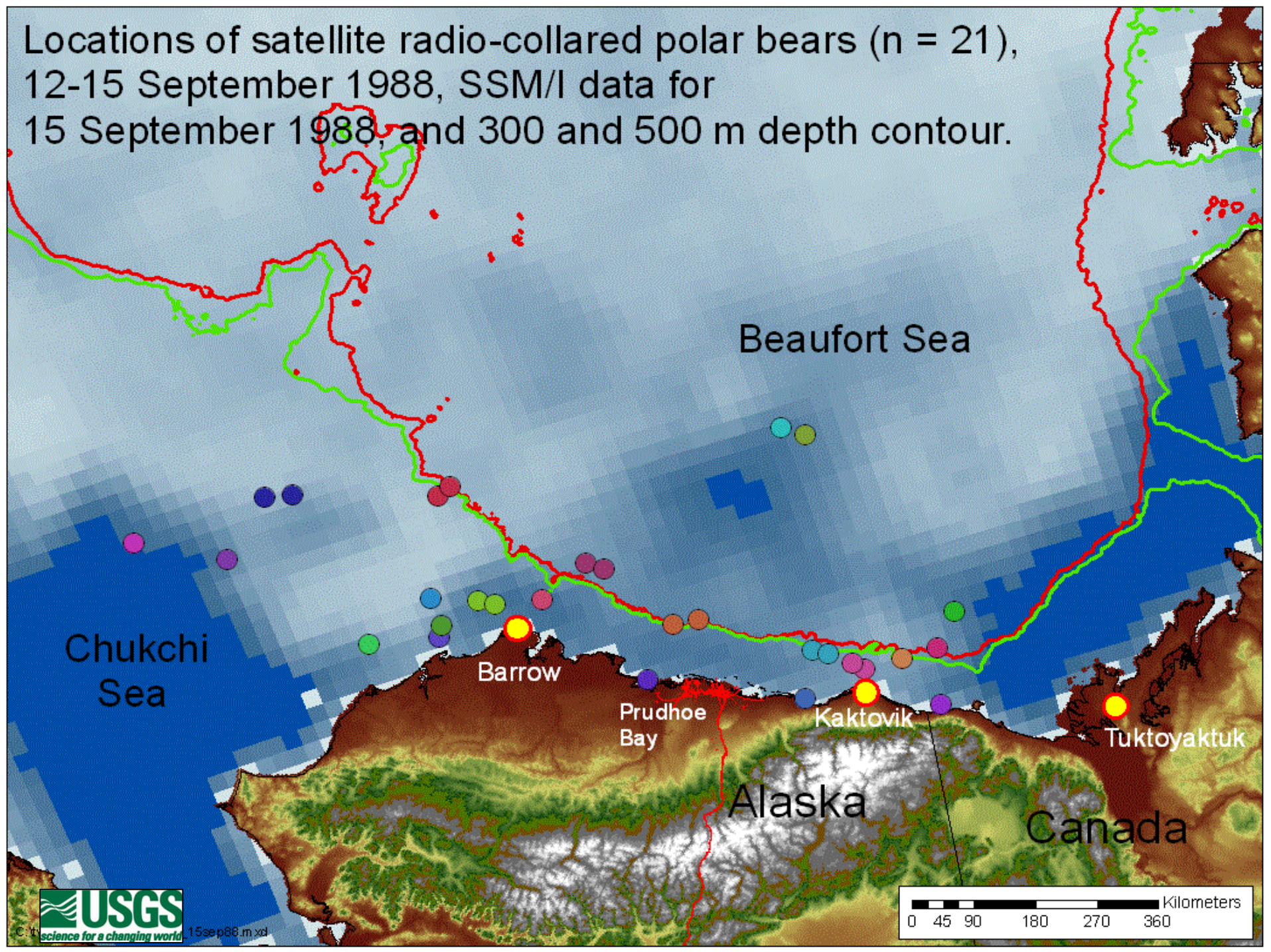
Figure 4. Mean Body Condition Index values for Southern Hudson Bay polar bears, 1984-1986 and 2000-2005 (SF = solitary adult females, AF = adult females with young, M = adult males, SA = subadults, ALL = all classes combined).

