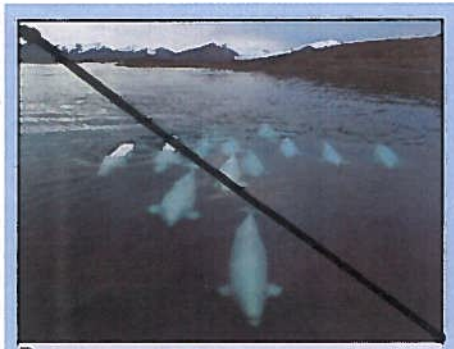
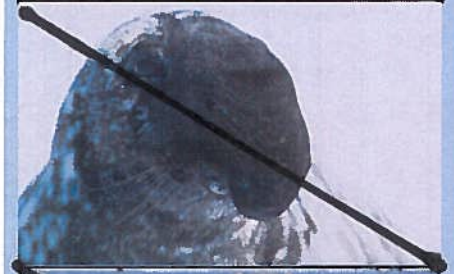



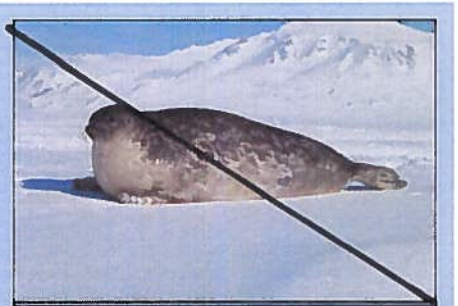
Threats to marine mammals in a time of rapid change

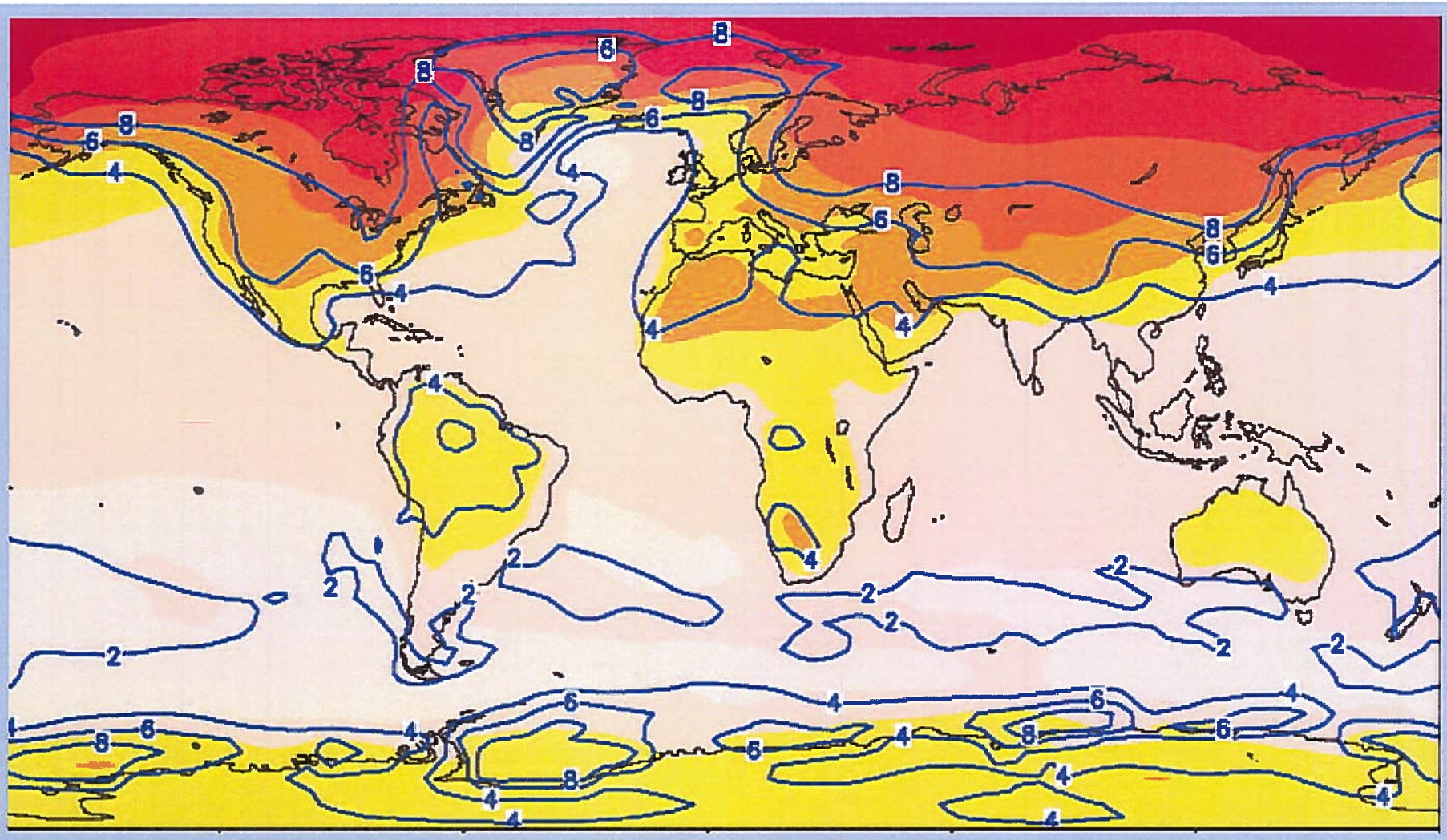
"Global treasure at risk due to climate change"

Kit M. Kovacs

(& many scientific colleagues)

NORSK·POLARINSTITUTT

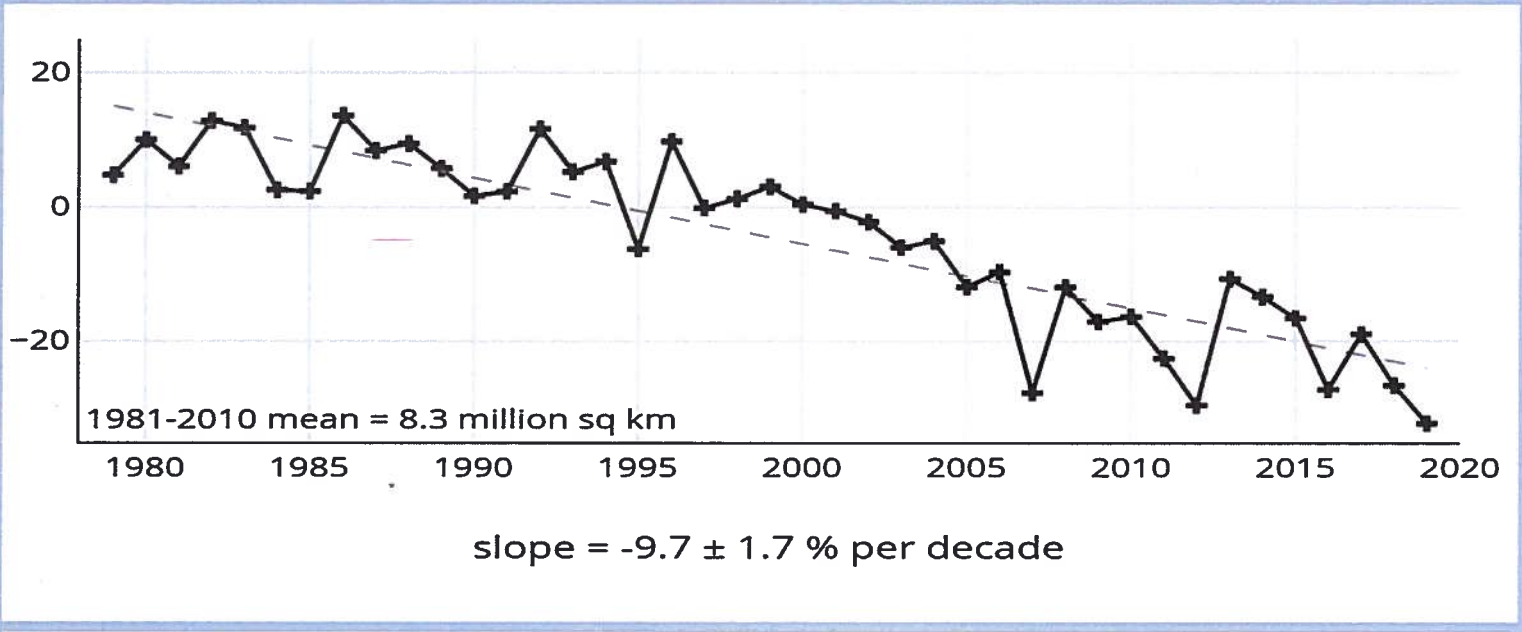


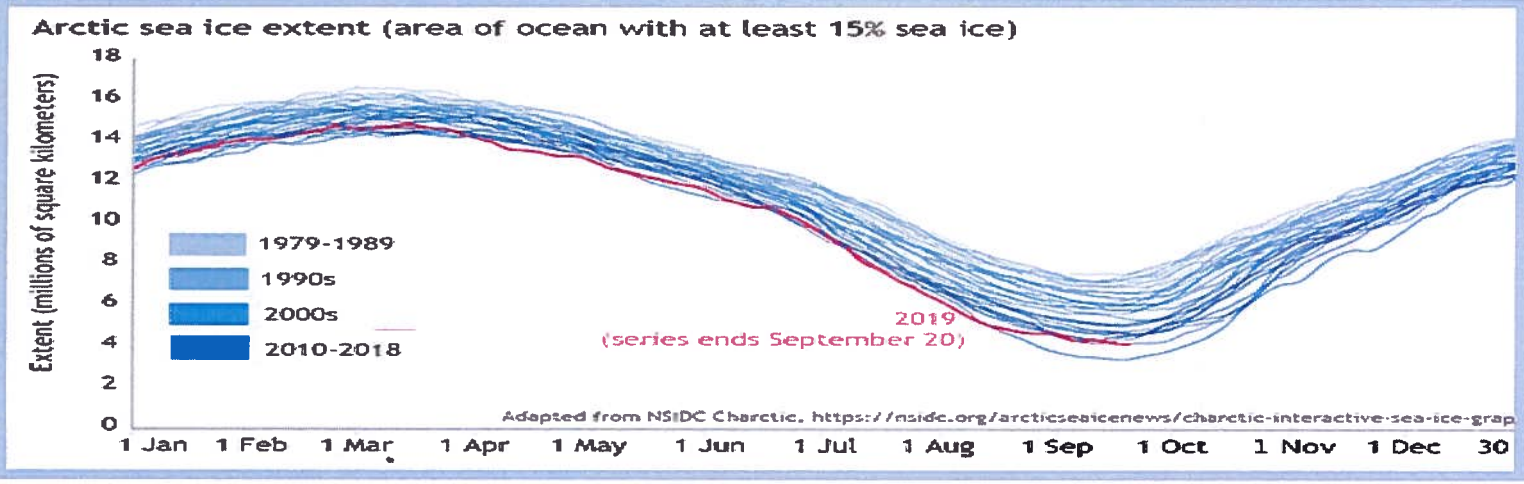


Warmer, wetter, "wilder" .....Arctic....

