



IPY-ARCTIC PREDATORS

Arctic foxes on Svalbard





Photo: Jason Roberts

Eva Fuglei,
Norwegian Polar Institute

International IPY conference - Salekhard, Russia, 21-25 April 2008



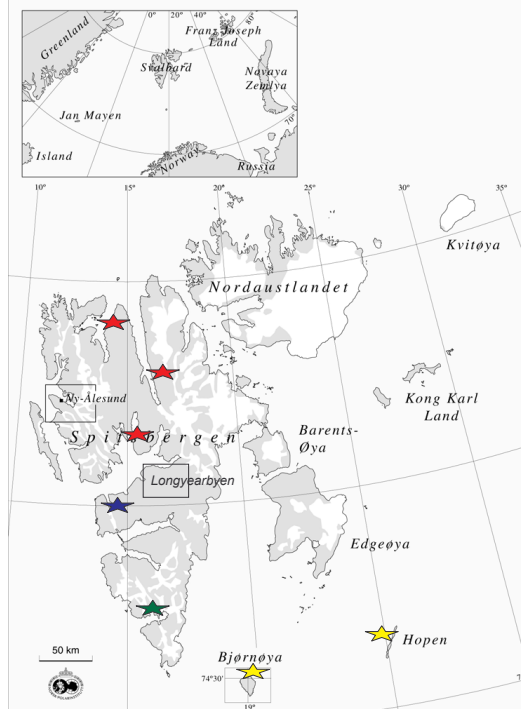



Svalbard
Archipelago
78°9' N, 11°8' E

Ny-Ålesund

Longyearbyen

- ★ Trapping stations
- ★ Barentsburg, Russia
- ★ Hornsund, Polish
- ★ Meteorological stations





Coastal foxes
(no lemmings)



Lemming foxes
(lemmings)

Stable populations

Cyclic populations

Canadian arctic

Age first reproduction:
2-4 years

Age first reproduction:
1 year

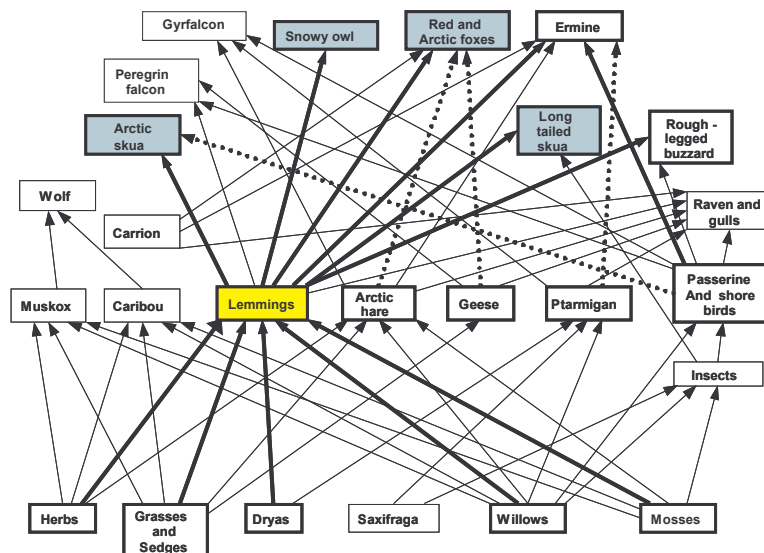
Number of pups: 5.6 (2-11)

Number of pups: 8.6 (0-19)

social groups - helpers: no?