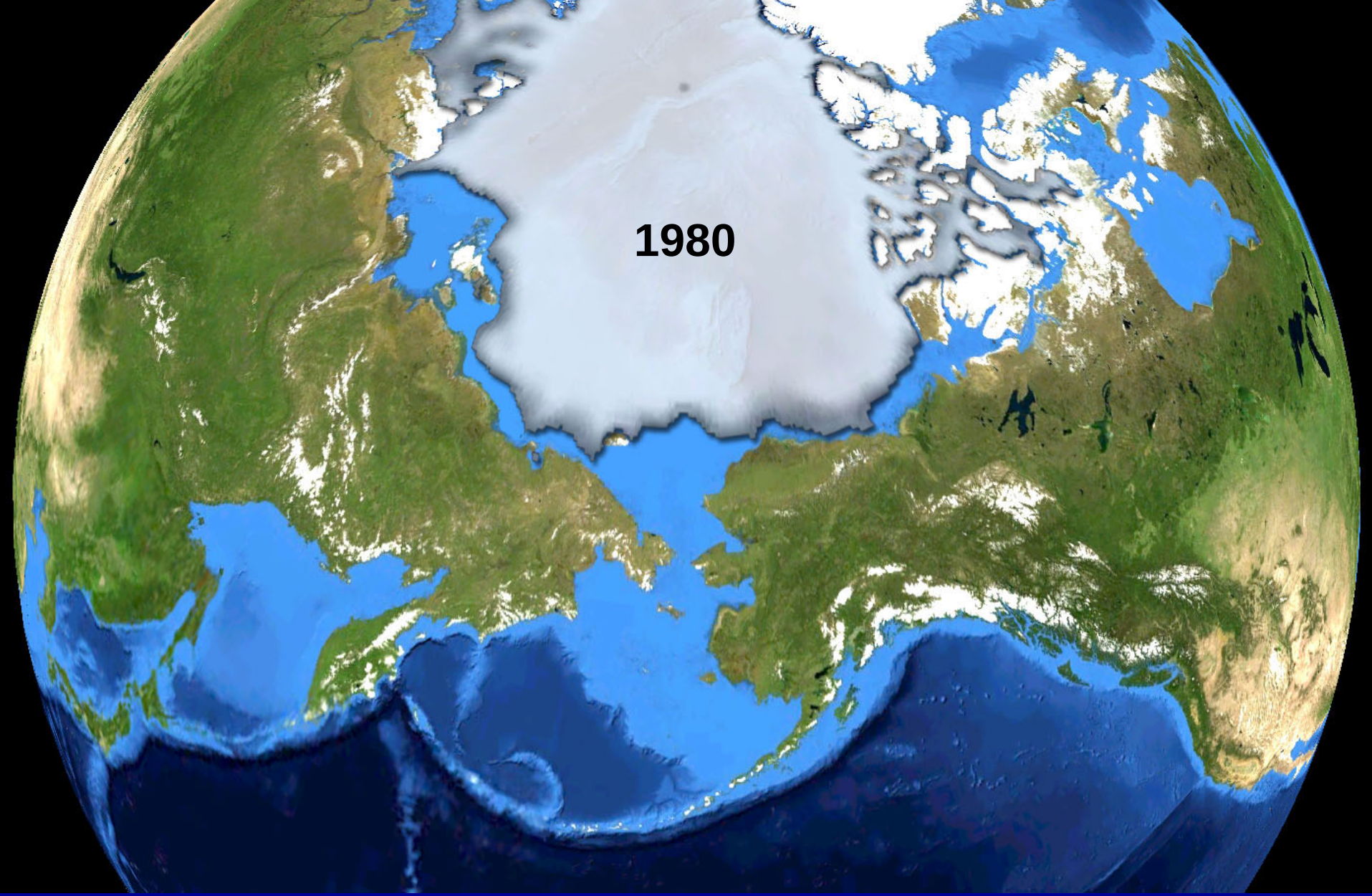
Obbard et al. 2006. Research Information Note No. 3. Temporal trends in body condition of Southern Hudson Bay Polar Bears


This information may be applicable to the other four populations where sea ice is seasonal
Baffin Bay
Foxe Basin
Davis Strait
Western Hudson Bay
Eastern Hudson Bay
NASA
Sci. Visualization. Studio

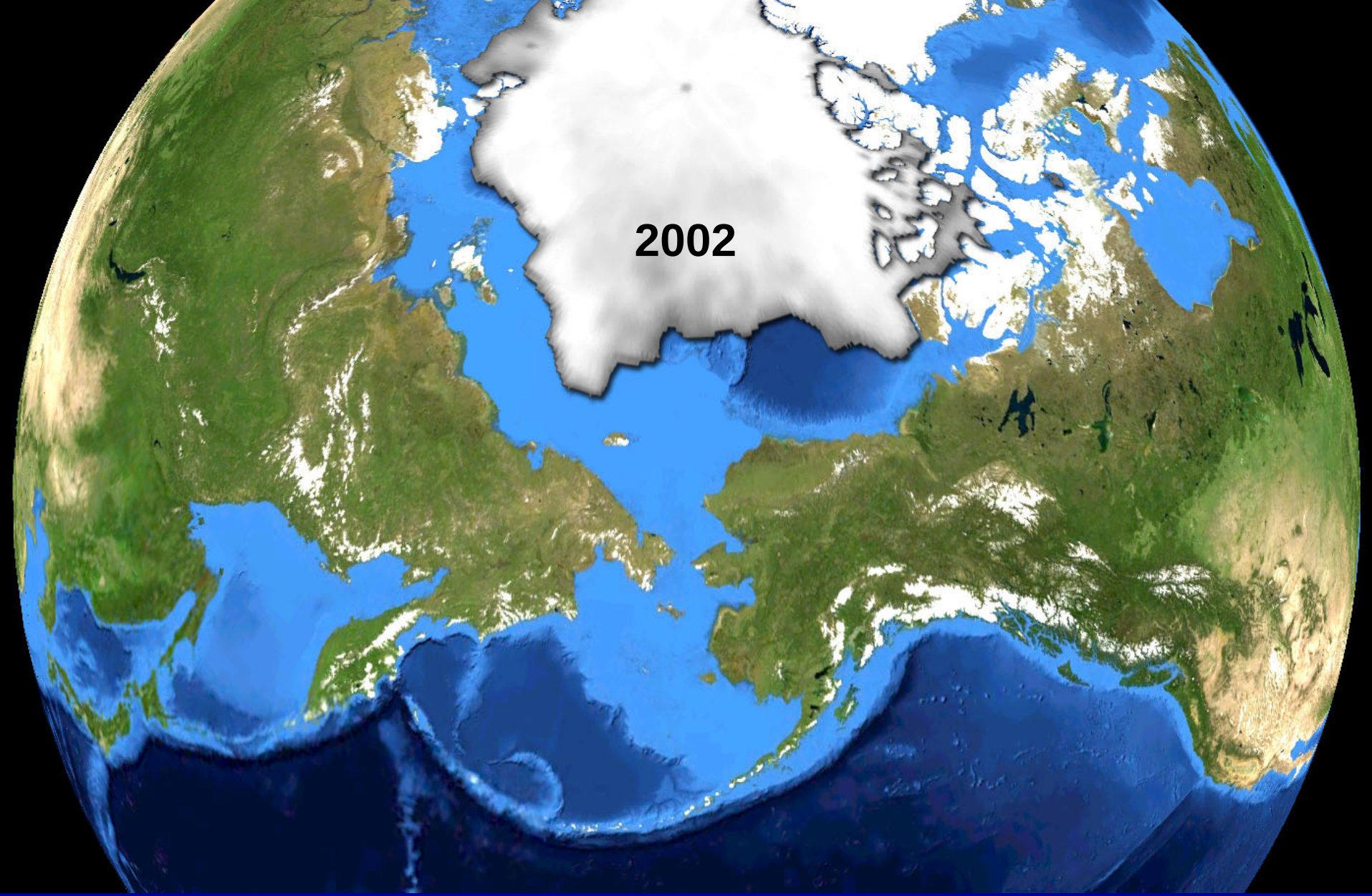
Now let's look at the polar basin




Locations of satellite radio-collared polar bears (n = 21),
12-15 September 1988, SSM/I data for
15 September 1988, and 300 and 500 m depth contour.
Beaufort Sea
Chukchi
Sea
Barrow
Prudhoe
Bay
Kaktovik
Tuktoyaktuk
Alaska
Canada
USGS
science for a changing world
15sep88.mxd
Kilometers
0 45 90 180 270 360