IPCC 1999, 2015, 2018, **IPCC oceans and cryosphere 2020**, ACIA 2005, SWIPA 2012, 2016, AACA 2017

Arctic Sea Ice ~'New State' (LESS)





Shorter sea ice season

Less stability
(thickness)

Less multiyear ice
(less sympagic biota)

Increased water temp

Increased sea level

Decreased ocean pH

IPCC 2020 Cryosphere report

11 endemic Arctic marine mammal species = ICE (9 in Norwegian waters)

Birthing/nursery areas

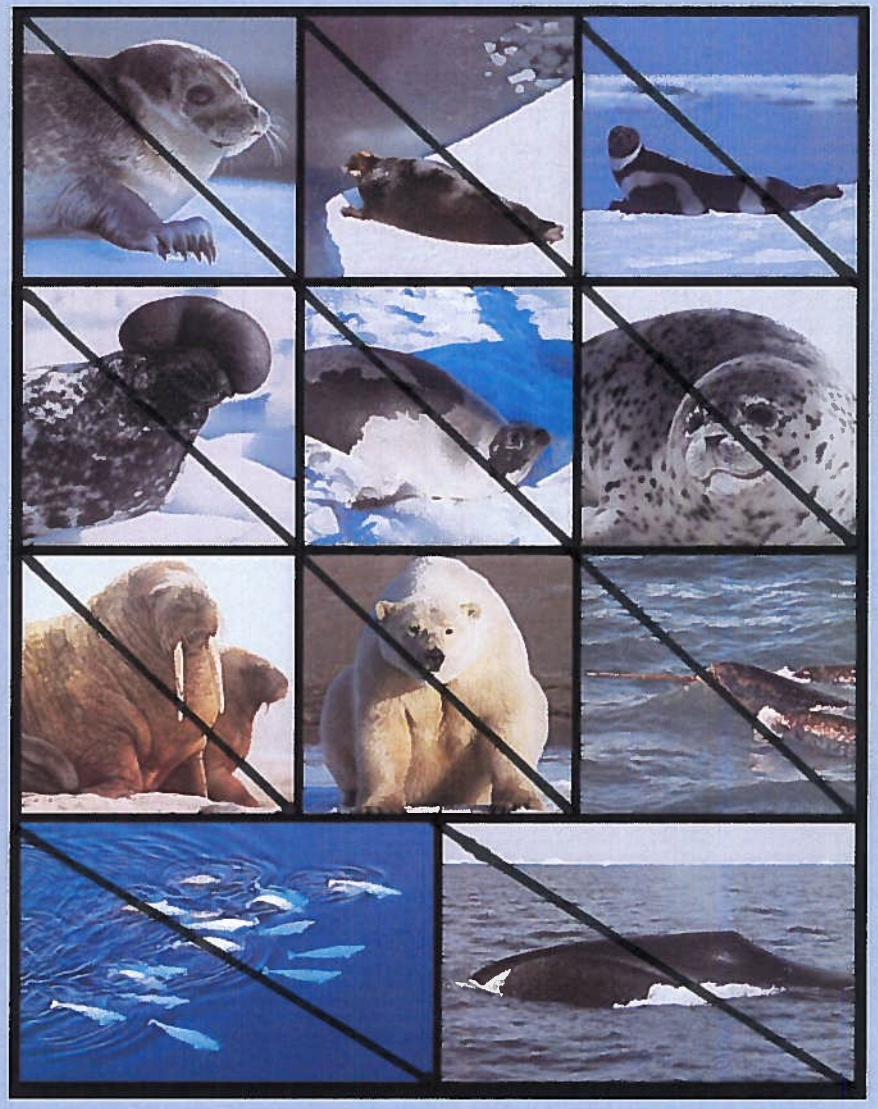
Protection from storms

Protection from open-water predators

Low competition environment

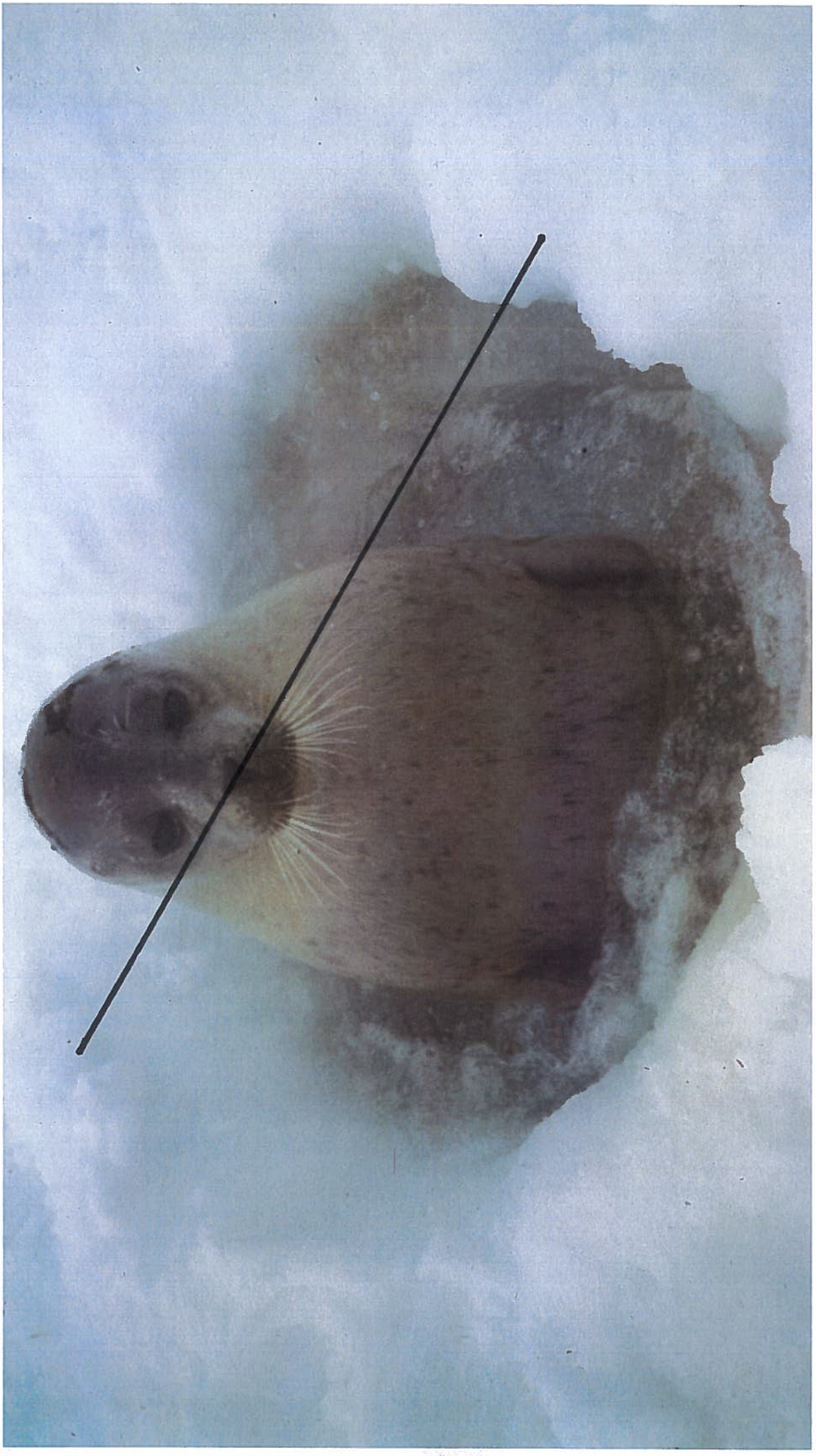
Ice-associated prey (S & B)

Disease "free" zone



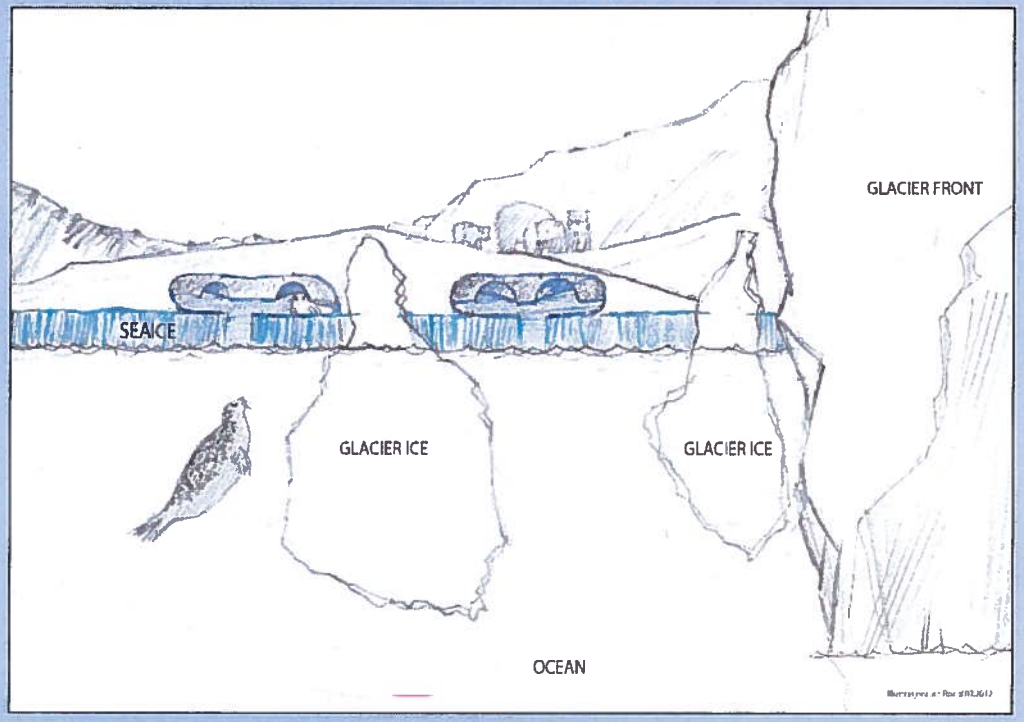
Climate change & marine mammals...

- Arctic endemics cannot do much range shifting - they are on the top of the world – *nowhere to go...conservative life histories...specialists...*
- most have been heavily overharvested
- increased competition from temperate species moving north
- increased predation risk in some regions
- food web changes (lipids "fat"…energy storage)
- increased disease risk (+ parasites etc, MME)
- increased human "traffic" & development
- **habitat change** (loss for ice-associated species)
- combined effects …….increased productivity



Svalbard – ringed seals

2006 sea ice «collapse», glaciers melting/retracting & polar cod declining



Lydersen et al. 2014. The importance of tidewater glaciers for marine mammals and seabirds in Svalbard, Norway. Journal of Marine Systems 129: 452-471.