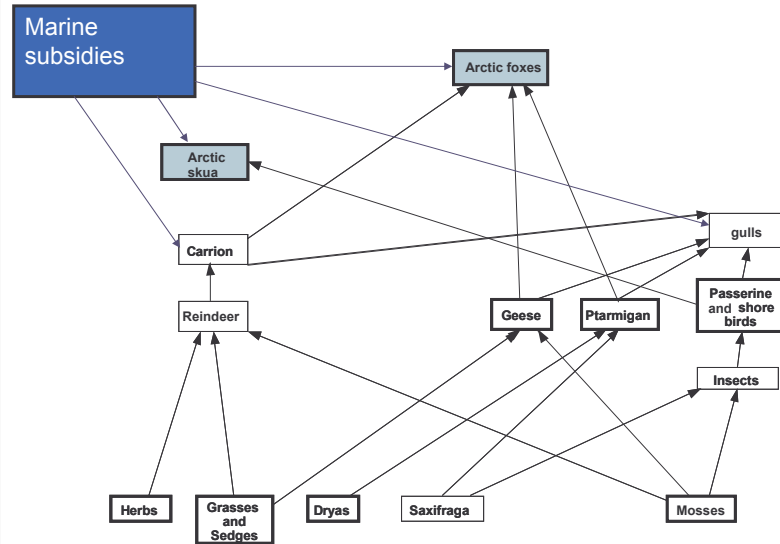
Social groups - helpers: yes

Complex arctic food web structure, terrestrial



Modified from Krebs et al. 2003

Svalbard: simple arctic food web structure



Food items

Marine and terrestrial food web, generalists, predictable and stable food supply.



Photo Jasper Doest

Food availability is more restricted during autumn and winter than during spring and summer when they breed

Spring, summer: ring seal pup, marine carcasses, seabirds, geese, bird eggs, ptarmigan and reindeer carcasses

Prestrud 1992, Frafjord 1993, Eide et al. 2005

Food continues....

Spring

Ringed seal pup killed by an arctic fox

From a study in Kongsfjorden (Ny-Ålesund) in 1986. Foxes had dug into 46% of the seal birth lairs and 18% of the seal pups were killed

Smith and Lydersen 1991

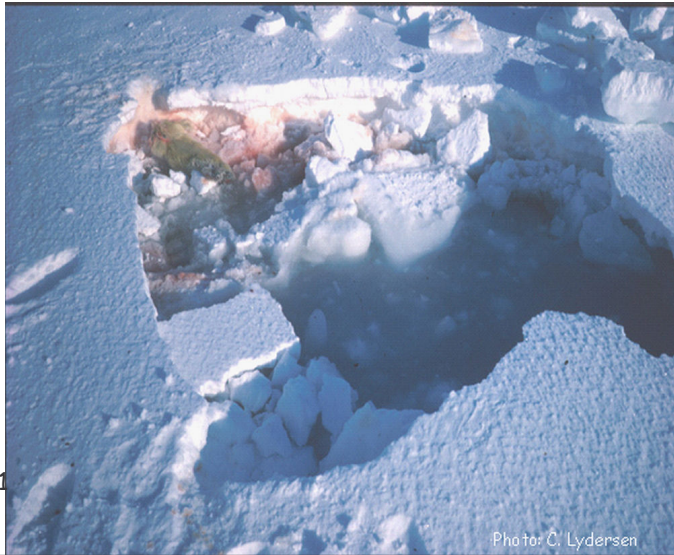


Photo: C. Lydersen

Photo: Norbert Rosing, National Geographic



Food continues....

Winter: rock ptarmigan, stored food gathered and cached during summer, carcasses of seals and reindeer, seals killed by polar bears