HABITAT AVAILABILITY



HABITAT AVAILABILITY

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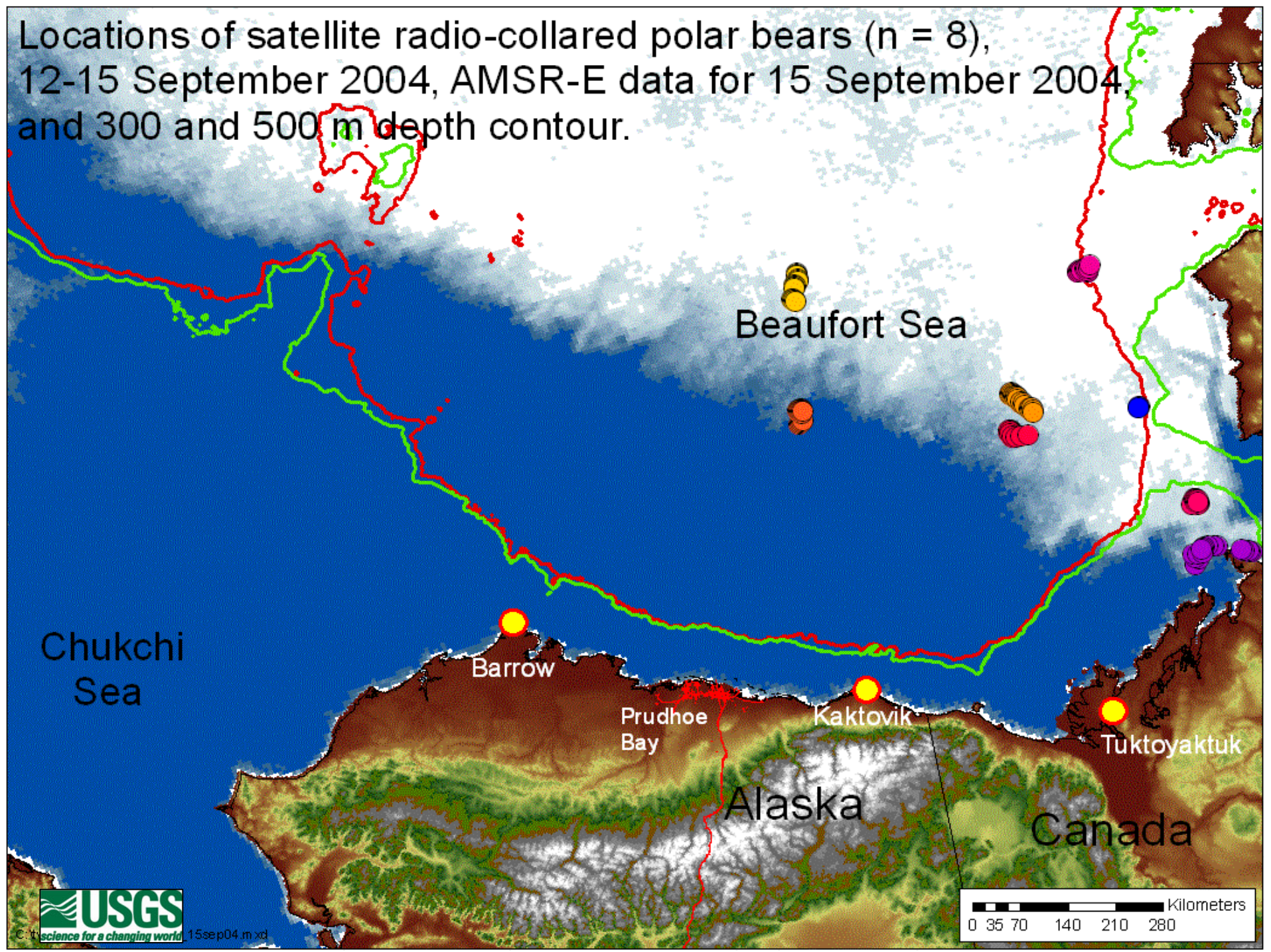

Locations of satellite radio-collared polar bears (n = 8), 12-15 September 2004, AMSR-E data for 15 September 2004, and 300 and 500 m depth contour.
Beaufort Sea
Chukchi Sea
Barrow
Prudhoe Bay
Kaktovik
Tuktoyaktuk
Alaska
Canada
USGS
science for a changing world
C:\t\15sep04.mxd
Kilometers
0 35 70 140 210 280

More bears are on land for longer periods of time

Schliebe et al. 2006. Fall distribution of polar bears along northern Alaska coastal areas and relationship to pack ice position

In either case, foraging success may be reduced

Southern Beaufort Sea

- Between the periods 1967–1989 and 1990–2006, skull sizes and weights of adult males declined.
- The skull sizes of COY declined.
- COY production appeared to increase in spring, but fewer COYs survived the first 6 months of life.
- Survival of COY declined

  Regehr, Amstrup and Stirling. 2006. *USGS OFR 2006-1337*

- Effect on population size?