Arctic desert (little snow)

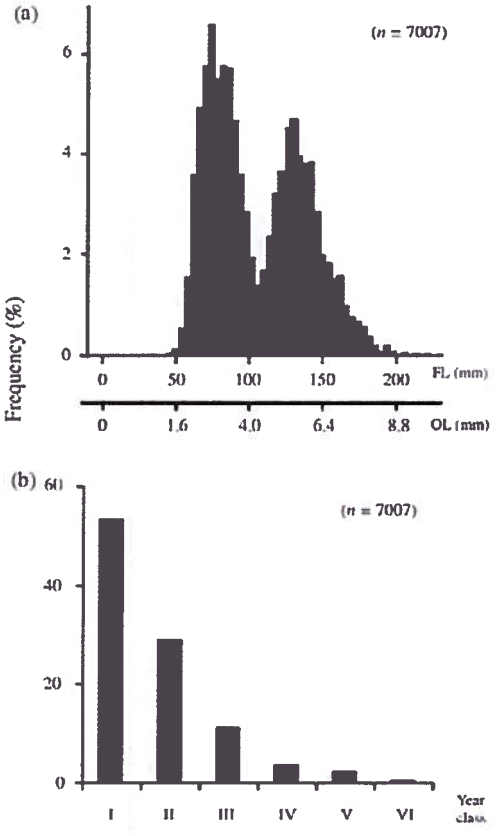


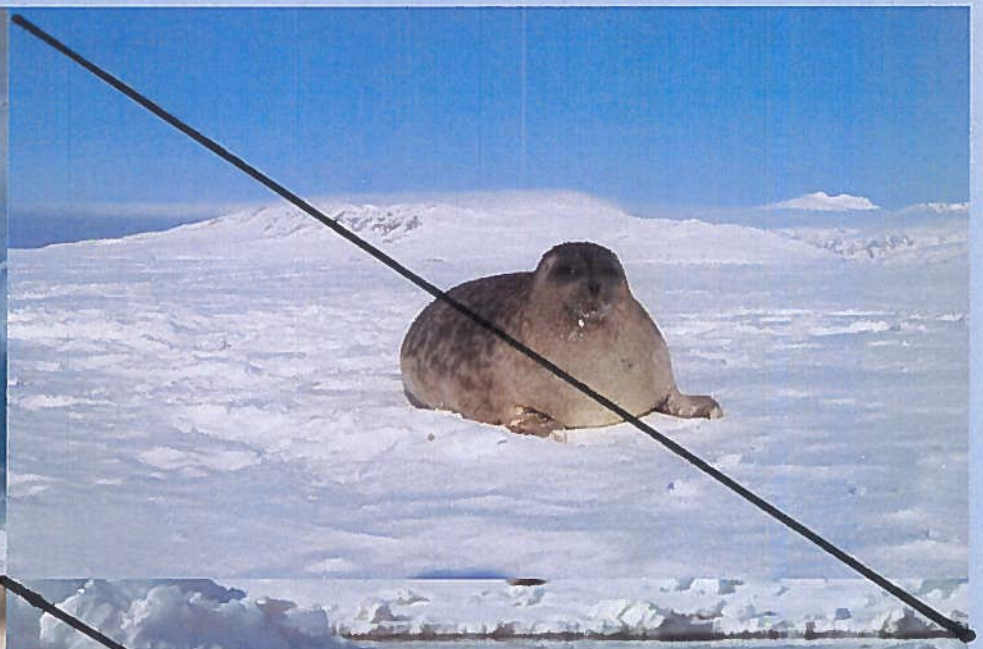
Figure 4. Frequency distributions of polar cod found in the GITs of 141 ringed seals from Spitsbergen, Svalbard by (a) fish length (FL) with corresponding otolith length (OL) and (b) year class.

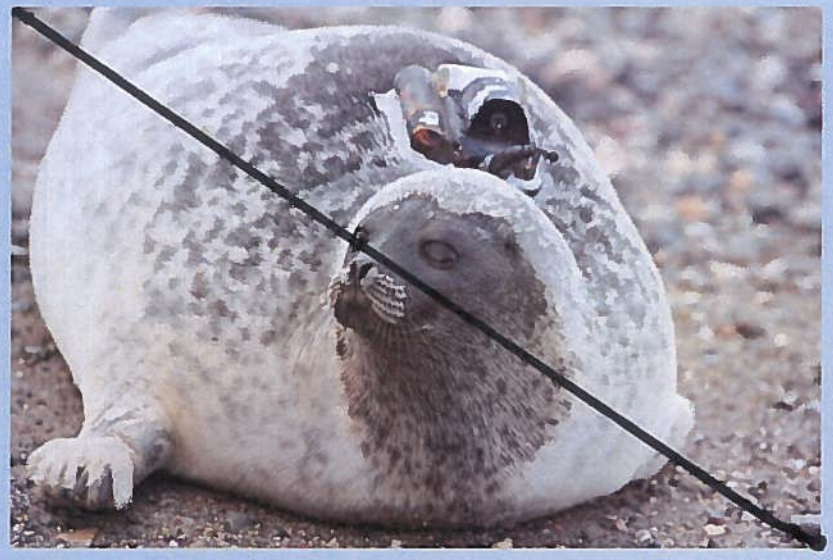
Ringed seal diet 75% polar cod!

Mostly year classes 1 and 2 (sympagic)

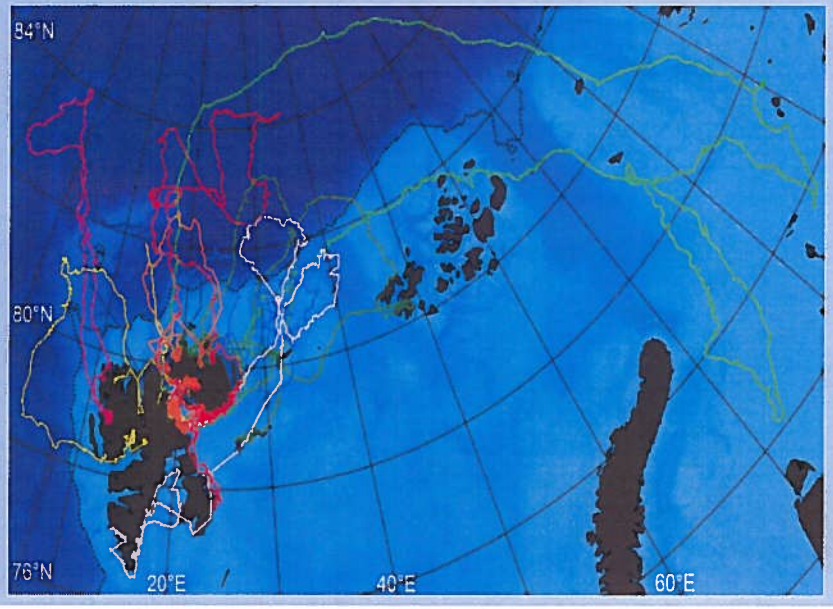
Labansen, A.L., Lydersen, C., Haug, T. and Kovacs, K.M. 2007. ICES Journal of Marine Science 64: 1246-1256.

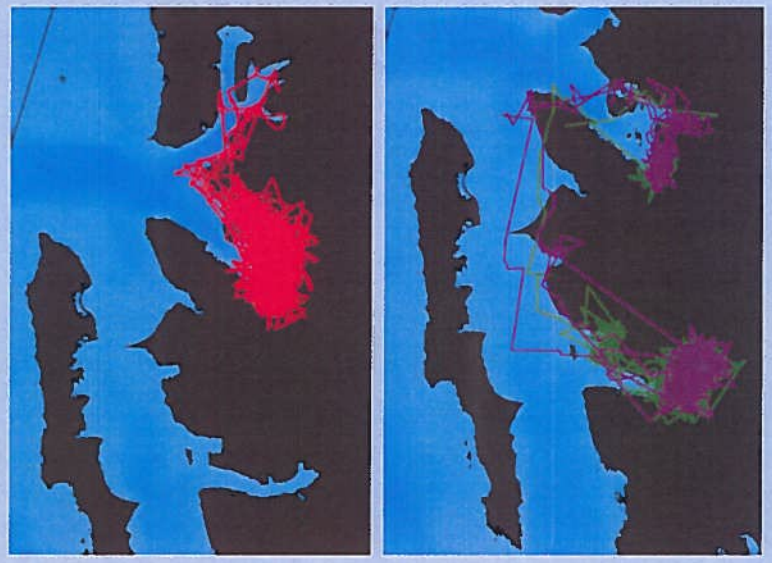
Bengtsson, O., Lydersen, C., Kovacs, K.M. and Lindström, U. 2020. Polar Biology 43:773–788.

