



SCAN ME

Global Warming – Forcing Life Changes on Polar Bears

The body fat percentage of female polar bears (*Ursus maritimus*) effect on litter size.

How does the change of diet and hunting affect the fat percentage and therefore energy levels of polar bears? Does this change have an effect on the population growth and reproduction?

Authors: Nora Solheim, Didrik Aamold, Rowan John Hamper & Oda Fløtre



Photo: Gregg McCambley

2 Ice Melting - A Big Consequence

The main sources of food for Polar Bears are ring seals and bearded seals. Taken as prey while they are nesting or recovering on the surface of the ice

The sea ice is declining at a high speed, removing the nesting home for the seals and as a consequence, the main source of food for the polar bear.

Polar bears have had to adapt their predation patterns and diets, and instead focus more on prey such as eider ducks and their eggs, which has led to a decrease in energy-efficiency

It is not enough!

→ the average body mass of a polar bear is at a decline!

1980
A decline of 4,2kg a year
1992



Photo: Seal PNG Images, pngkey.com

1 The Polar Bear and It's Challenges

With climate changes rapidly causing the polar ice caps to melt, polar bears have been put under increased danger of extinction. The polar bears are a key factor to the natural ecosystem in the northern polar region, being on top of the food chain.

In this project we have looked more closely at polar bears in the Chukchi and Beaufort seas, to see how this decrease in energy-efficiency may have affected polar bear reproduction and hypothesise that it will have caused a downward trend in body fat percentage in female polar bears as well as number of offspring they produce.

3 Declining Body Fat Percentage

Body fat Percentage of Female Polar Bears

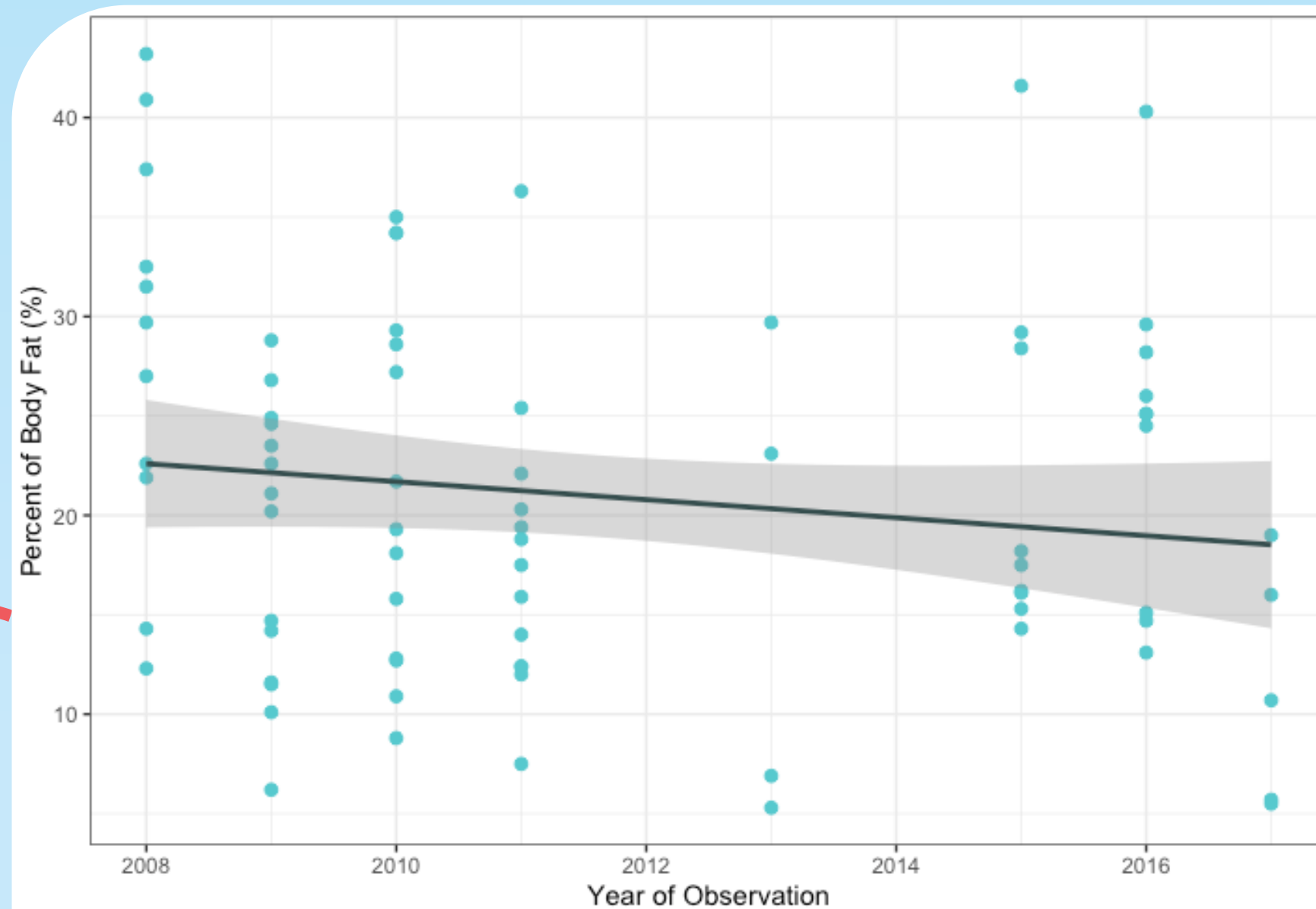


Figure 1: Linear regression of yearly measured body fat percentage of female polar bears. There was a total decrease of approximately 4 % in the period.

In order to determine how the lack of ice and change of diet affected the polar bears population growth a data analysis was needed. Over the period 2008-2017 the body fat percentage of female polar bears was measured by Chukchi and Beaufort.