USGS

Polar bear den distribution has changed

1985 – 1995: 63% of dens on sea ice

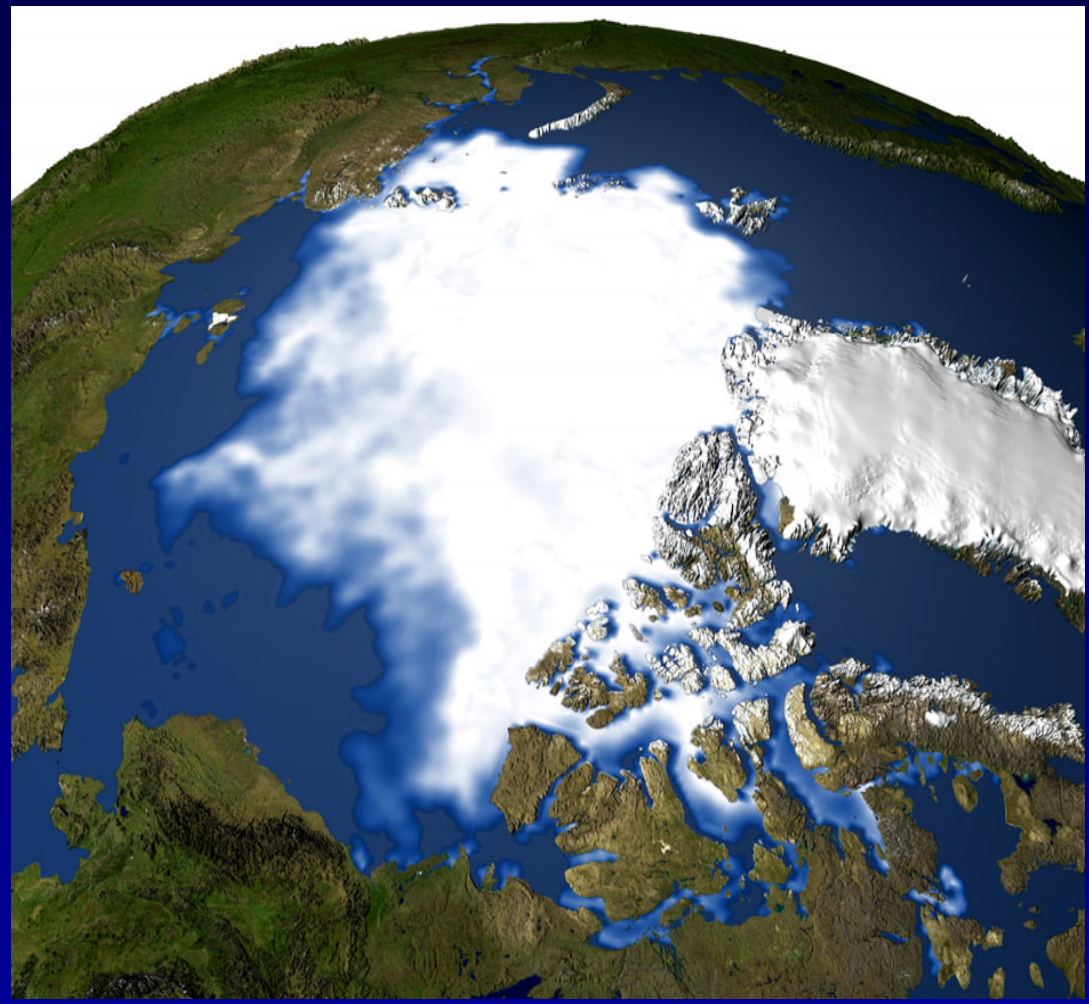
1996 – 2005: 36% of dens on sea ice

Fischbach, Amstrup and Douglas. In review. *Polar Biology*

USGS

Southern Beaufort Sea

- bears summer over deep water
- reduced size
- poorer survival
- Anecdotal Sightings



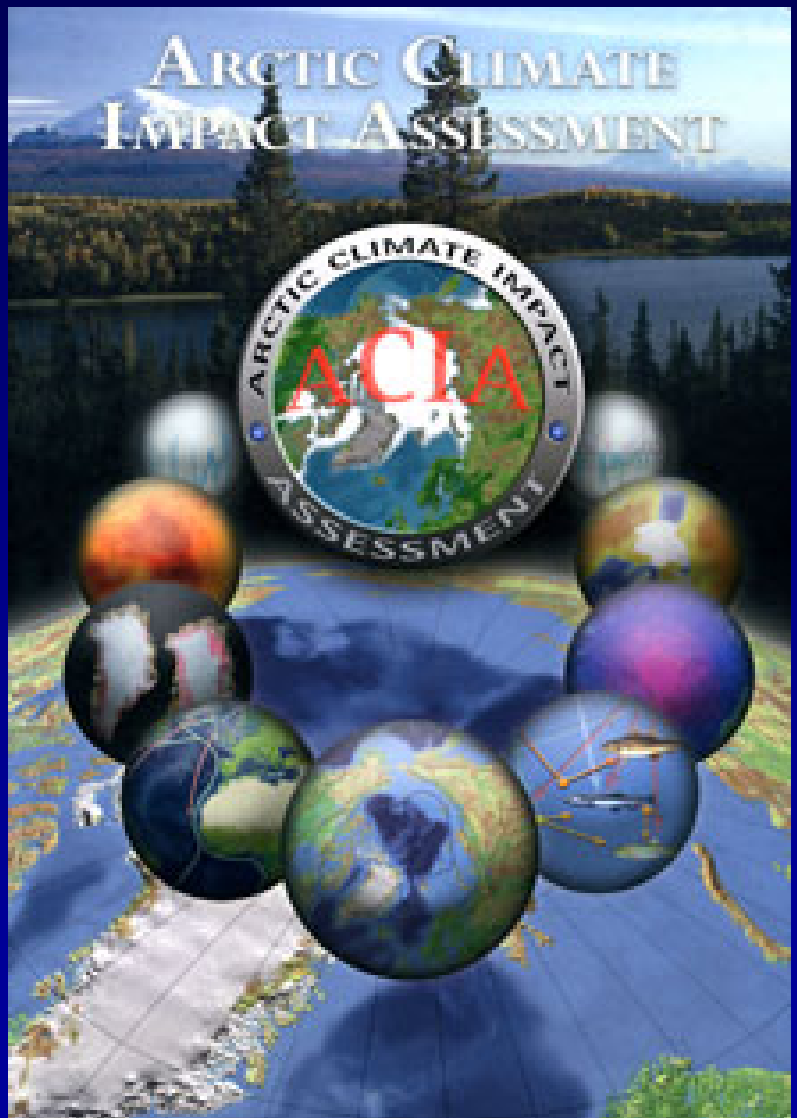
USGS

- **ESA Listing Factor A – sea ice**

Present or threatened destruction, modification, or curtailment of the species habitat or range