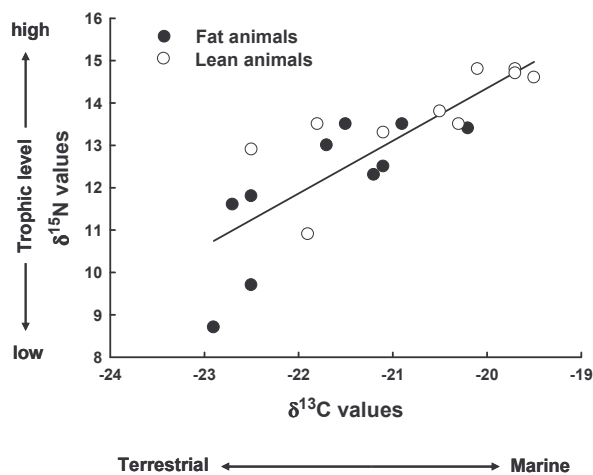


Foto: Henning Thing DP

Prestrud 1992, Frafjord 1993

Stable isotopes

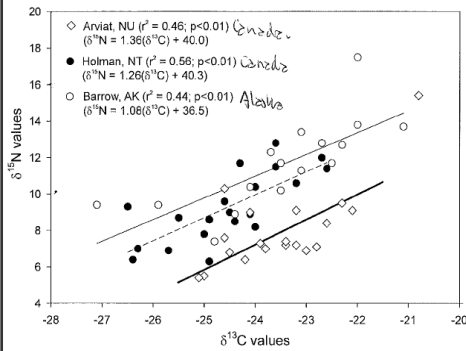
Linear relationship between stable carbon ($\delta^{13}\text{C}$) and nitrogen ($\delta^{15}\text{N}$) isotopes in muscle from arctic foxes in Svalbard



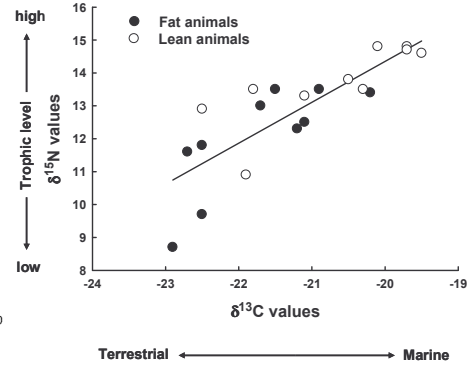
Fuglei et al. 2007

Stable isotope continues....

The relationship between stable carbon and nitrogen isotopes in arctic foxes from the Alaskan (Barrow) and Canadian (Holman and Arviat) Arctic and from Svalbard

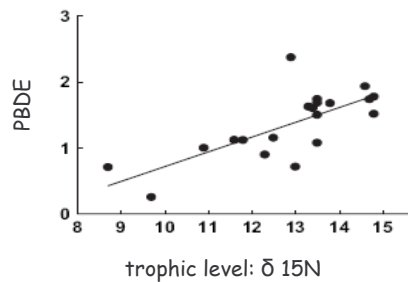


Hoekstra et al. 2003

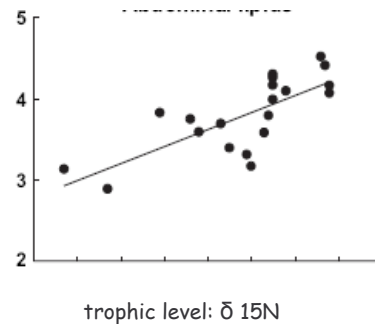


Fuglei et al. 2007

The relationship between concentrations of the sum of polychlorinated biphenyls (PCB) and sum of polybrominated diphenyl ethers (PBDE) and feeding ecology (trophic level: $\delta^{15}\text{N}$) in the arctic fox in Svalbard



PCB



Fuglei et al. 2007

Life history parameters

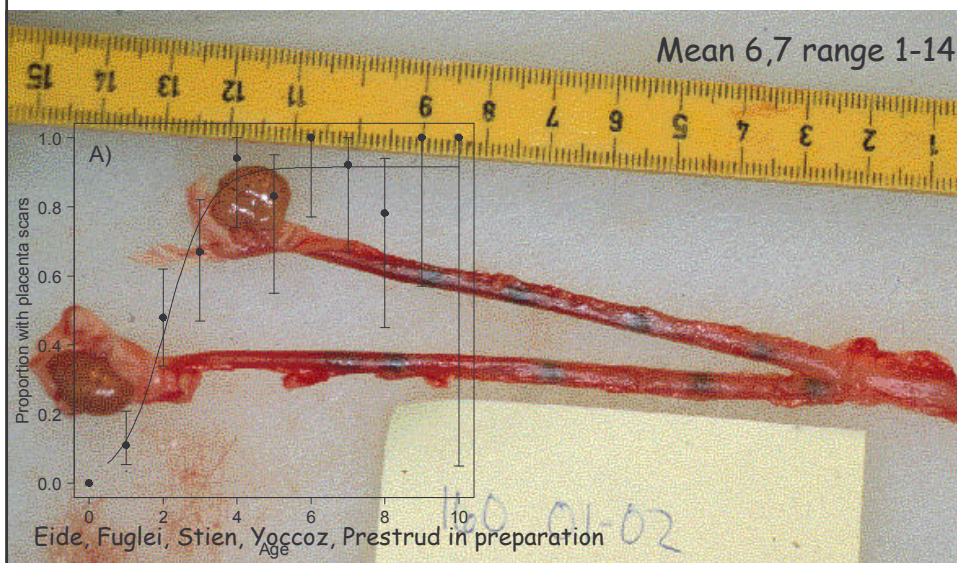
Litter size at birth: mean 6.3, range 2-11 (Prestrud 1992, Frafjord 1993, Eide, Fuglei, Stien, Yoccoz, Prestrud in preparation)