Relationship of Number of Cubs and Females

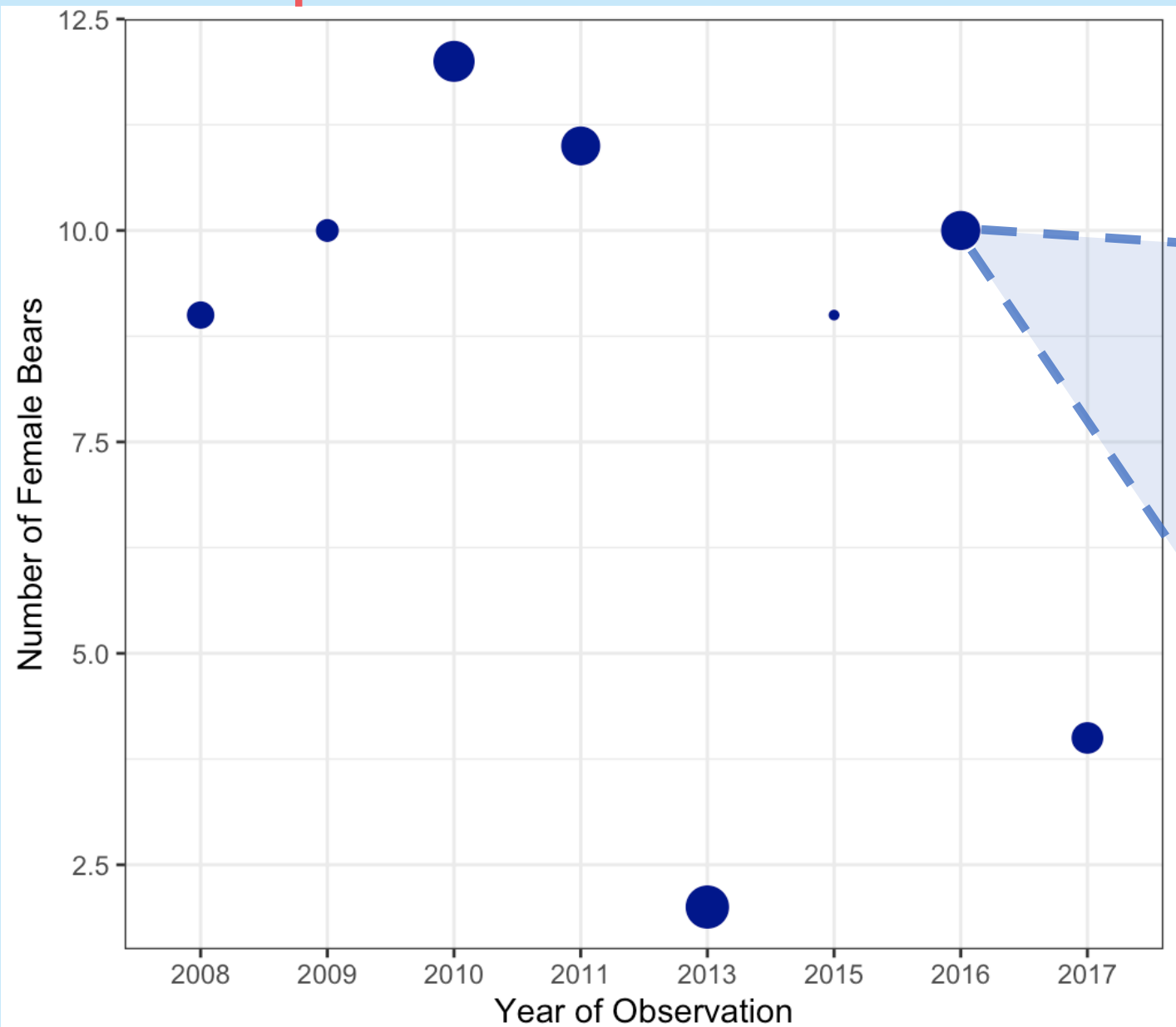


Figure 2: Relationship of observed number of cubs and female polar bears. The size of each point represents the average number of cubs for the given year. The smallest points : average of 0.5 cubs, medium: 1.0 cubs, and large: 1.5 cubs per female.

4 The Relationship Between Cubs and Body Fat %

A decline in body fat percentage of female polar bears has showed to have no significant effect on the number of cubs per female. The number of cubs per female does not show any specific pattern. However, fewer observations might still indicate a decrease of the polar bear population size.



Photo: Natural World Safaries

Acknowledgements

Illustrations were made using PowerPoint and PresentationGo. All data analysis were made using R.Studio. Photo credits: Gregg McCambley, Natural World Safaries and PNG Images

References

Rode, K. D. (2020). Measurement data of Polar Bears captured in the Chukchi and southern Beaufort Seas, 1981-2017. *U.S. Geological Survey data release*. DOI: <https://doi.org/10.5066/P97VtK3PX> | Arctic sea ice minimum ties for tenth lowest , *Arctic Sea Ice News and Analysis*. (n.d.). | Derocher, A. E., Lunn, N. J., & Stirling, I. (2004). Polar Bears in a Warming Climate. *Integrative and Comparative Biology*, 44(2), 163-176. <https://doi.org/10.1093/icb/44.2.163> | Hemstock, A. Wendt. (1999). *The polar bear*. Capstone High/Low Books. <https://books.google.no> | Wiig, Ø., Aars, J., & Born, E. W. (2008). Effects of Climate Change on Polar Bears. *Science Progress*, 91(2), 151-173. <https://doi.org/10.3184/003685008X324506>



UNIVERSITY OF BERGEN
Faculty of Mathematics and Natural Sciences