



IPY-ARCTIC PREDATORS

# Arctic foxes on Svalbard



Photo: Jason Roberts

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





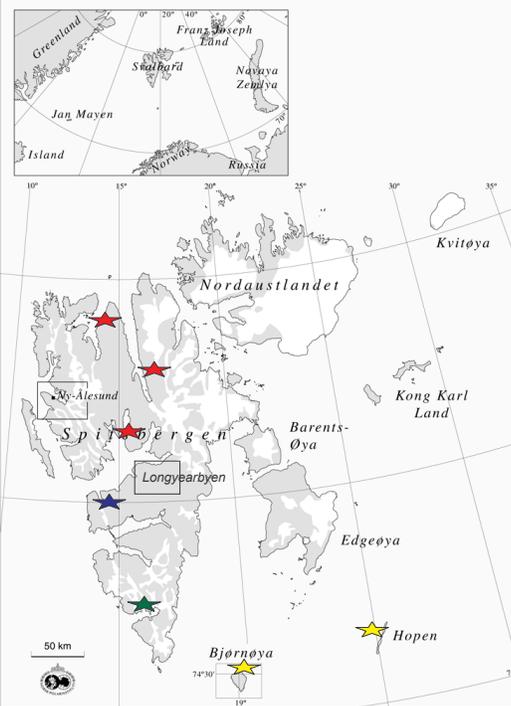


Svalbard  
Archipelago  
78°9' N, 11°8' E

Ny-Ålesund

Longyearbyen

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





Coastal foxes  
(no lemmings)



Lemming foxes  
(lemmings)

Photo: Jasper Doest

Stable populations

Cyclic populations

Canadian arctic

Age first reproduction:  
2-4 years

Age first reproduction:  
1 year

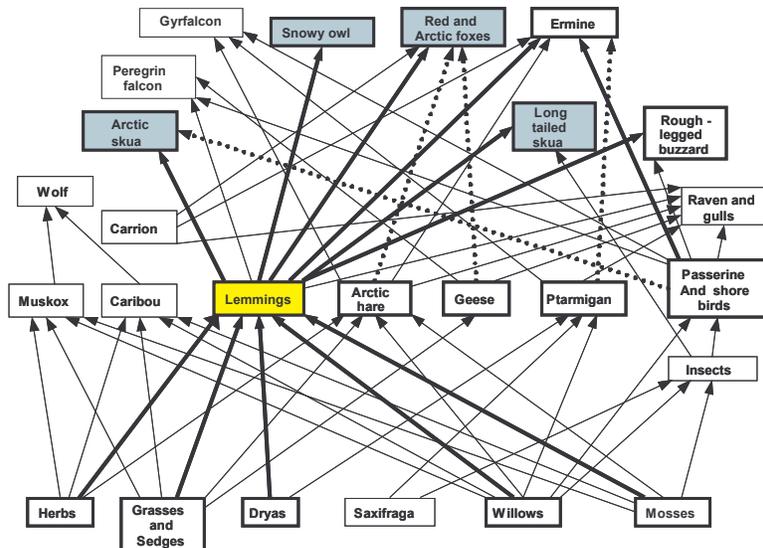
Number of pups: 5.6 (2-11)

Number of pups: 8.6 (0-19)

social groups - helpers: no?