Factor A - analysis

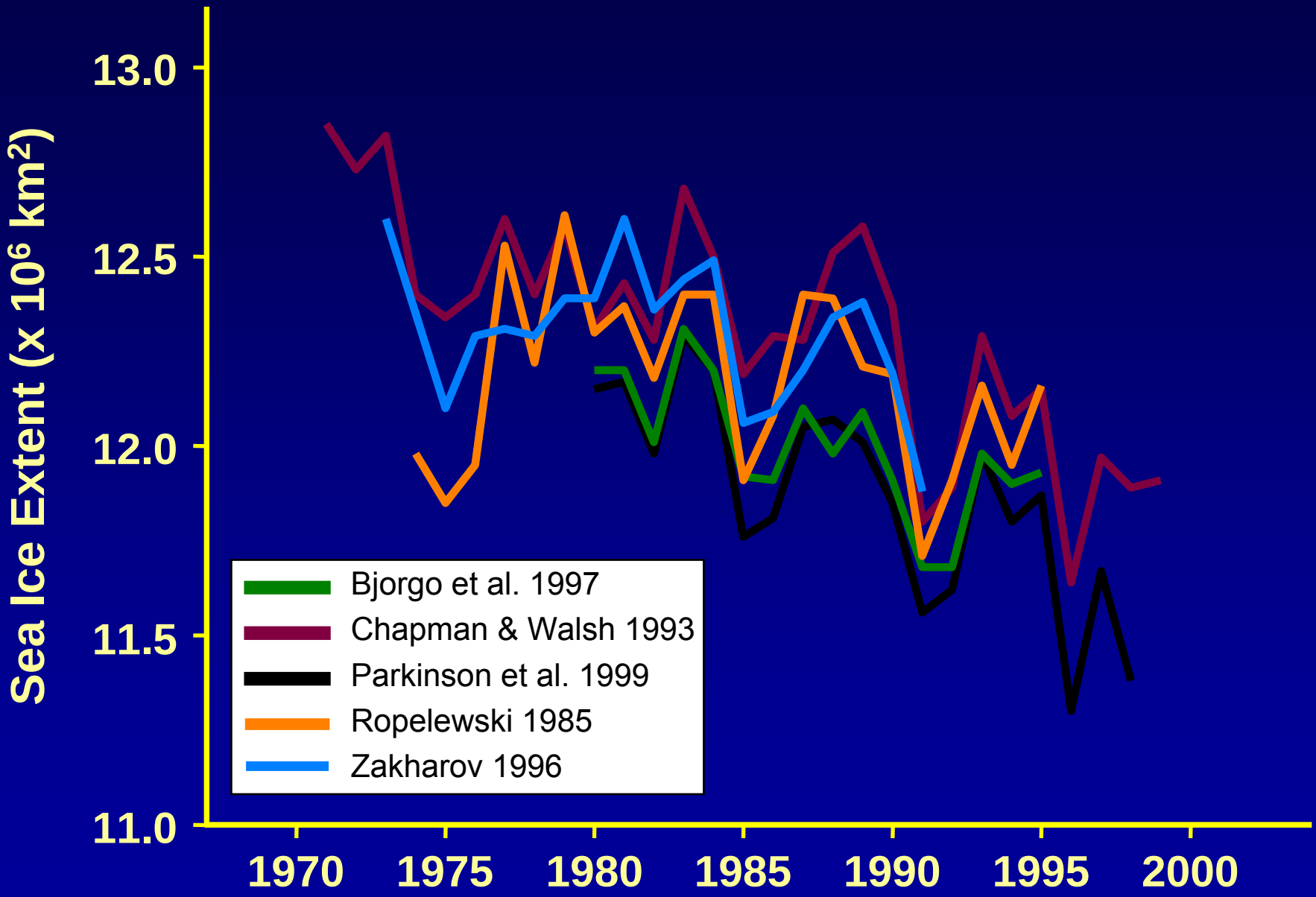
Best Available scientific climatological data



Rothchuck, Stroeve et al., Holland et al., Overpeck et al., NSIDC, NCAR, Comiso, Parkinson et al., Johanson et al., NOAA, Vinnikov et al.,