Life history parameters continue.....

Placental scars in the uterus from arctic fox carcasses

(Prestrud 1992; Fuglei unpublished)



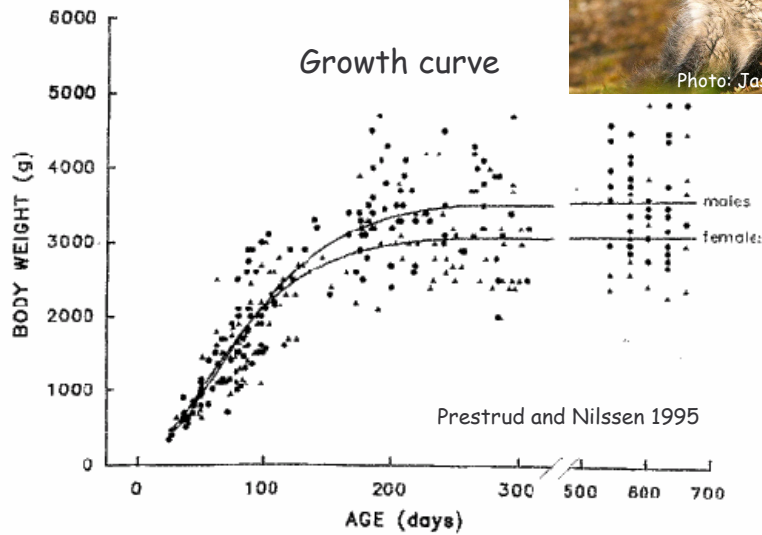
Life history parameters continue.....

Body weight at birth (1. May-5. June):

50-60 g (Prestrud and Nilssen 1995)