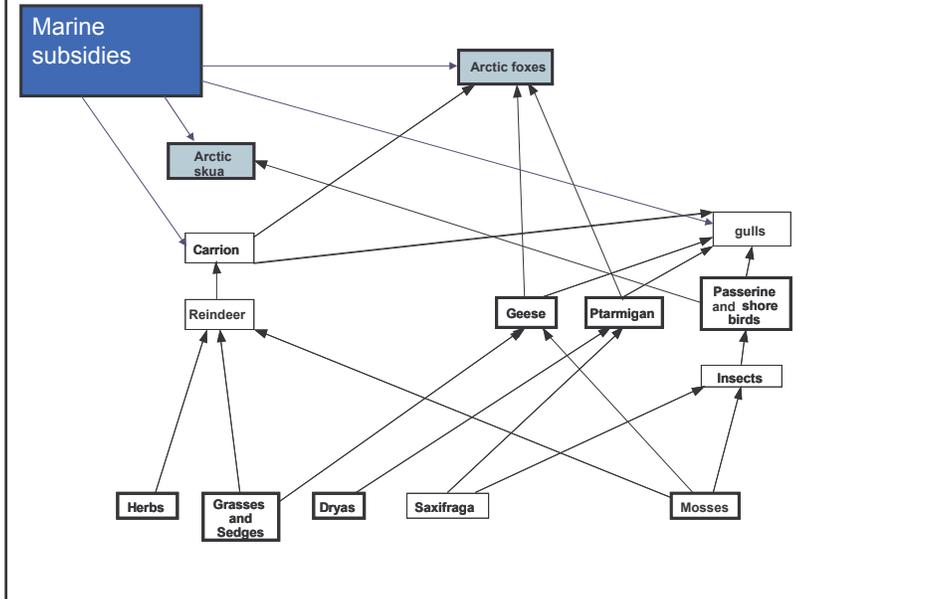
Social groups - helpers: yes

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.



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

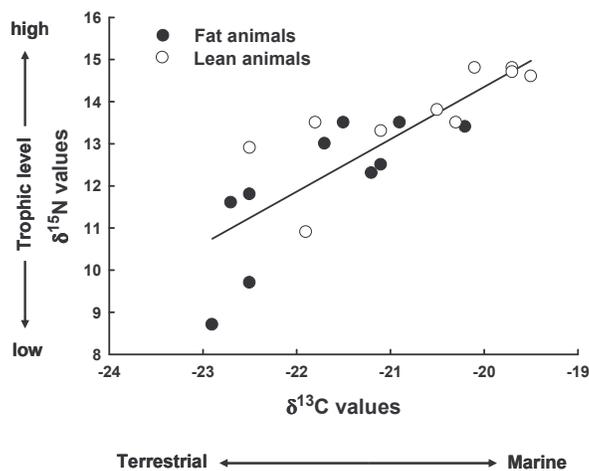


Foto: Henning Thing DP

Prestrud 1992, Frafjord 1993

### Stable isotopes

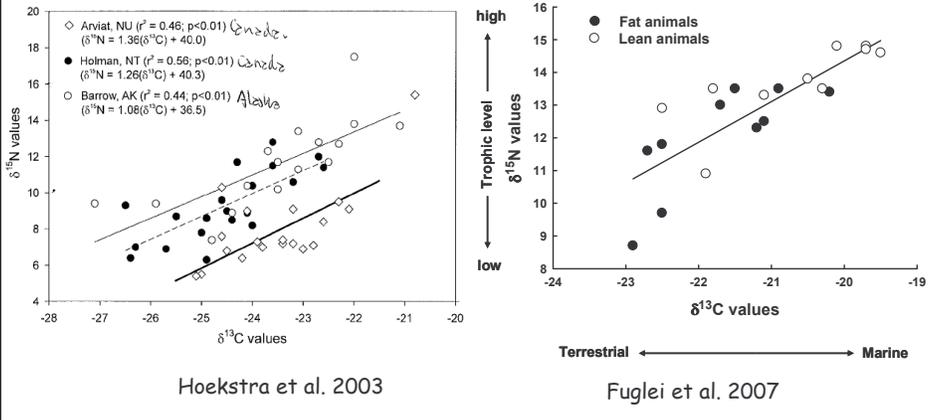
Linear relationship between stable carbon ( $\delta^{13}\text{C}$ ) and nitrogen ( $\delta^{15}\text{N}$ ) isotopes in muscle from arctic foxes in Svalbard