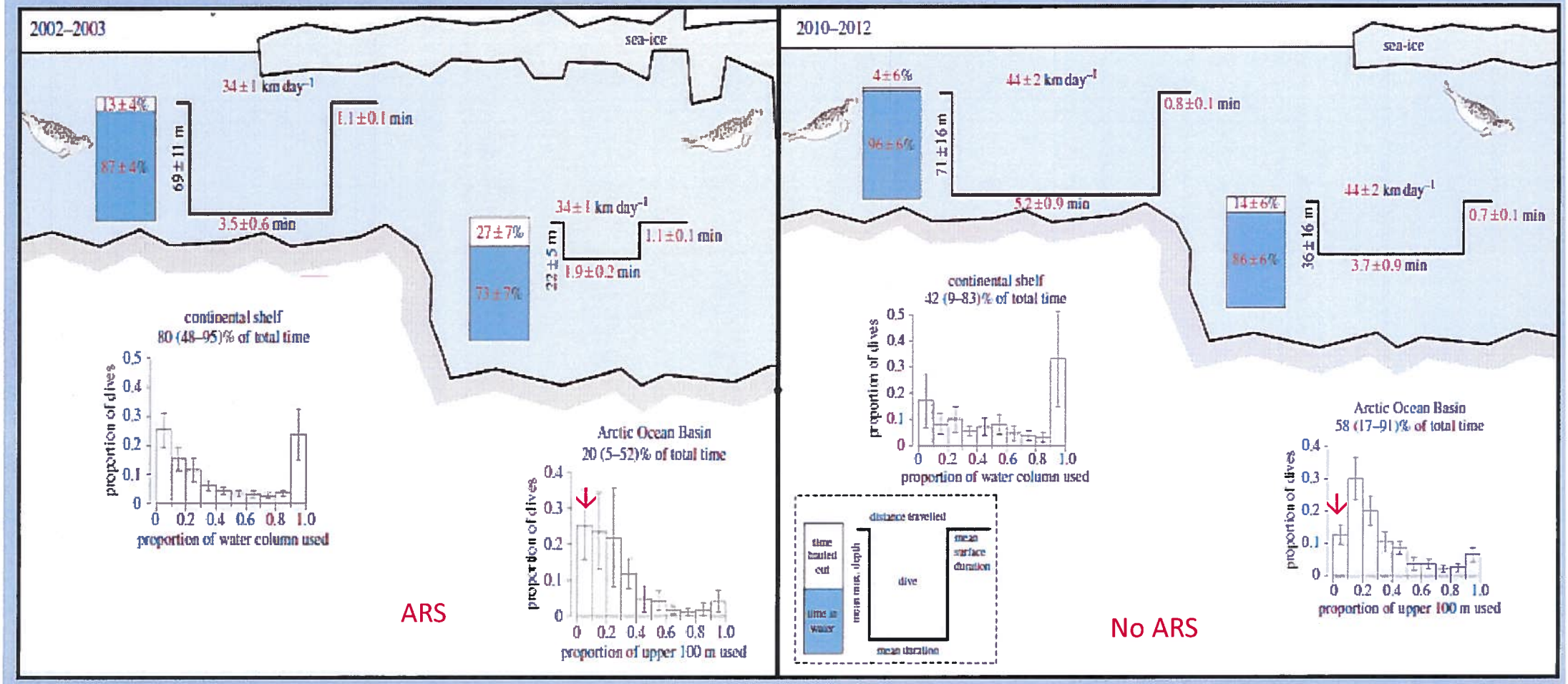




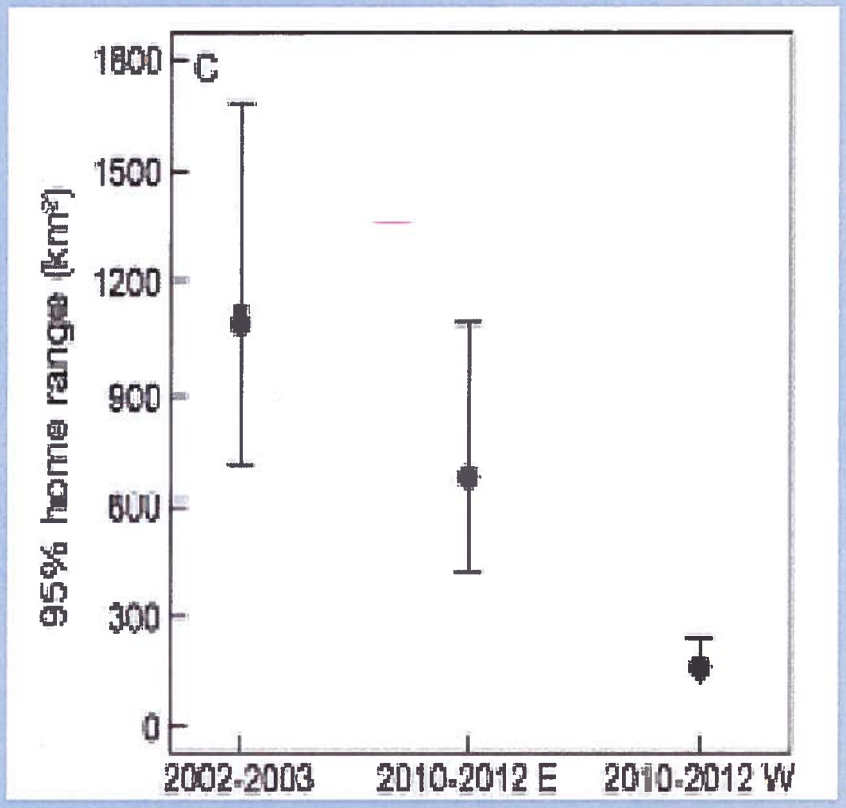
80°
78°N


84°N
80°N
76°N
20°E
40°E
60°E

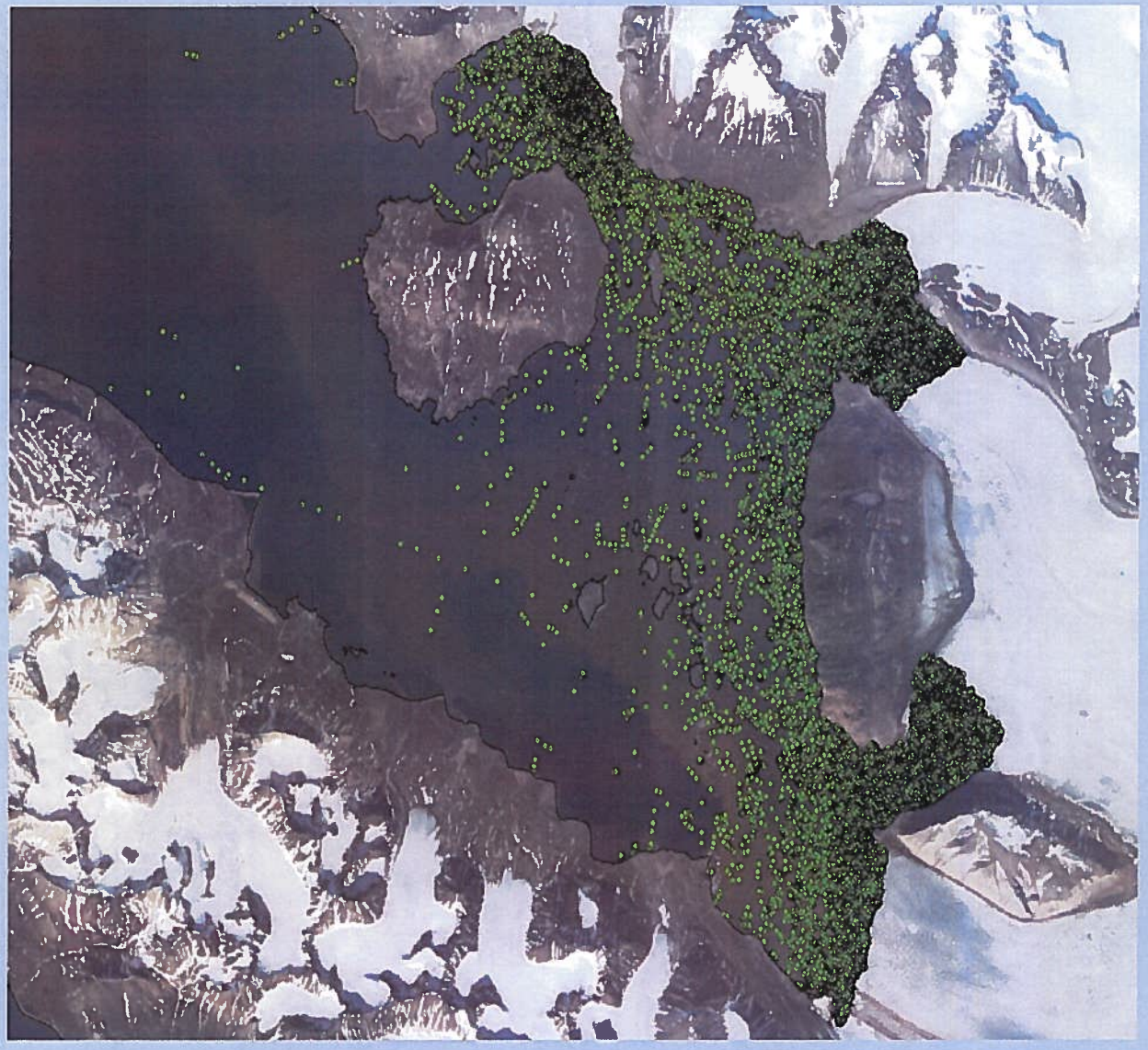




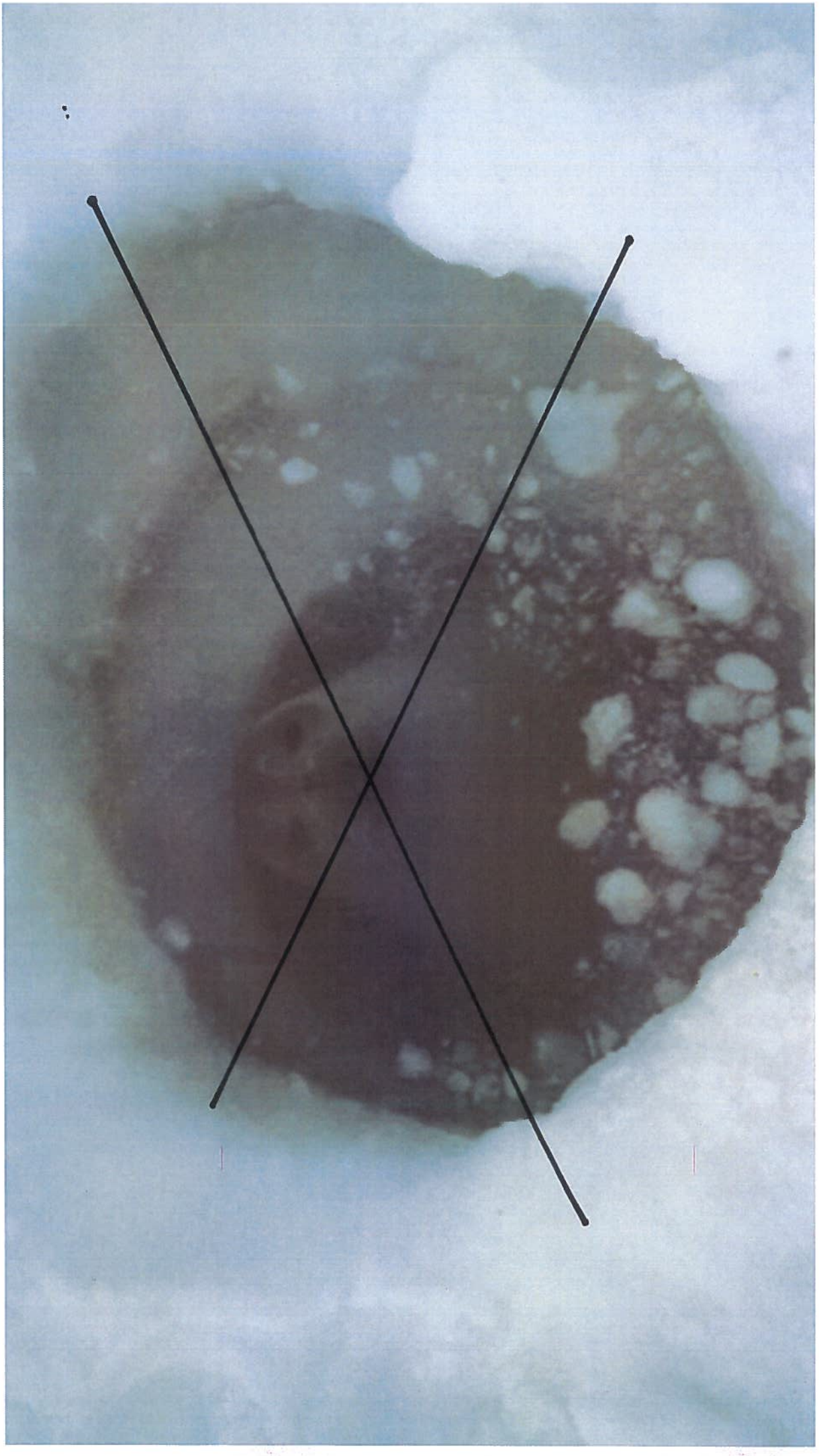
Hamilton, C.D., Lydersen, C., Ims, R.A. and Kovacs, K.M. 2015. Predictions replaced by facts in a changing Arctic: a keystone species' responses to declining sea ice. Biology Letters 11: 20150803.