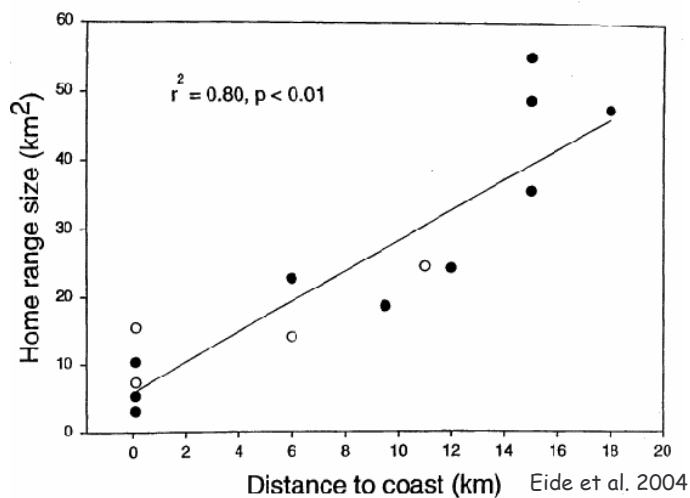
Photo: Jasper Doest



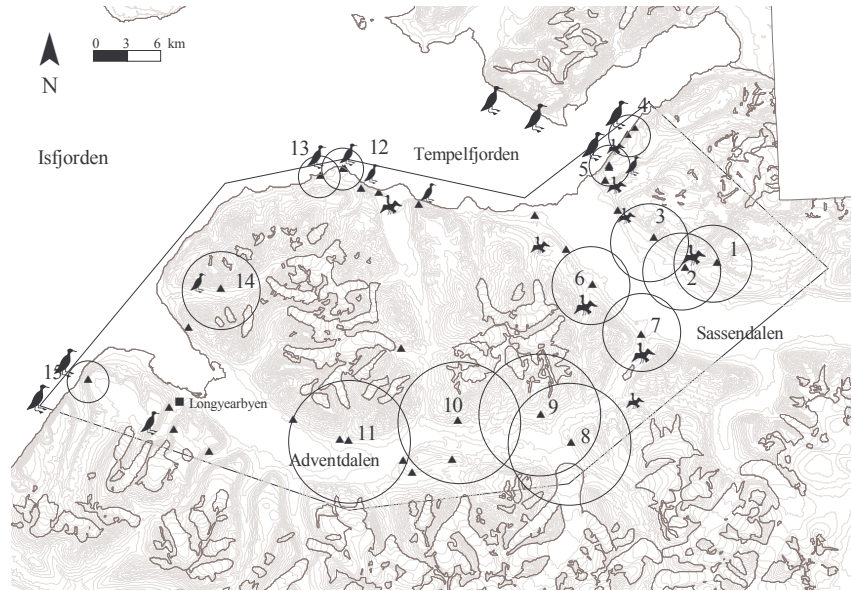
Territories and recourses

Territorial in the breeding season (home range size coast 3 km², inland 60 km²) (Frafjord and Prestrud 1992; Eide et al. 2004;)

Home range size increase from coast to inland



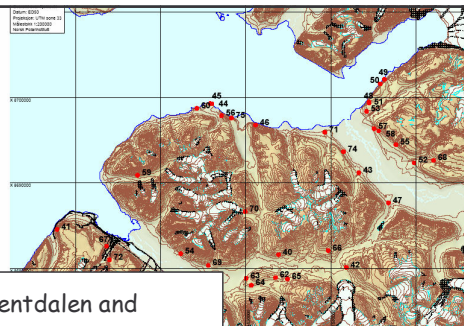
Arctic fox breeding dens with calculated summer home ranges varying in size according to the resource area from coast (3 km²) to inland (60 km²)



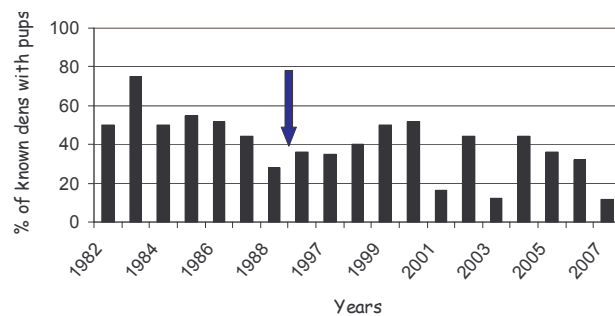
Eide et al. 2005

Annual den monitoring

Adventdalen/Sassendalen
(900 km²)

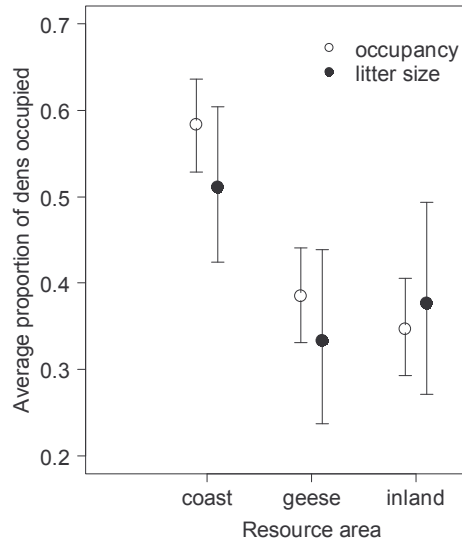


% of natal dens with pups in Adventdalen and Sassendalen



Prestrud 1992,
Eide, Fuglei, Stien,
Yoccoz, Prestrud in
prep.,
Fuglei, unpublished

Den monitoring continue.....



