

Salekhard, Russia, 21-24 April 2008

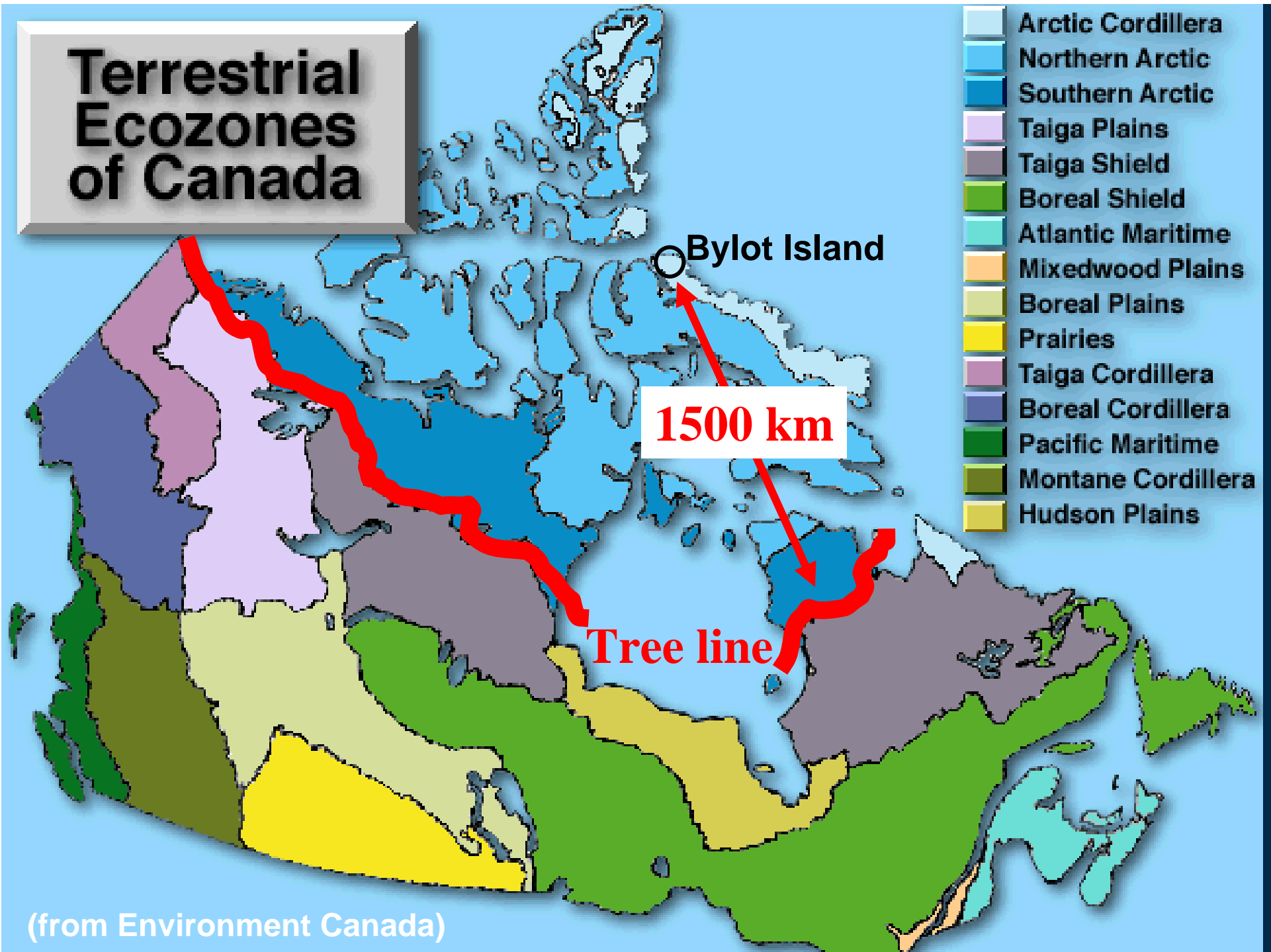
Dynamics of lemmings and arctic foxes on Bylot Island, Nunavut, Canada

Dominique Berteaux (Université du Québec à Rimouski, Canada)
and
Gilles Gauthier (Université Laval, Canada)