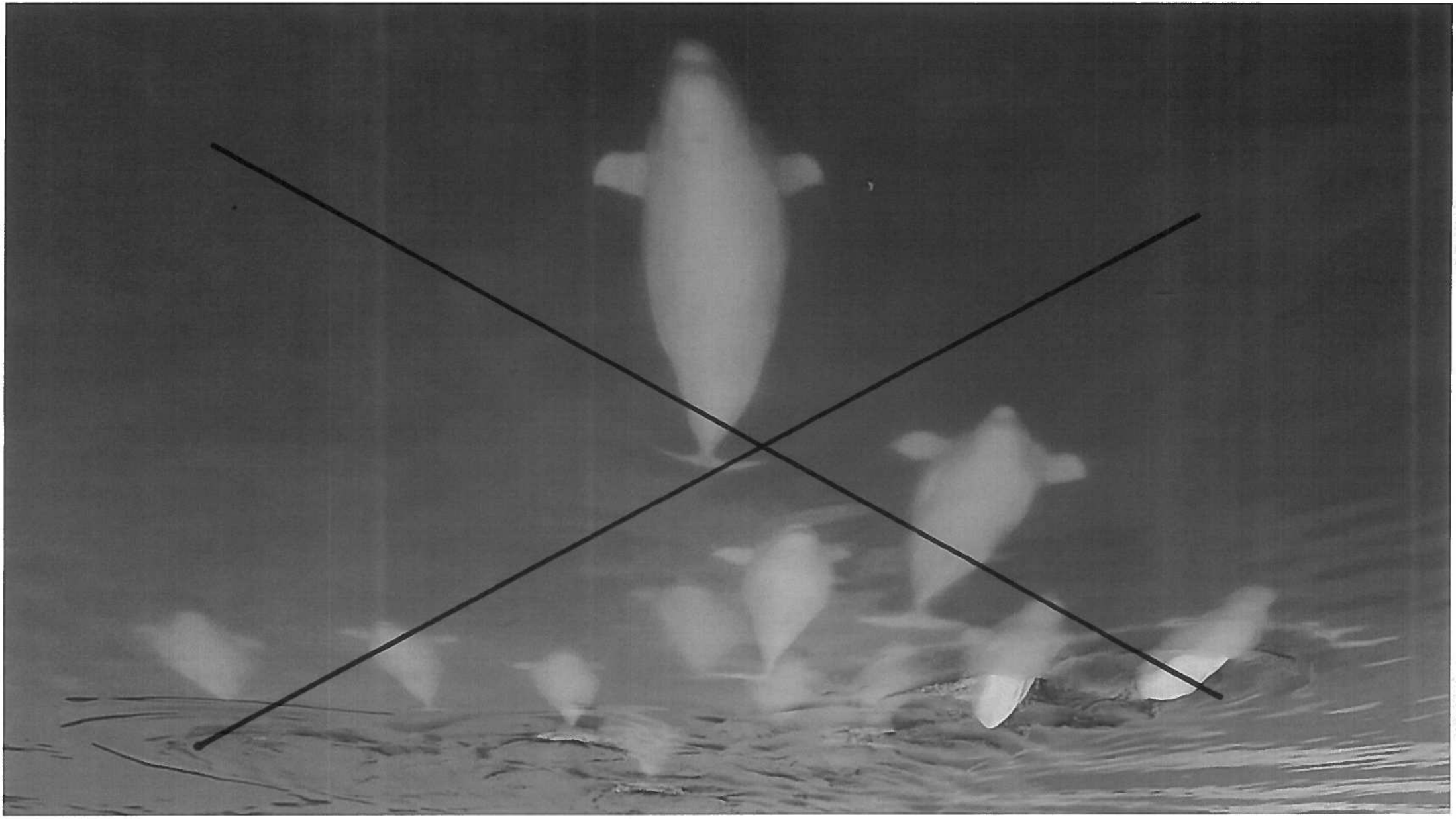


Hamilton, C.D., Lydersen, C., Ims, R.A., and Kovacs, K.M. 2016. Coastal habitat use by ringed seals Pusa hispida following a regional sea-ice collapse: importance of glacial refugia in a changing Arctic. Marine Ecology Progress Series 545: 261–277.



Lydersen, C., Vacquie-Garcia, J., Lydersen, E., Christensen, G.N. and Kovacs, K.M. 2017. Terrestrial haul-out by ringed seals (Pusa hispida), with harbour seal (Phoca vitulina) in Svalbard. Polar Research 36, 1374124.