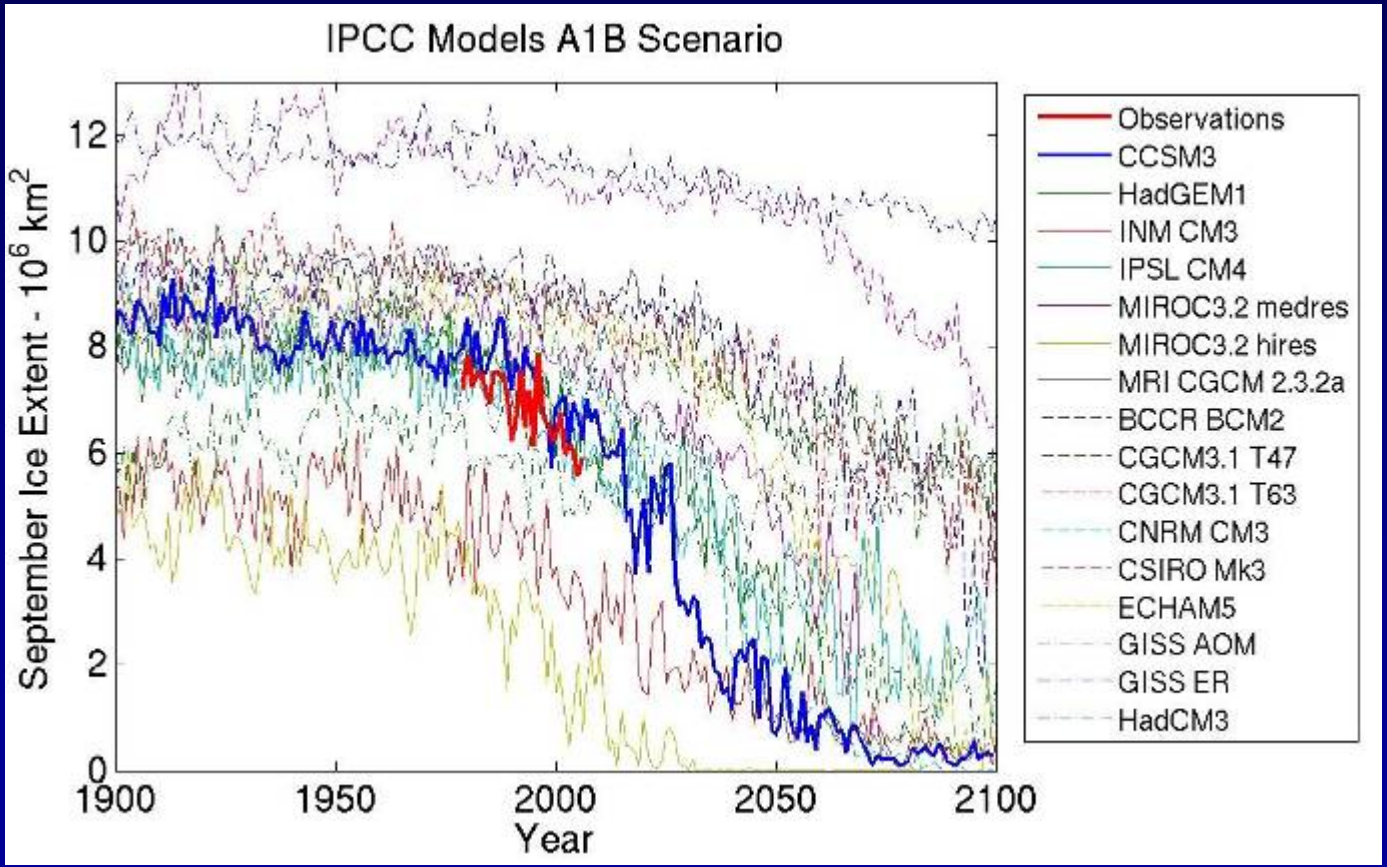
Factor A - analysis

Observed Decrease in Northern Hemisphere Sea Ice Extent



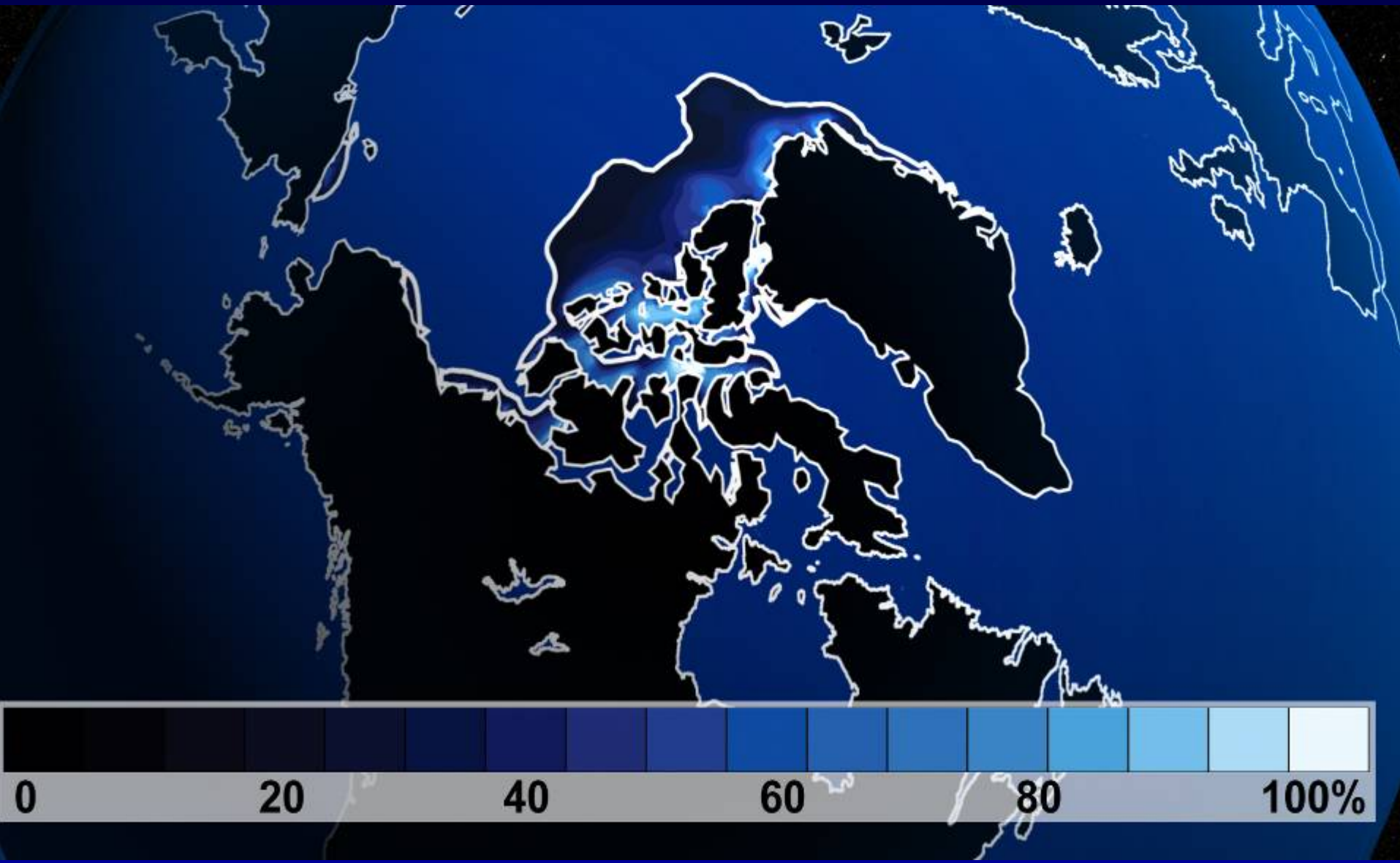
(after Vinnikov et al. 1999, *Science* 286:1934-1937)