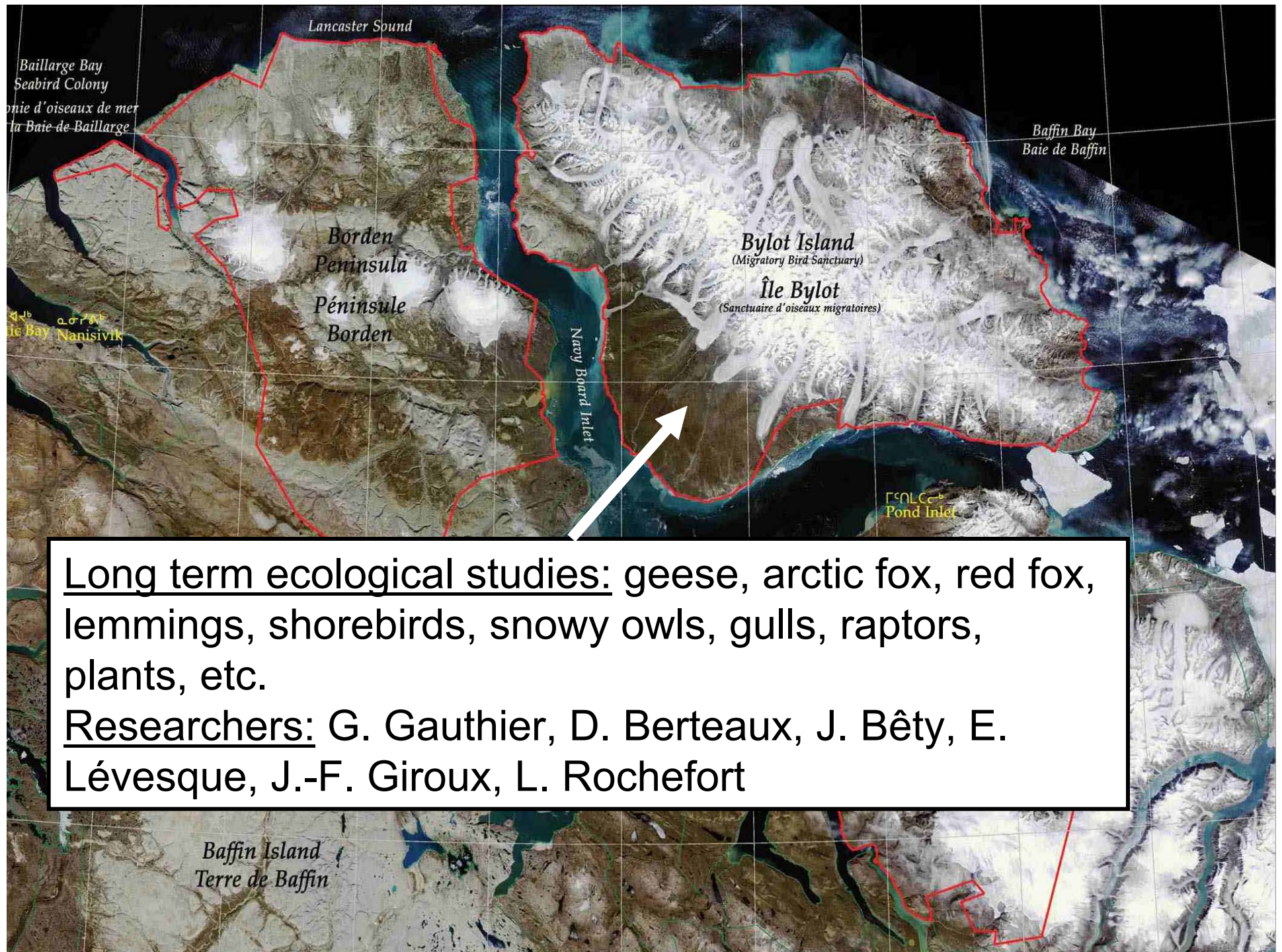




Terrestrial Ecozones of Canada