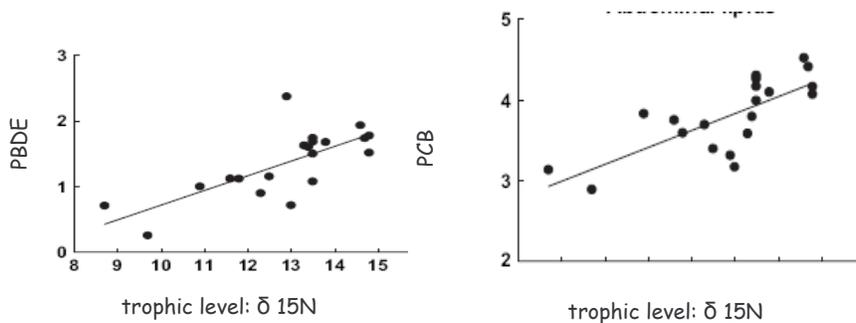
Fuglei et al. 2007

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



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



## Life history parameters

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

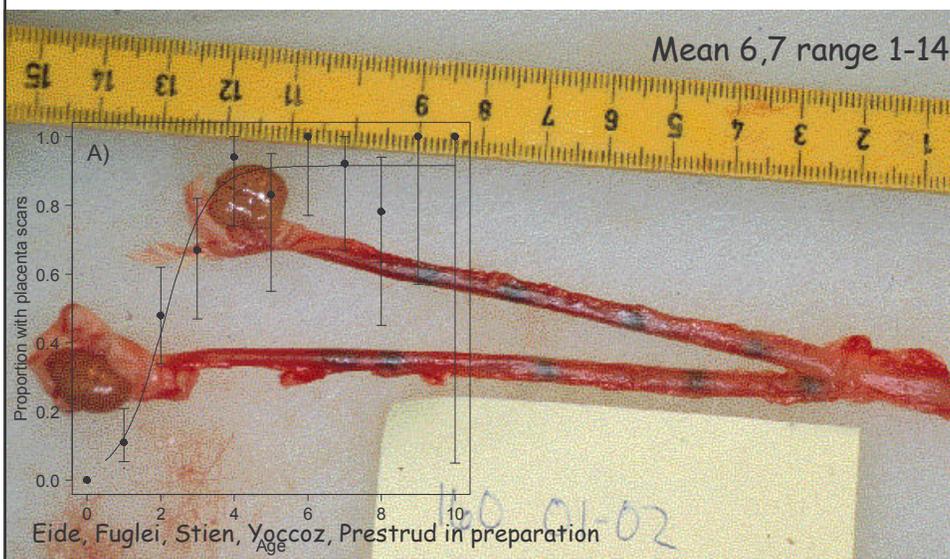


Photo: Jasper Doest

Life history parameters continue.....

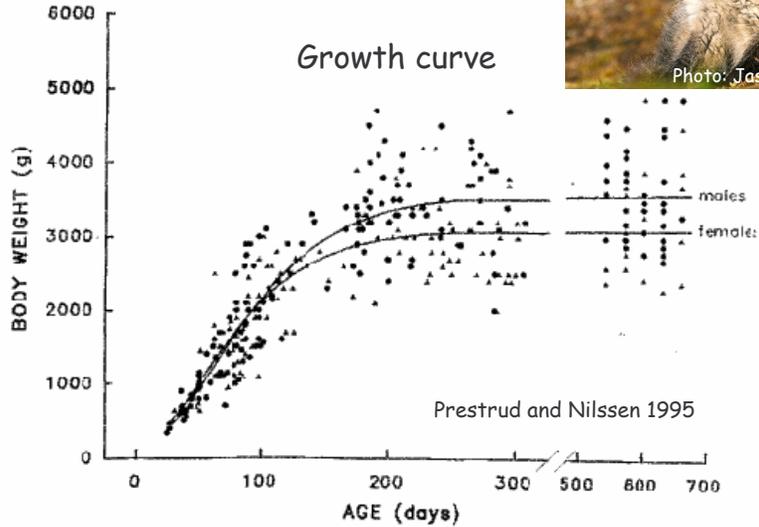
## Placental scars in the uterus from arctic fox carcasses

(Prestrud 1992; Fuglei unpublished)



Life history parameters continue.....