But what about the future?
Global Models predict less sea ice



Source: Intergovernmental Panel on Climate Change (IPCC) 2007

Projection for mid 21st century



Holland et al. 2006. *Geophys. Res. Lett.*

Predicted Impacts to polar bears

Less consolidated more fragmented sea ice will be present

Increased swimming

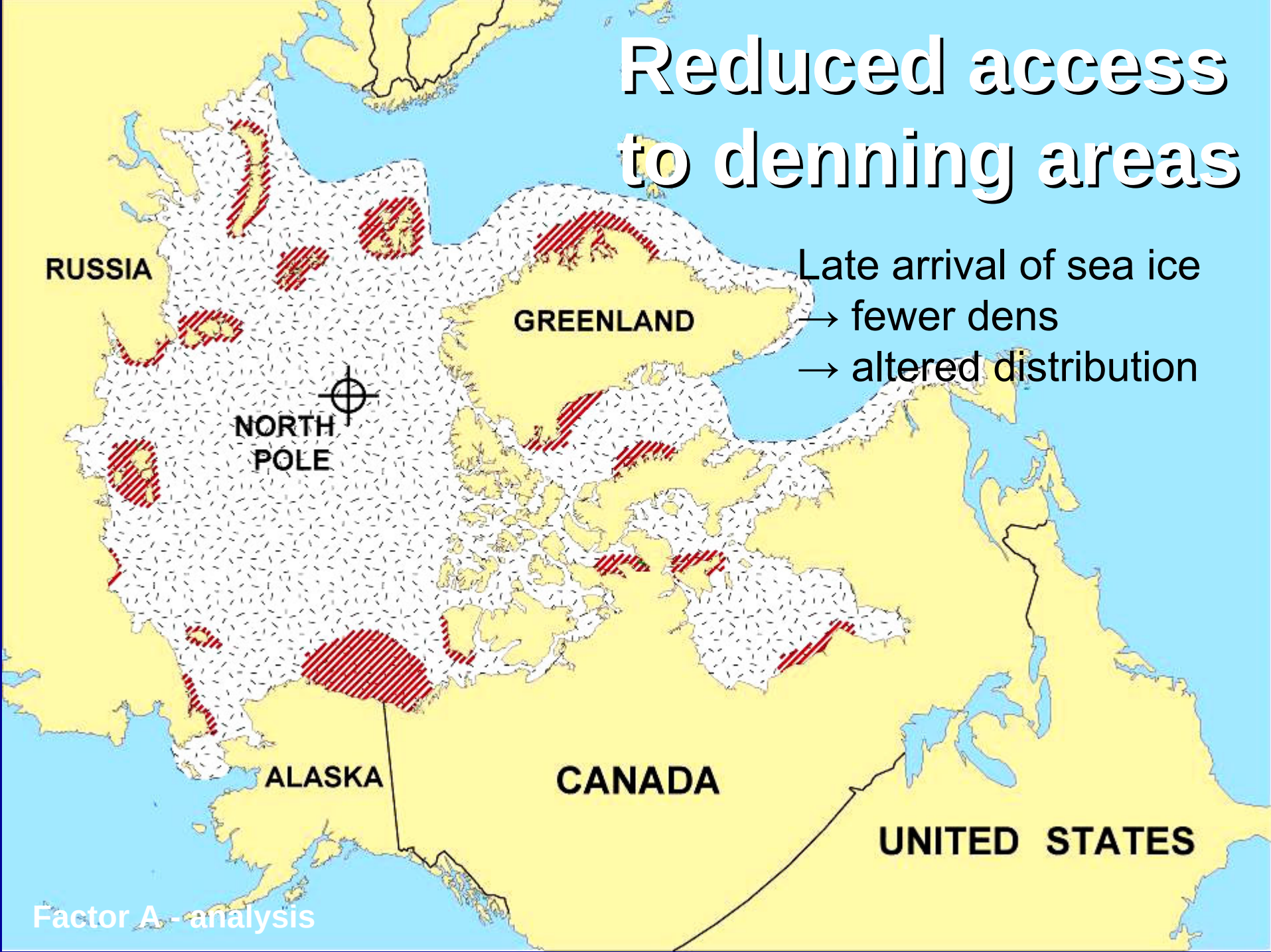
Increased rates of ice and polar bear movements

Increased energetic demands for polar bears

and

Decreased feeding opportunities as pack ice retreats beyond the continental shelf