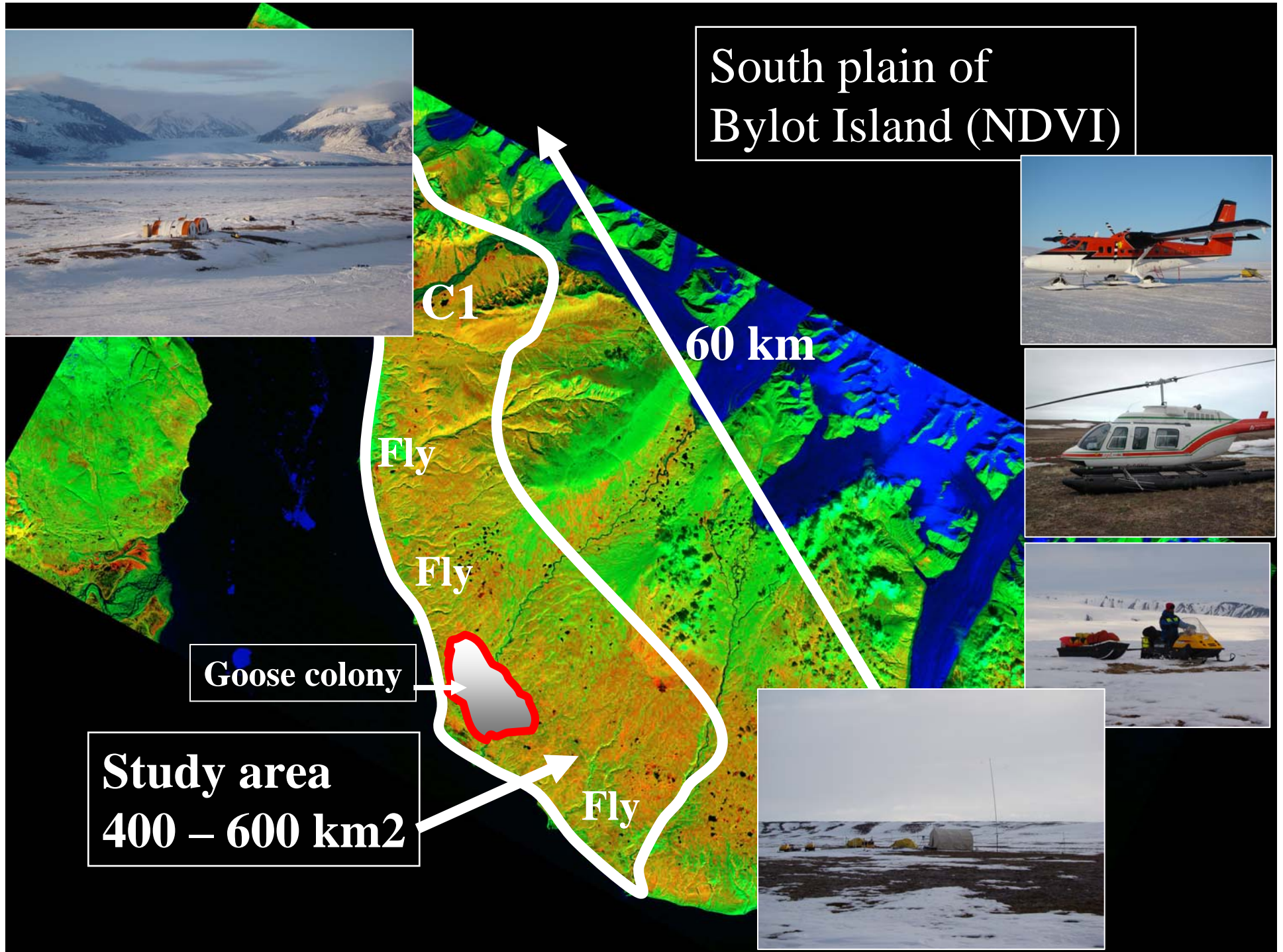
(from Environment Canada)