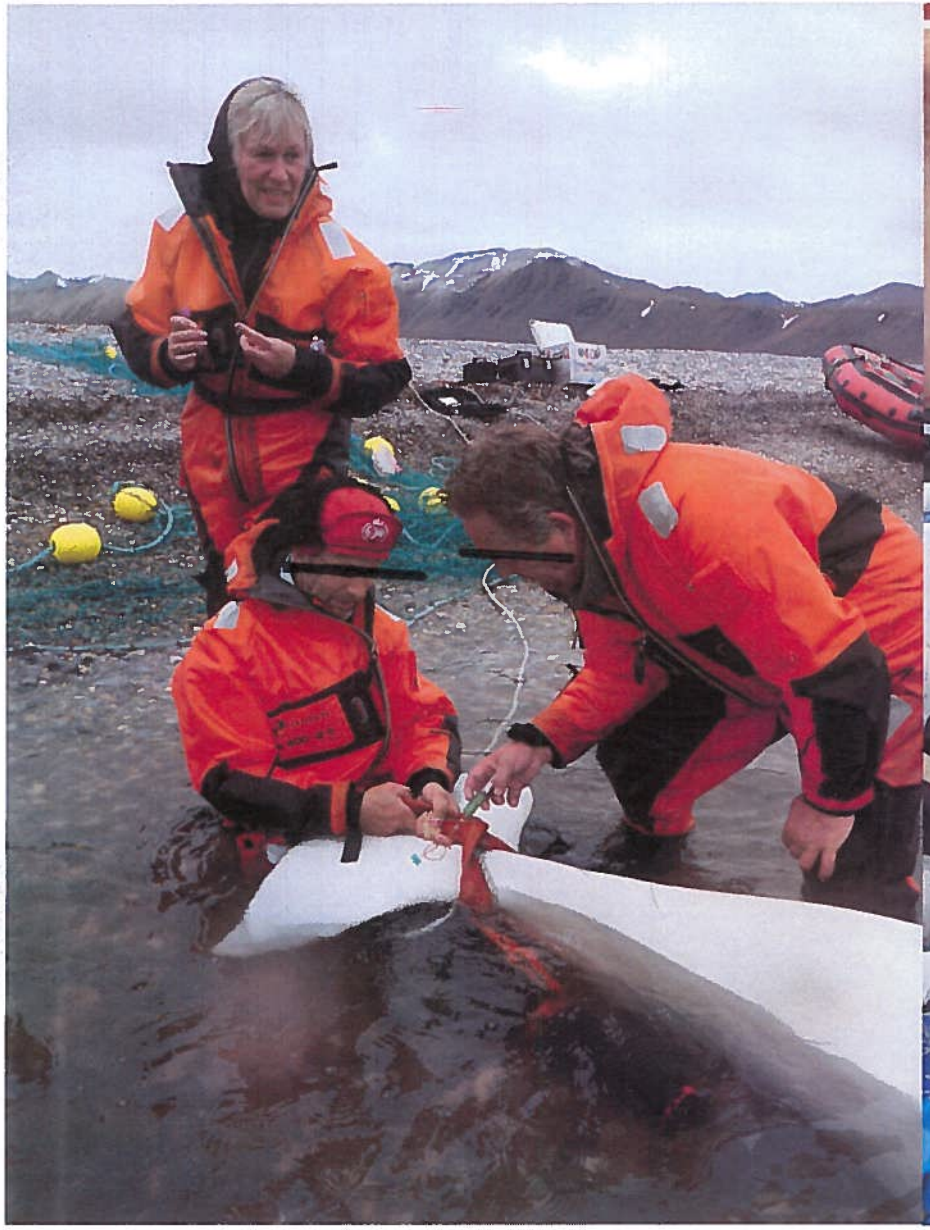


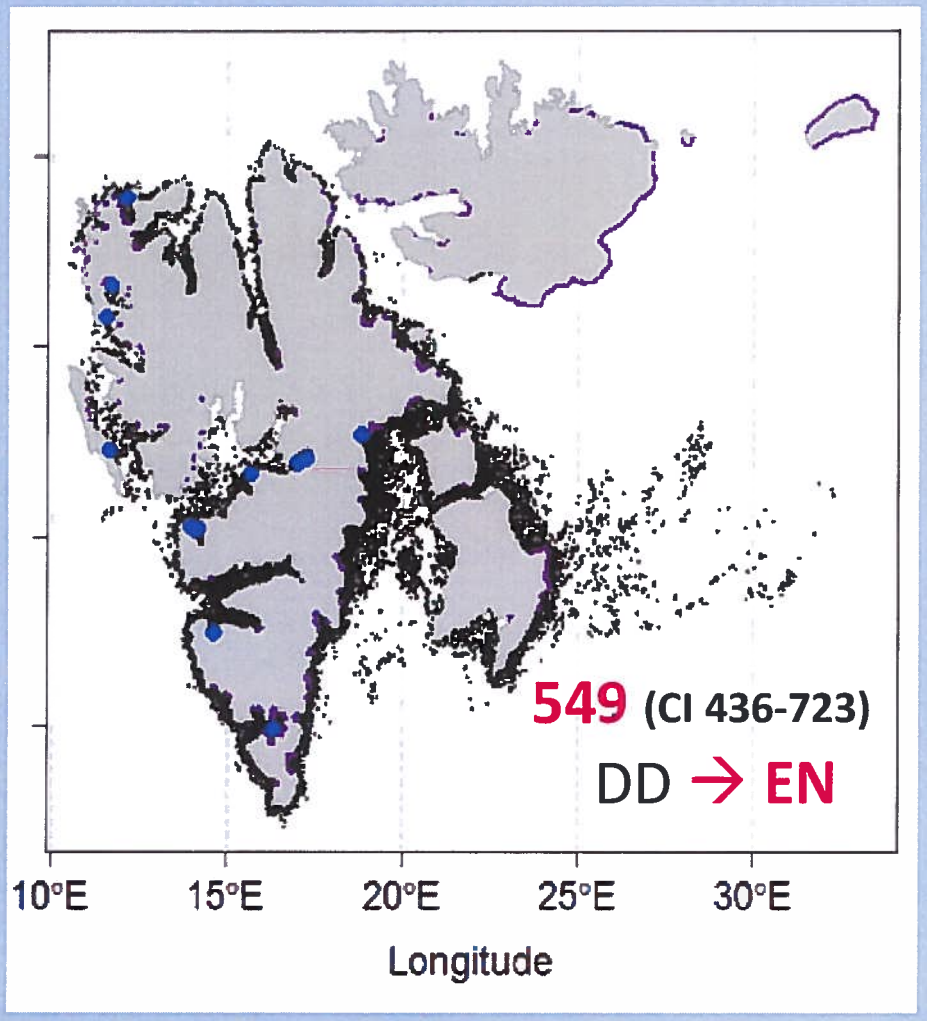


STATUS - Overharvested

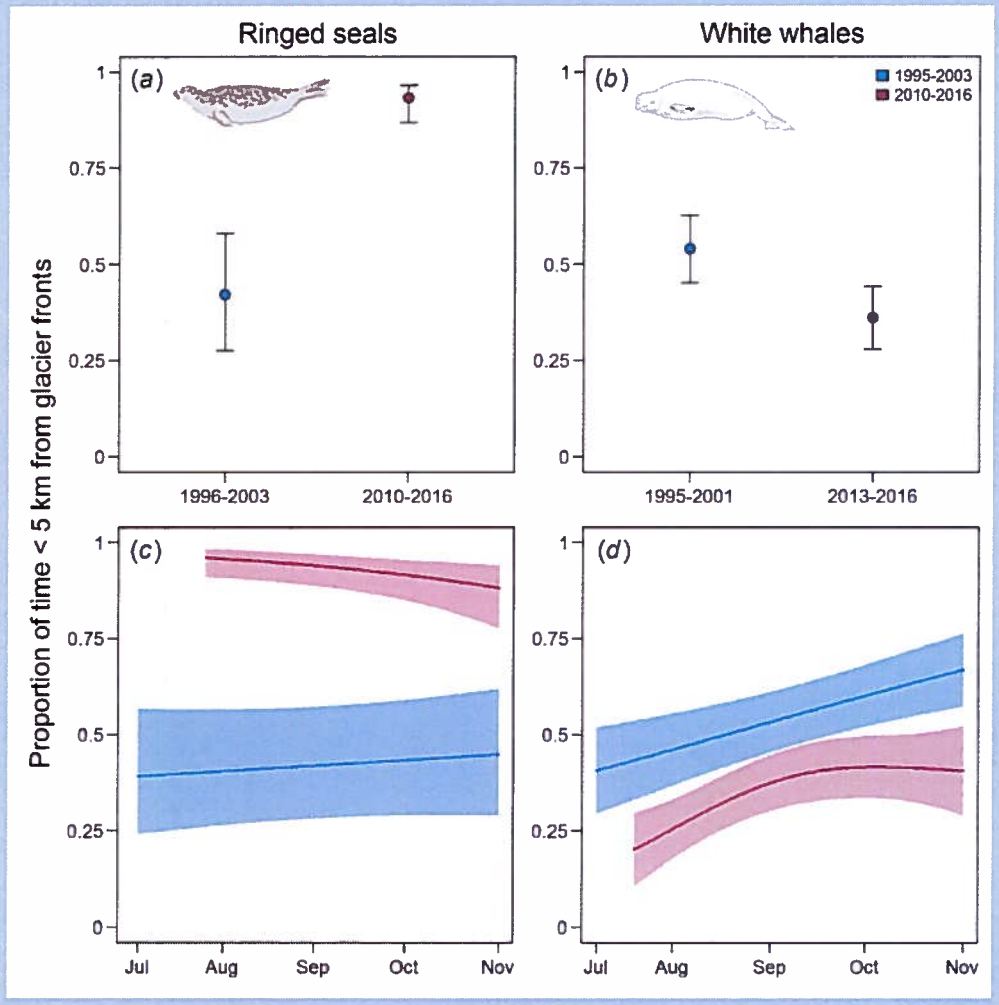
1) Russian harvests in the 18th and 19th centuries (post the Great Whaling period - in combination with trapping – in the thousands (no good records)
2) Norwegian whaling 1866 – 1921 – over 10,000 ….
3) 1945-1960 Norwegian whaling resumed - at least some thousands taken (seine nets and dynamite)

…. "economic" extinction occurred, followed by PROTECTION - dramatically reduced, population described in the 1960s as "insignificant" compared to 1800s…

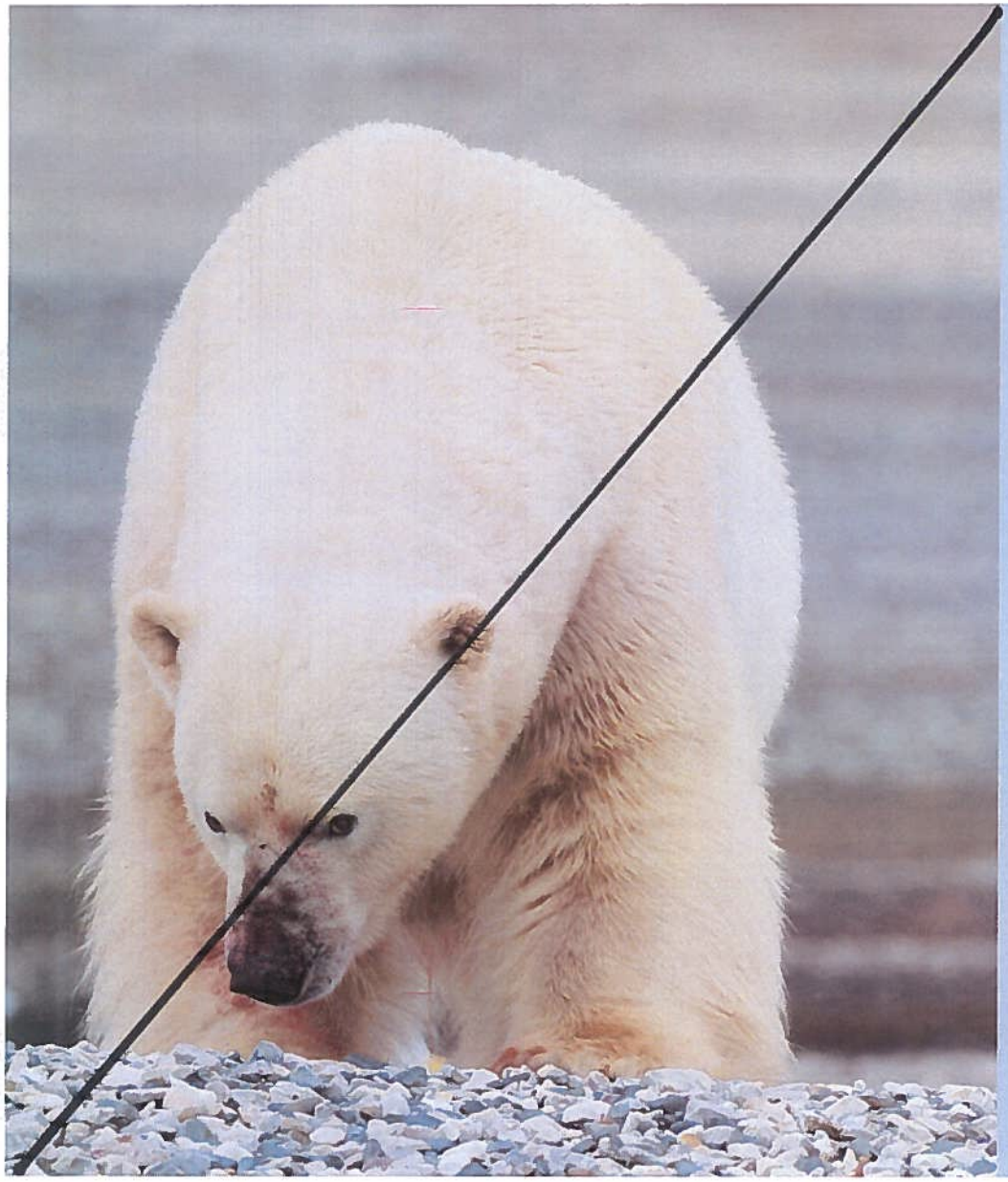




Vacquie-Garcia, Lydersen, C., Ims, R.A. and Kovacs, K.M. 2018. Habitats and movement patterns of white whales Delphinapterus leucas in Svalbard, Norway in a changing climate. Movement Ecology 6: 21.



Hamilton, C.D., Vacquié-Garcia, J., Kovacs, K.M., Ims, R.A., Kohler, J. and Lydersen, C. 201x. Contrasting responses to climate change by two Arctic marine mammal species. Biology Letters.



Climate change's "poster child"

Arctic symbol….

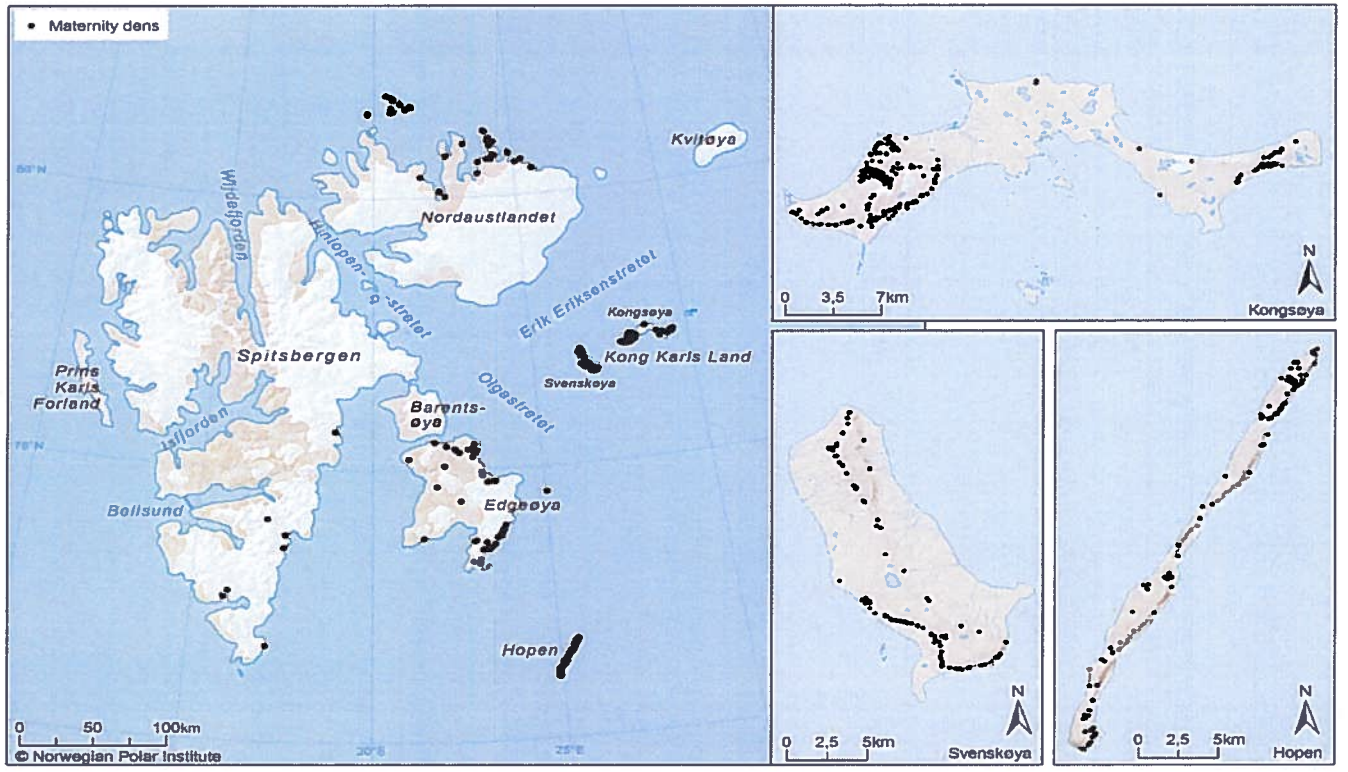
Apex predator
(top-down control)

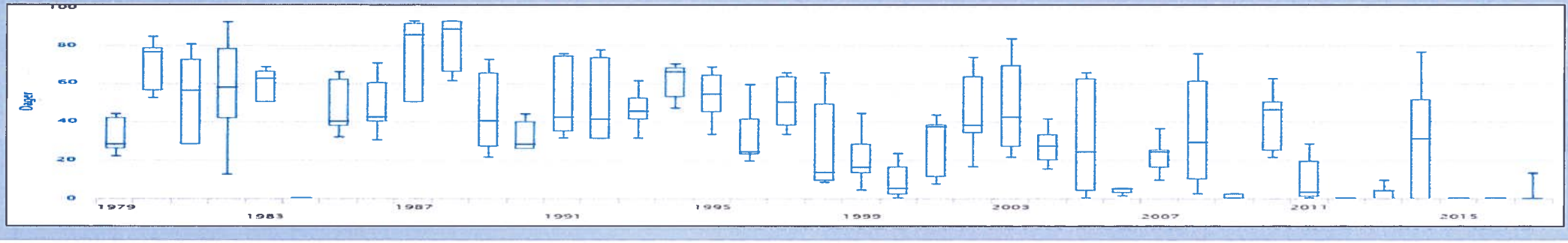
Sea ice dependent…
("corridor", **ice-seals**)