Reduced access to denning areas

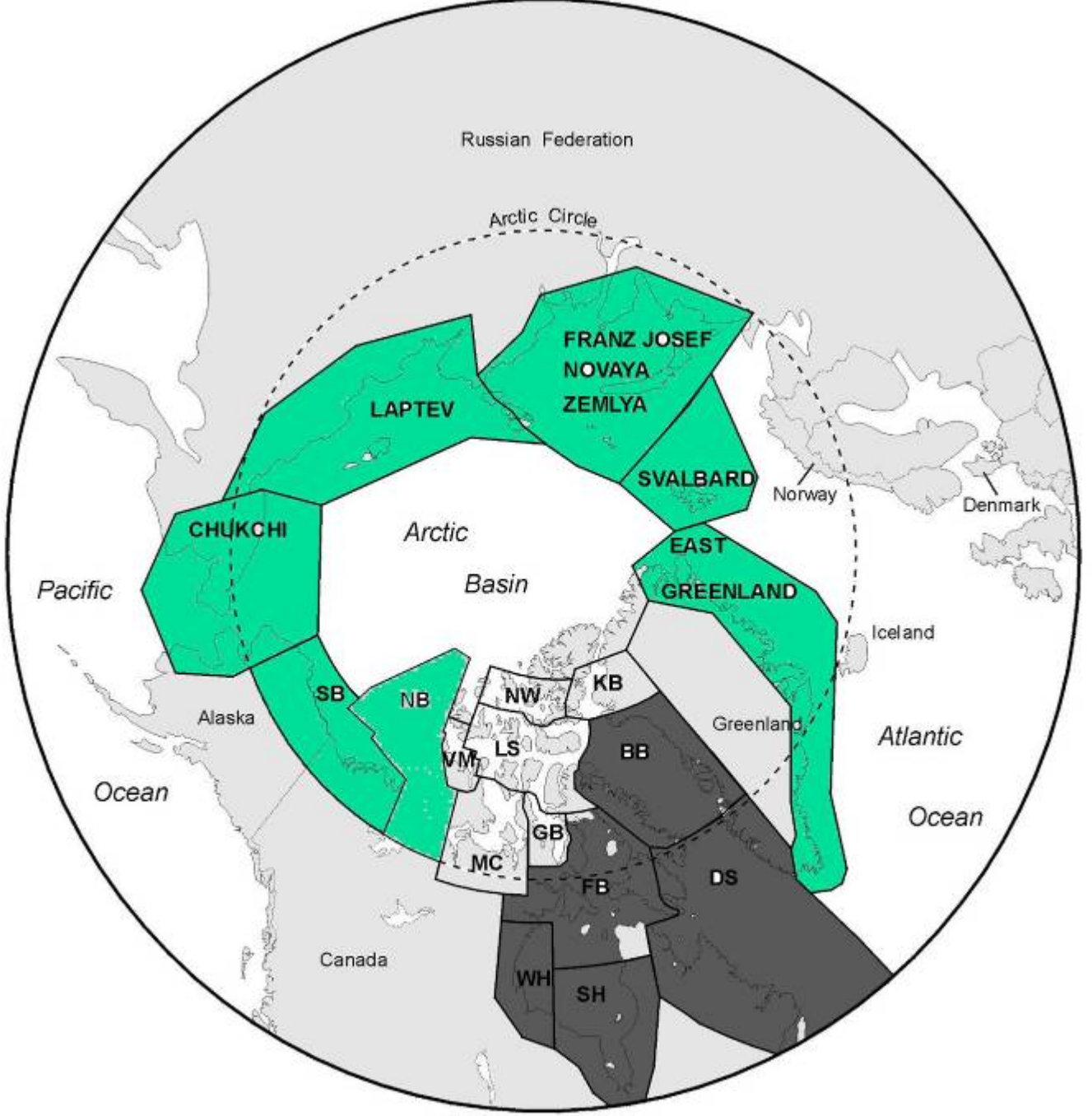


Late arrival of sea ice
→ fewer dens
→ altered distribution

Observed and forecasted increase rain on snow events predicted to result in:

- Earlier spring melt
- Reduced period of prey availability
- Reduced seal pupping success
- Reduced numbers of prey
- Potential effects on denning success

I. Stirling



Distribution of Polar Bear Populations

ESA Listing Factor A Conclusion: Loss of sea ice threatens the species range-wide

- Reduced extent and area of occurrence of pack ice will impact polar bears
- Reduced prey numbers
- Reduced access to prey
- Altered polar bear distributions
- Increased movements and energetic costs
- Reduced physical condition and fitness
    - Declining recruitment rates
    - Declining survival rates
    - Declining population abundance

ESA Listing Factor B conclusion:

Overutilization as a singular factor does not threaten polar bear

- Over harvest for some populations
- Active management programs - Canada
- MMPA - US (depletion standard)
- Russia-US bilateral agreement (CS)
- Inupiat – Inuvialuit agreement (SBS)
- Greenland – Canada cooperation

ESA Listing Factor C Conclusion

- Disease and predation (cannibalism) as singular factors do not threaten polar bear

ESA Listing Factor D Conclusion

Effectiveness of existing regulatory mechanisms

- **Vast majority of regulatory acts and statutes, in a global context, are effective in providing for the conservation of polar bears**
  - **International Laws, Treaties and Agreements**
  - **International Classification Systems**
  - **National Laws and Statutes**

- **However there are no known regulatory mechanisms currently in place at the national or international level effectively addressing threats to polar bear**

ESA Listing Factor E Conclusion

- **Other natural or manmade factors affecting the continued existence do not threaten the species by themselves：**

- **eg. Contaminants, development, bear-human interactions, shipping**

Listing Factor Assessment Summary

- **Current and projected loss of habitat threatens the species**
- **There are no known regulatory mechanisms currently in place at the national or international level effectively addressing this threat**

Currently seeking additional information

- Polar bear life history
- Sea ice habitat and polar bear relationships
- Factors that may affect polar bears
- Accuracy of information in proposed rule
- Completeness of information in proposed rule

What's Next

- **Information will be evaluated further**
  - **FWS will review public and peer review comments**
  - **Additional analysis of Southern Beaufort Sea population trajectory and habitat modeling will be conducted by USGS**
  - **USGS will coordinate a critical review of the climate modeling information in coordination with climate experts from a number of organizations**

Options

- **Review of information supports listing**
  - Publish a final rule
- **Review of information does not support listing**
  - Withdraw proposal
  - Use existing conservation mechanisms

Thank You for Your Attention

Questions regarding the proposed rule