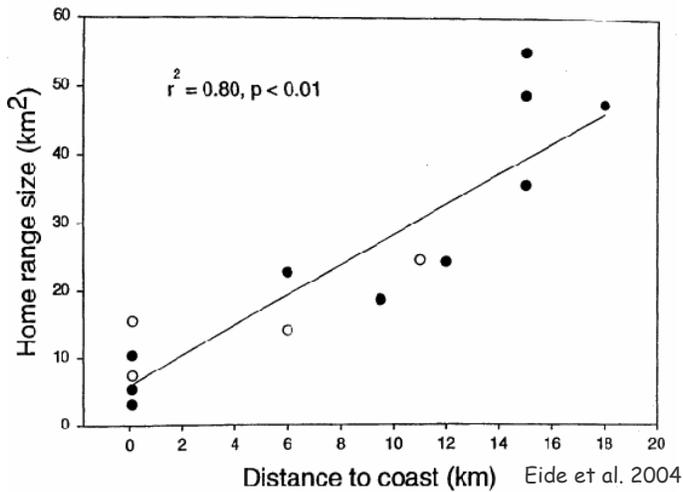
Body weight at birth (1. May-5. June):  
50-60 g (Prestrud and Nilssen 1995)



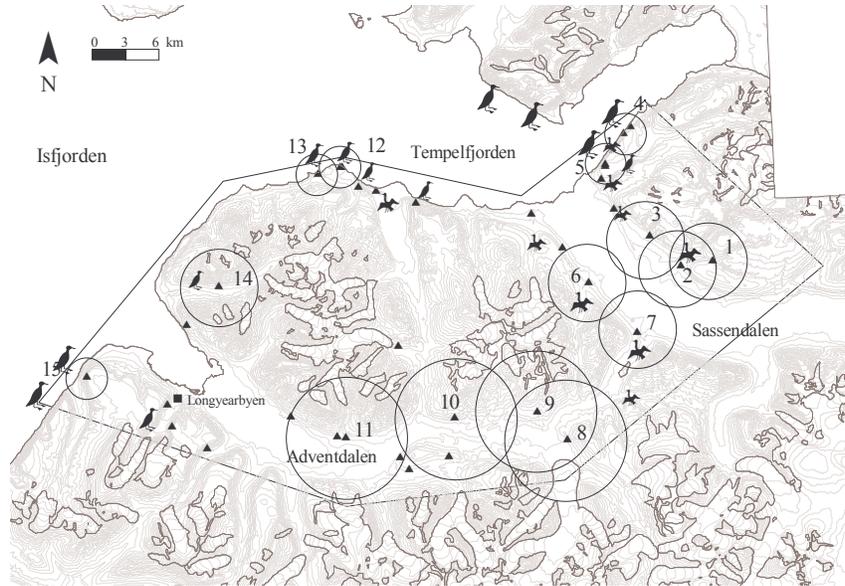
## Territories and recourses

Territorial in the breeding season (home range size coast  
3 km<sup>2</sup>, inland 60 km<sup>2</sup>) (Frafjord and Prestrud 1992; Eide et  
al. 2004; )

Home range  
size increase  
from coast to  
inland



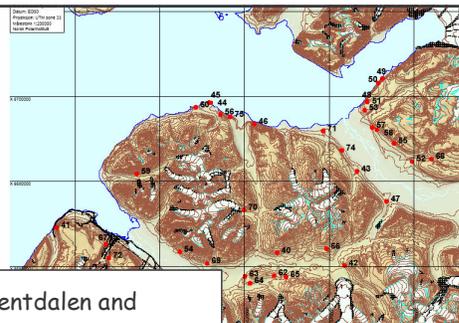
Arctic fox breeding dens with calculated summer home ranges varying in size according to the resource area from coast (3 km<sup>2</sup>) to inland (60 km<sup>2</sup>)



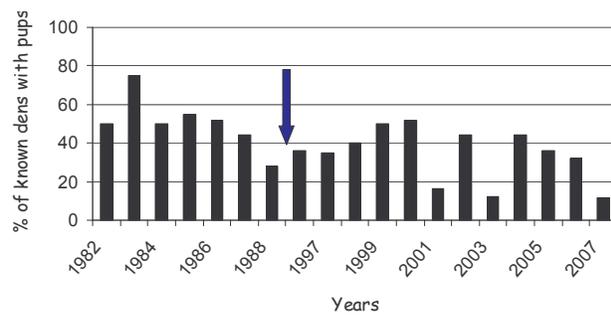
Eide et al. 2005

## Annual den monitoring

Adventdalen/Sassendalen  
(900 km<sup>2</sup>)