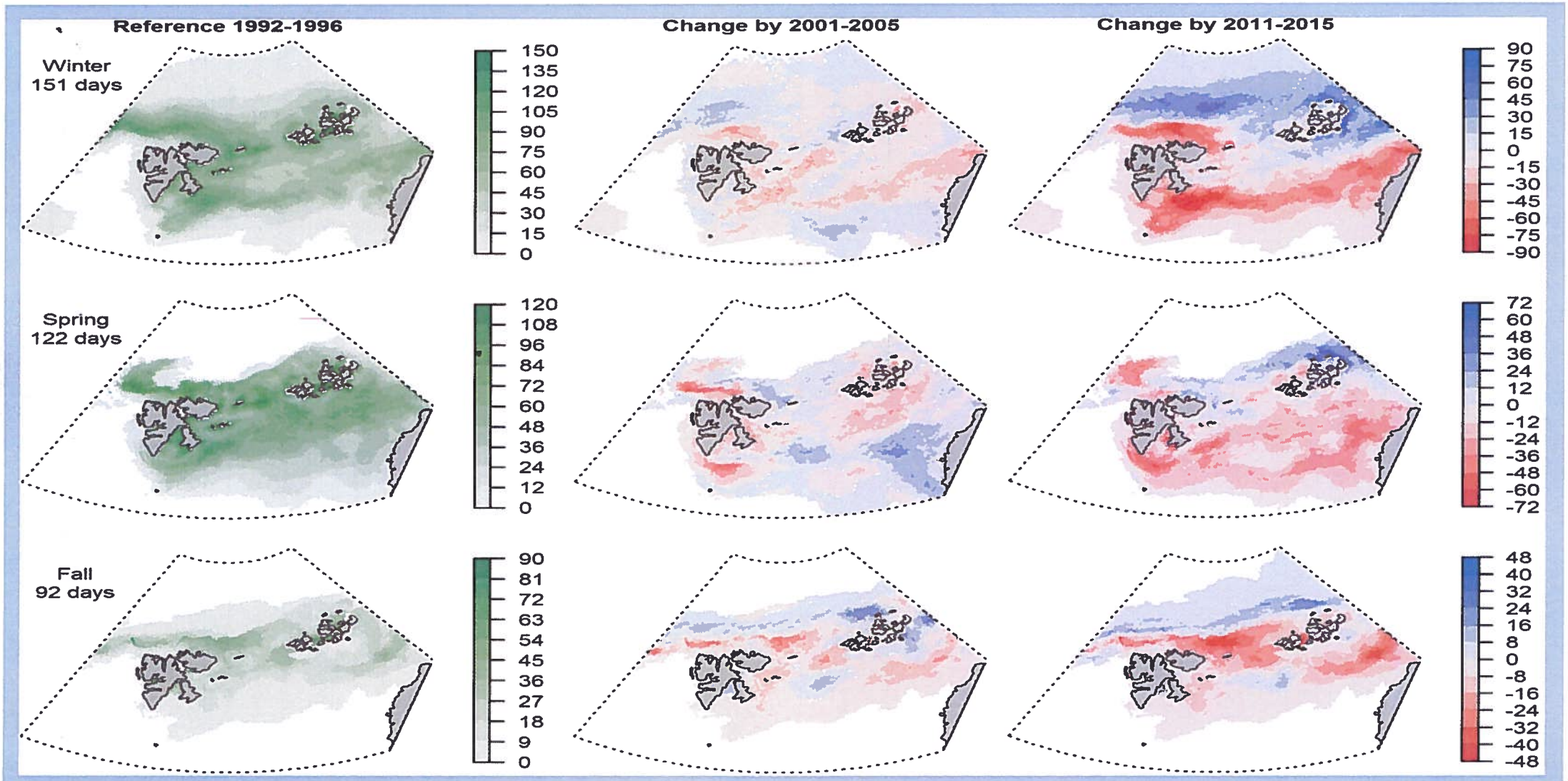
Habitat degradation ≈climate change

Maternity denning sites shifting (many traditional sites no longer in use)

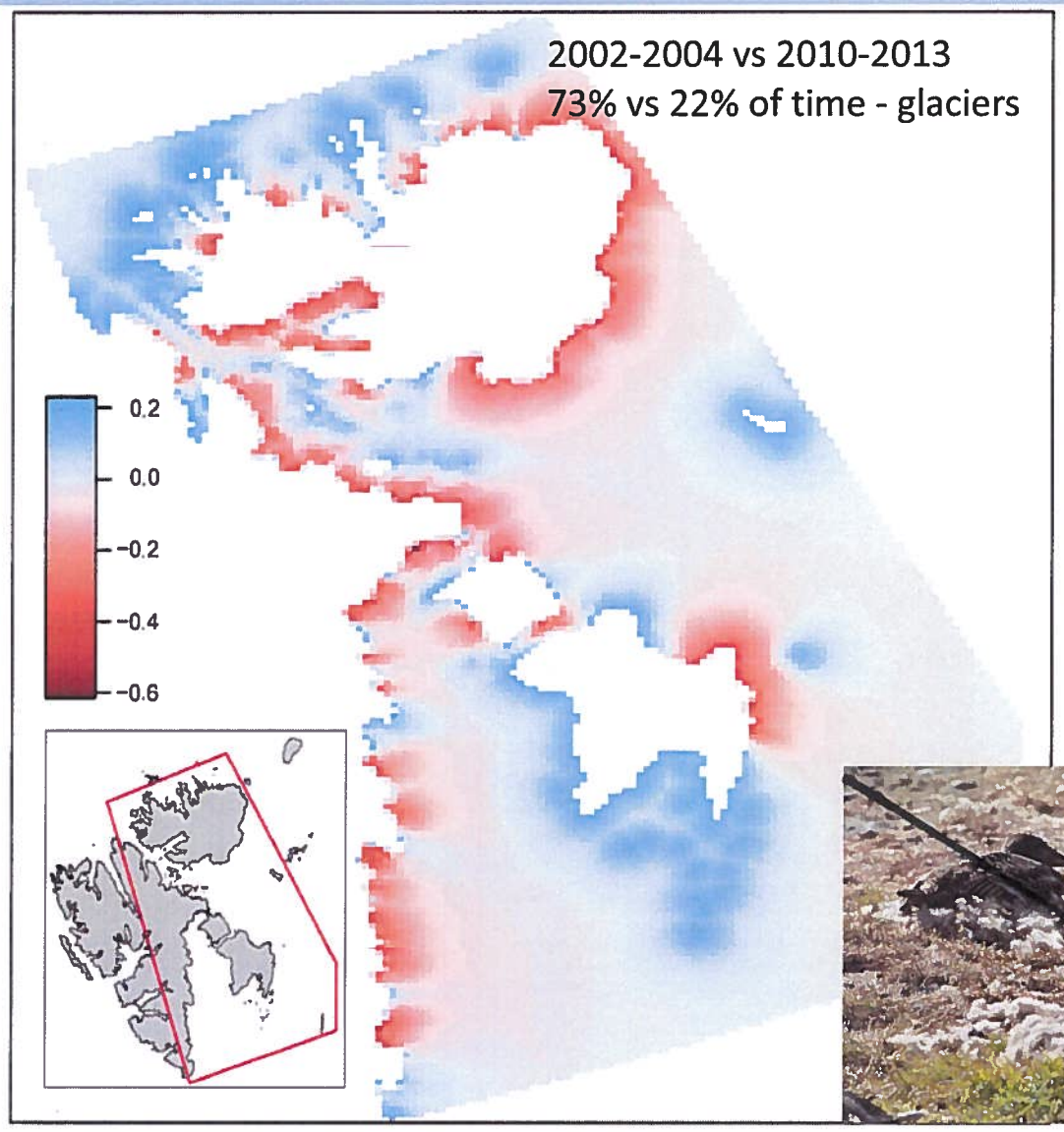
Jon Aars & Magnus Andersen (NPI)







Lone, K., Merkel, B., Lydersen, C., Kovacs, K.M. and Aars, J. 2018. Sea ice ***resource selection models*** *for polar bears in the Barents Sea subpopulation. Ecography 1(4): 567-578.*



An Arctic predator-prey system "decoupling"

Spring – normal overlap between ringed seals and polar bears.....

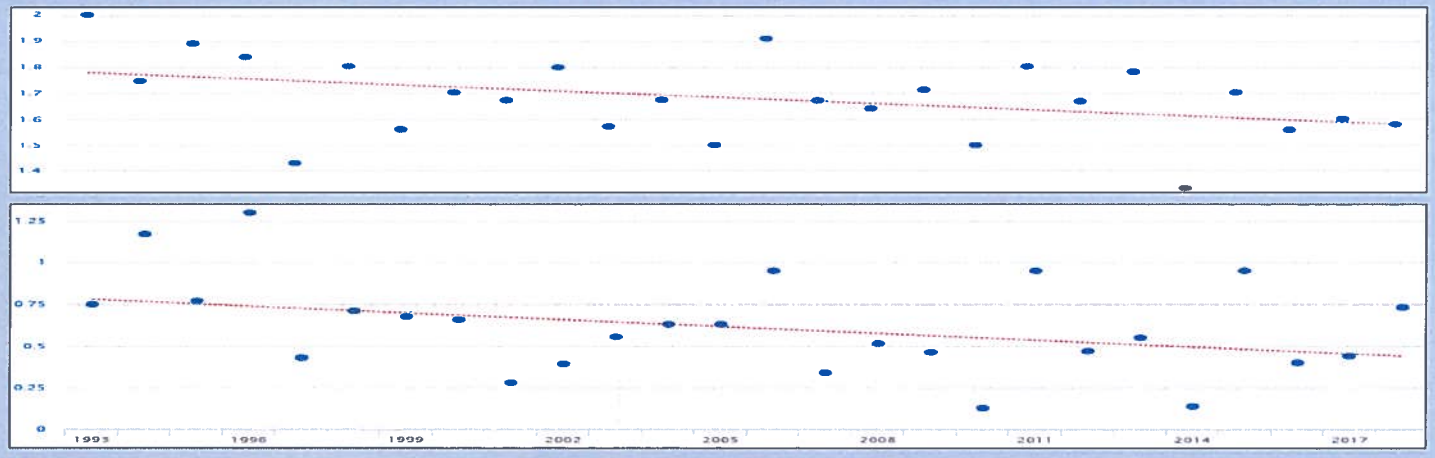
Summer – (female) polar bears spatial patterns have change - using other food

- ground nesting bird colonies++++

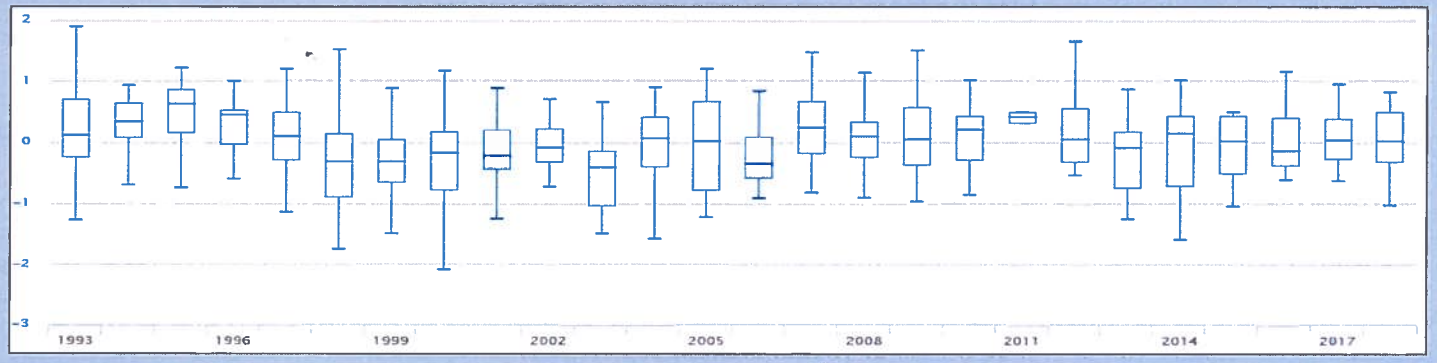
Hamilton, C.D, Kovacs, K.M., Ims, R.A., Aars, J. and Lydersen, C. 2017. An Arctic predator-prey system in flux: climate change impacts on space use by polar bears and ringed seals. Journal of Animal Ecology 86:1054–1064.