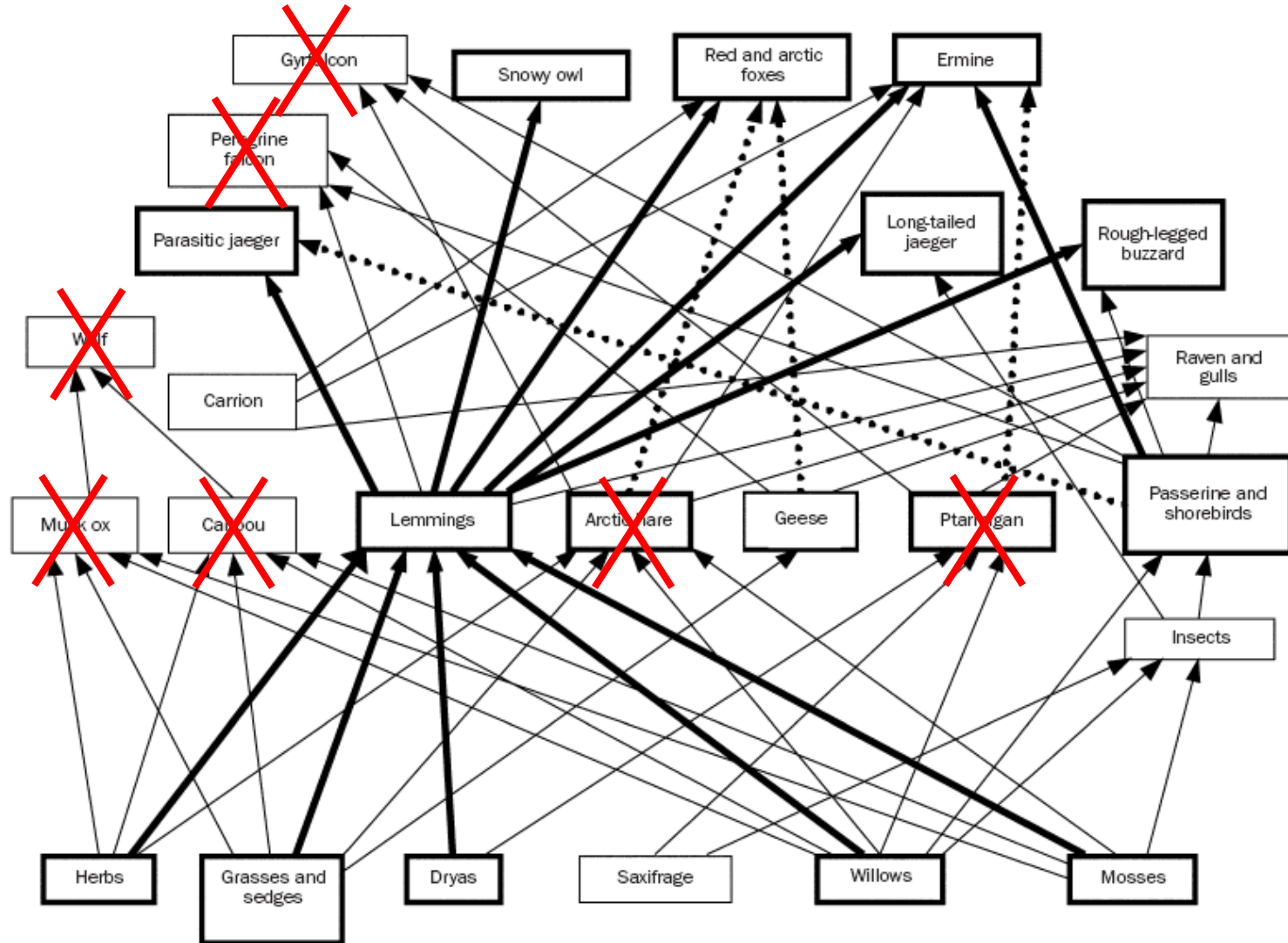
Long term ecological studies: geese, arctic fox, red fox, lemmings, shorebirds, snowy owls, gulls, raptors, plants, etc.