Coastal dens were more frequently used than dens in the inland and by goose colonies

Coastal dens also tended to have slightly larger litters than the other two resource areas

Eide, Fuglei, Stien, Yoccoz, Prestrud in prep

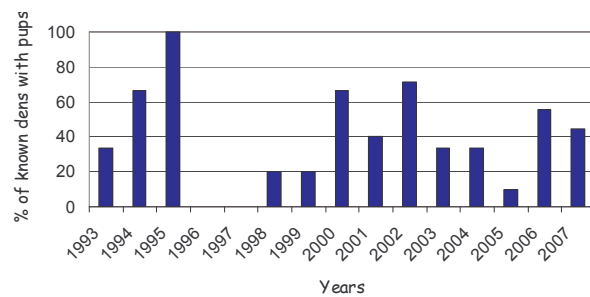
Den monitoring continue.....

Brøggerhalvøya/Kongsfjorden (220 km²)

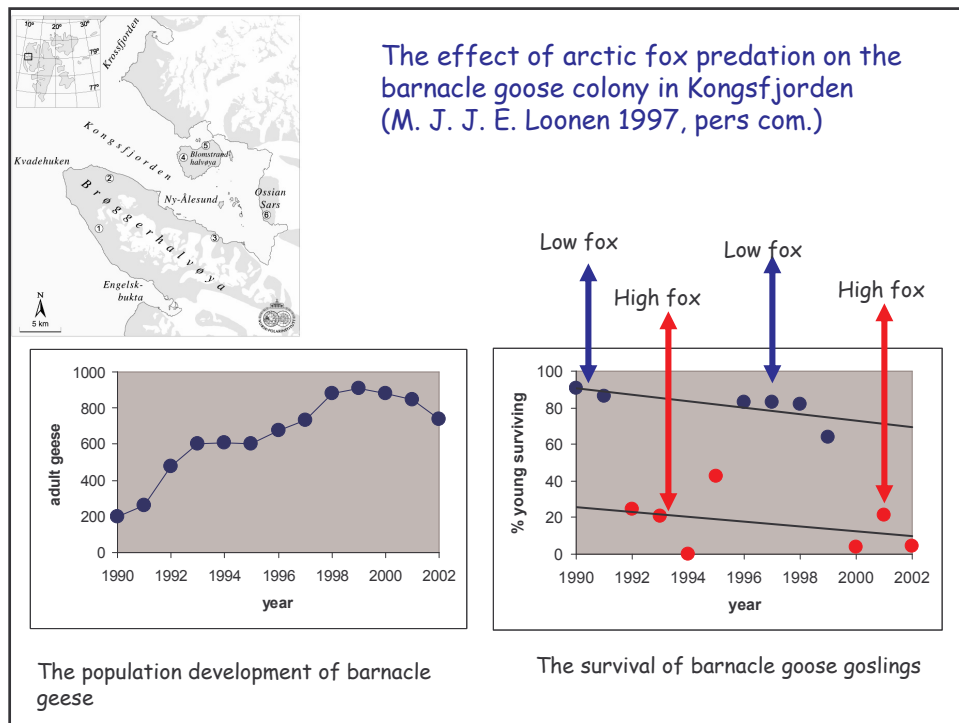
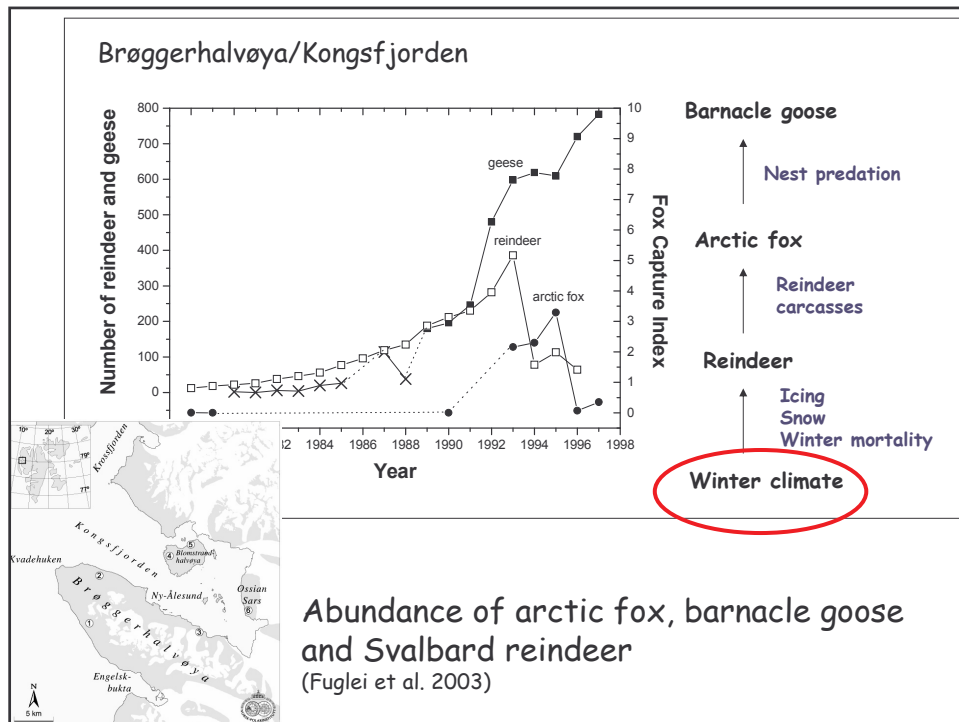
Scale: 1:10000
Projection: UTM zone 18
Datum: WGS84
Elevation: 1000m
Source: Norwegian Polar Research Institute