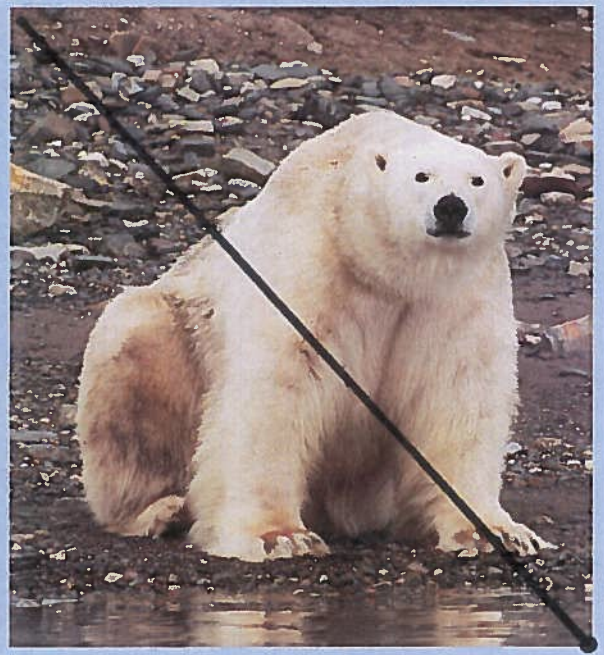
Reproduction

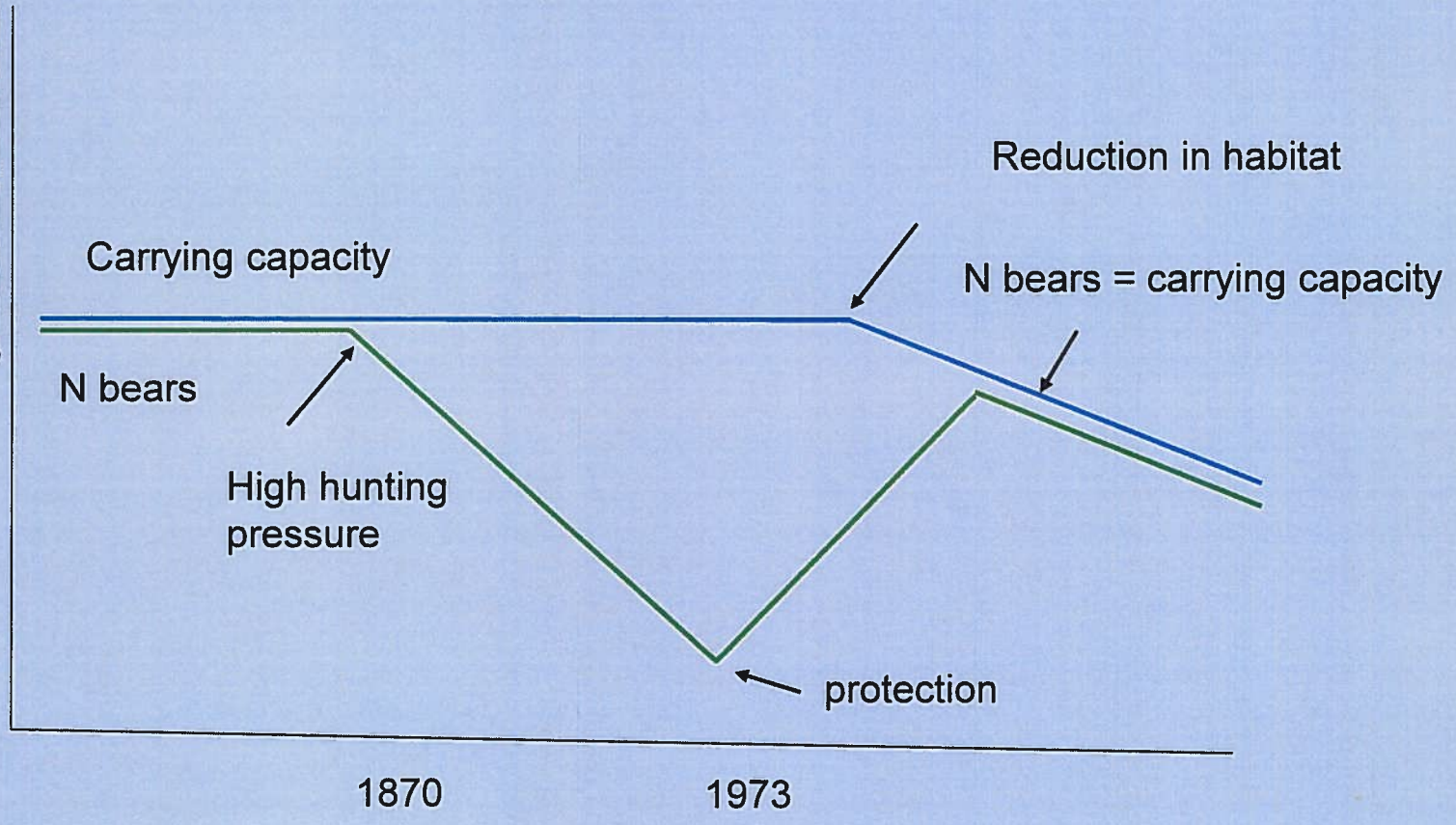
Slight drop in the number of adult females accompanied by first year cubs (top) and one year olds (bottom) – but no statistically significant trends

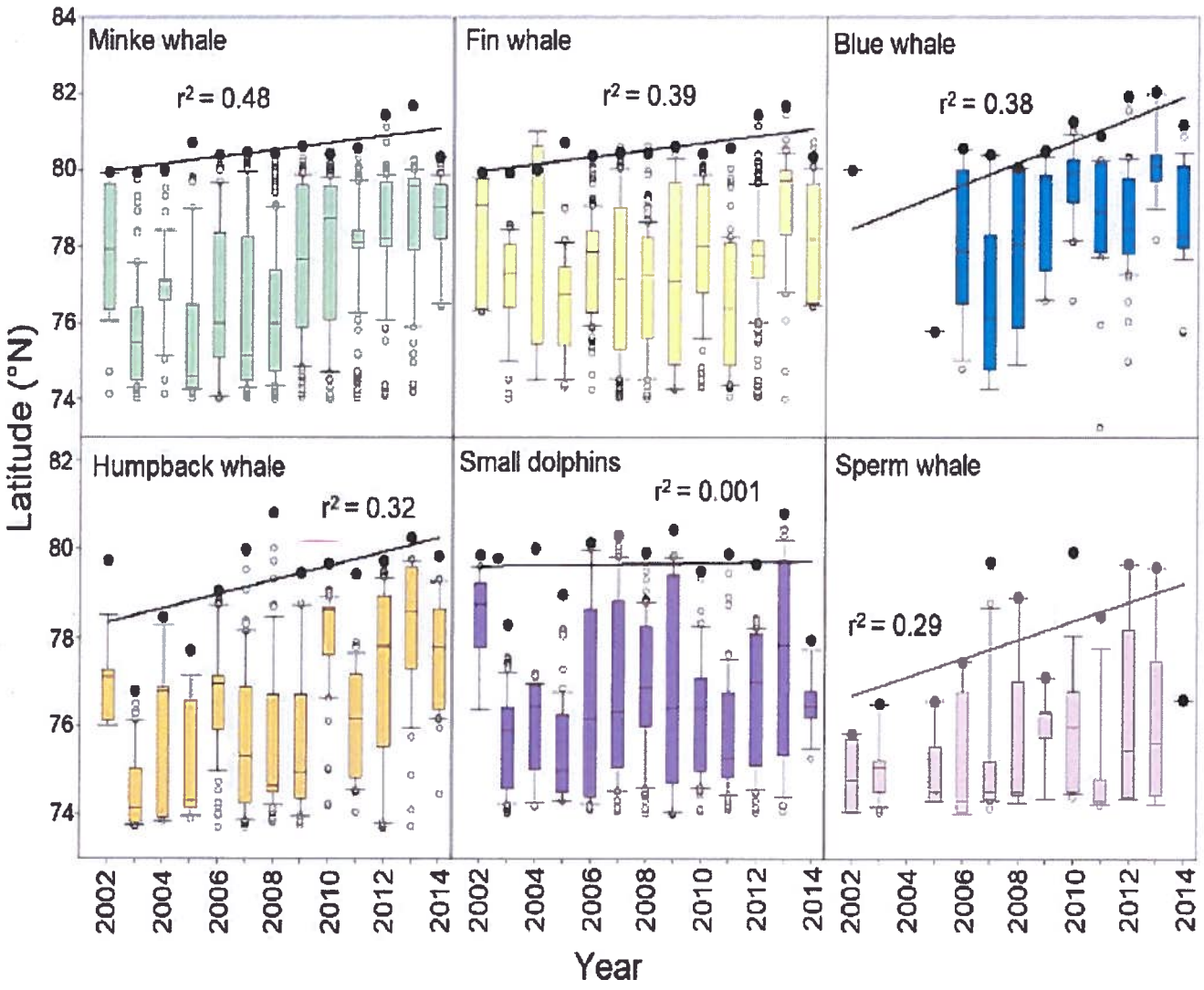


Condition (body fatness - males) & 5-20 year olds 95% + survivorship…



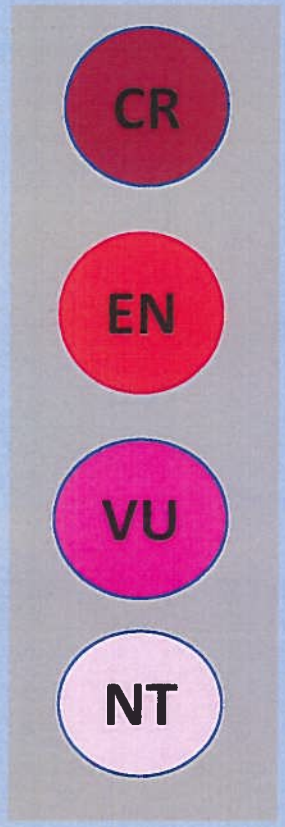



Reduction in habitat
Carrying capacity
N bears = carrying capacity
N bears
High hunting pressure
protection
1870
1973



Storrie, L., Lydersen, C., Andersen, M., Wynn, R.B., and Kovacs, K.M. 2018. Determining the species assemblage and habitat use of cetaceans in the Svalbard Archipelago, based on recorded observations from 2002-2014. Polar Research 37: 1463065.

Rødliste



Norway is a rich country with amazing nature. Conservation and rational use of all endemic species is our responsibility.

We need to:

- monitor status and **respond when threats arise** (**RED LIST**)
- create recovery plans for all Red Listed species/populations
- act upon well-reasoned management plans (with determination) to ensure recovery e.g. sustainable harvest

For Arctic endemic marine mammals – the time is now.....

Thanks for your time/attention