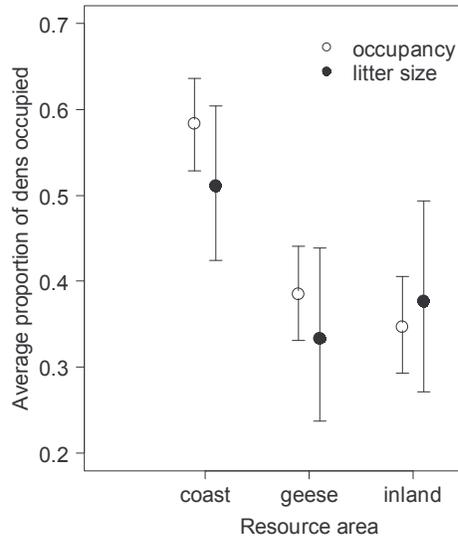


% of natal dens with pups in Adventdalen and Sassendalen



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

Den monitoring continue.....



Average litter size

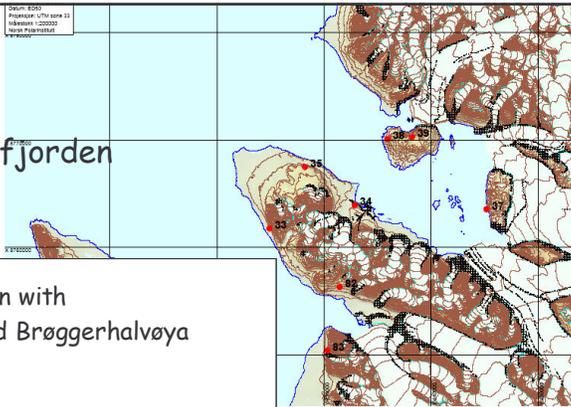
Coastal dens were more frequently used than dens in the inland and by goose colonies

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

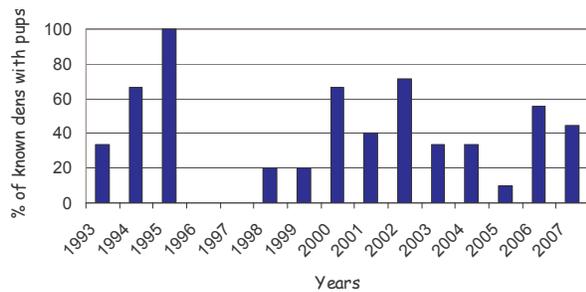
Eide, Fuglei, Stien, Yoccoz, Prestrud in prep

Den monitoring continue.....