% of natal den with pups in Kongsfjorden and Brøggerhalvøya



Fuglei et al. 2003; Fuglei, unpublished



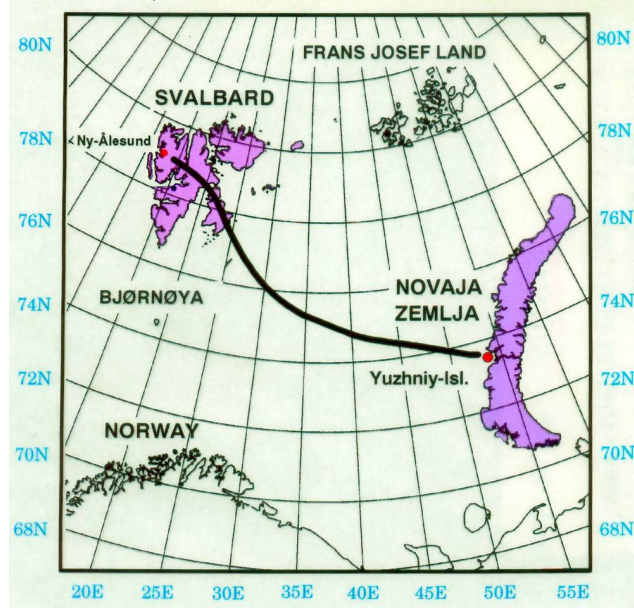
Infectious diseases and parasites

Introduction of
parasites and
diseases:
Echinococcus
multilocularis
and rabies.

Probably from
Russia

Henttonen et al. 2001

Johnson et al. 2007



Infectious diseases and parasites, continue....

Toxoplasma gondii is a coccidian protozoan
of the family *Sarcocystidae*, with a global
distribution

A disease factor and possible mortality
factor in arctic foxes on Svalbard



The seroprevalence was 43.2 % in arctic fox, 7.4 % in
barnacle goose and 5.1 % in walrus

Barnacle goose may be an important vector for the parasite
to Svalbard

Sørensen et al. 2005; Prestrud et al. 2007; 2008

Photobox study



Thank you for your attention!!



Photo: Jasper Doest