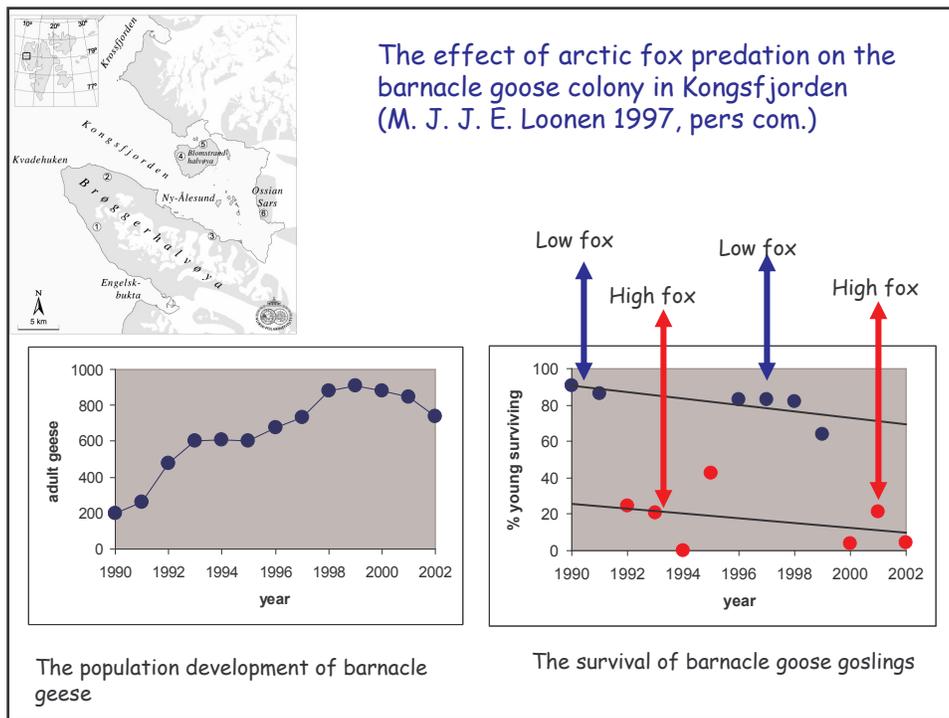
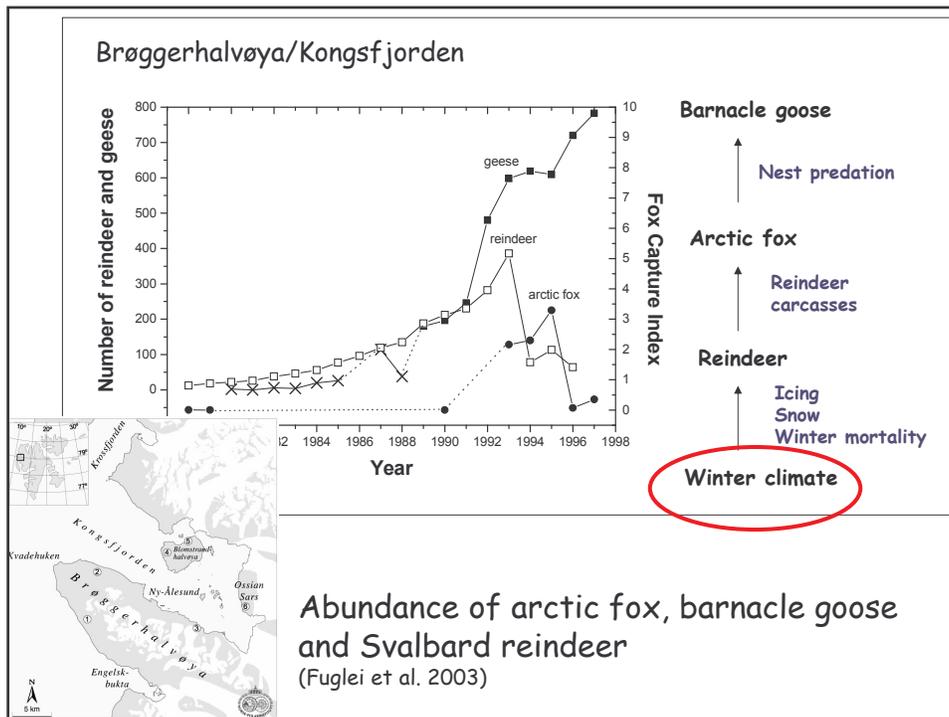
Brøggerhalvøya/Kongsfjorden  
(220 km<sup>2</sup>)



% of natal den with pups in Kongsfjorden and Brøggerhalvøya



Fuglei et al. 2003; Fuglei, unpublished



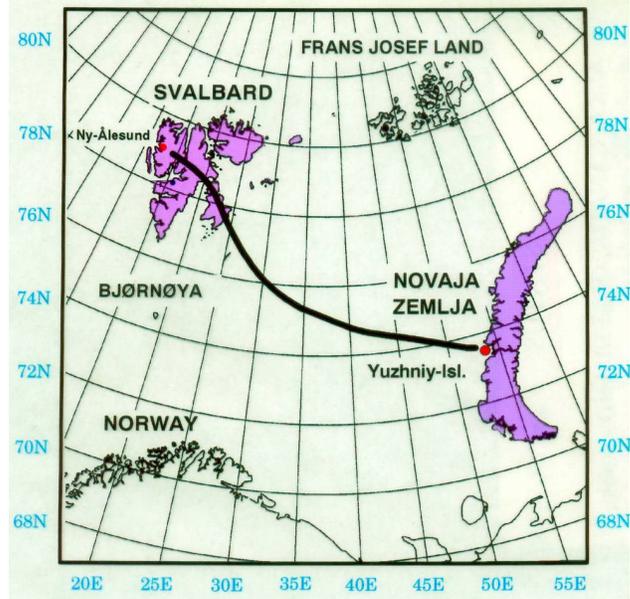
## Infectious diseases and parasites

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