Researchers: G. Gauthier, D. Berteaux, J. Bêty, E. Lévesque, J.-F. Giroux, L. Rochefort

South plain of
Bylot Island (NDVI)







From Ims & Fuglei 2005 modified from Krebs et al. 2003

1. Lemmings - Methods
 - Cycles
 - Densities

2. Foxes

3. Lemmings x Foxes

Lemmings

2 grids (wet + mesic) x 100 Longworth traps x 15-16 days = ca. **3000 trap-nights**

Live trapping site 1

1 plot (mixed wet-mesic) x 50 Museum traps x 10 days = ca. **500 trap-nights**

Snap trapping site 2

2 plots (wet + mesic) x 50 Museum traps x 10 days = ca. **1000 trap-nights**

Snap trapping site 1

Nest survey

1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007

Year

South plain of
Bylot Island (NDVI)

60 km

C1

Fly

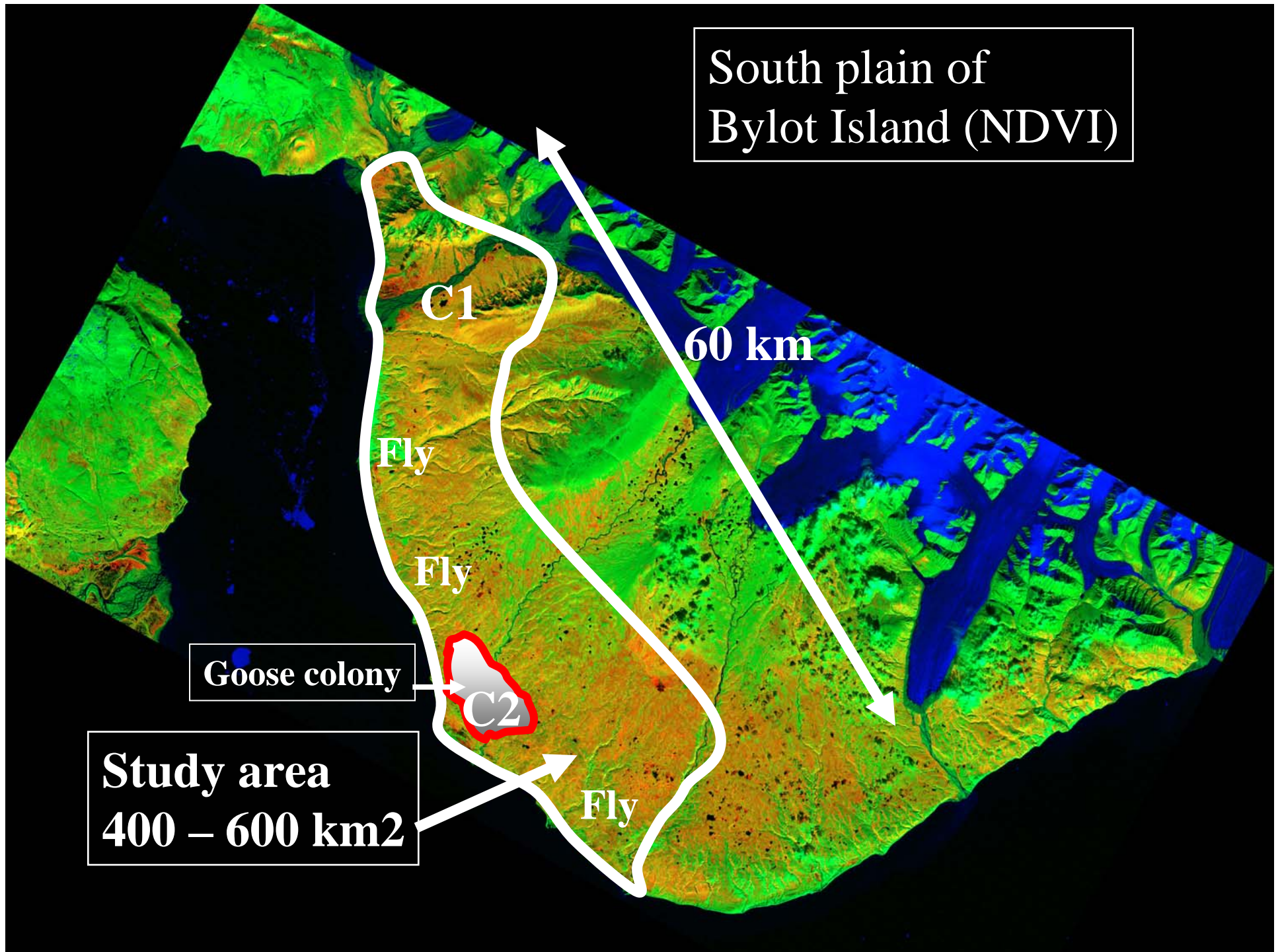
Fly

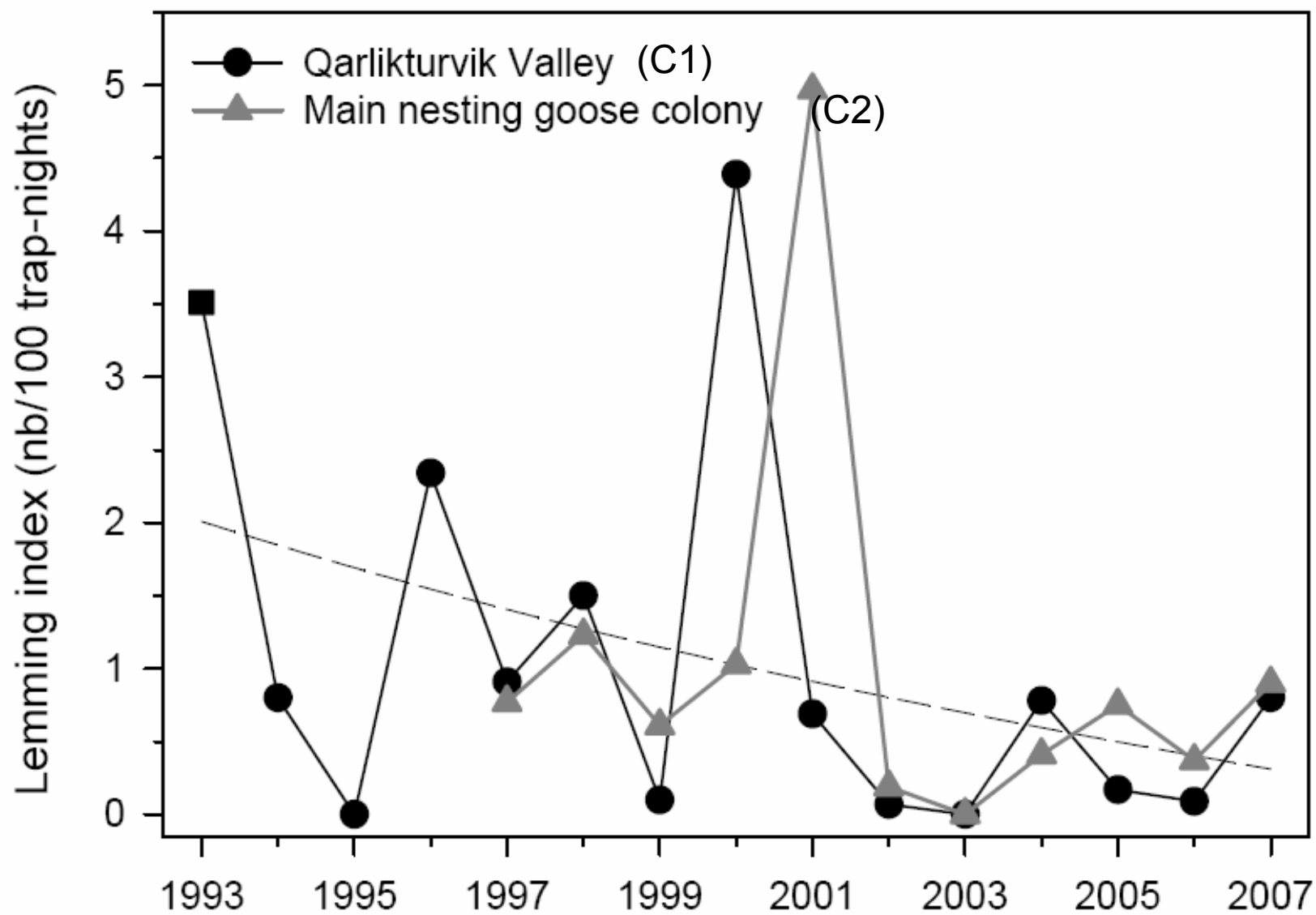
Goose colony

C2

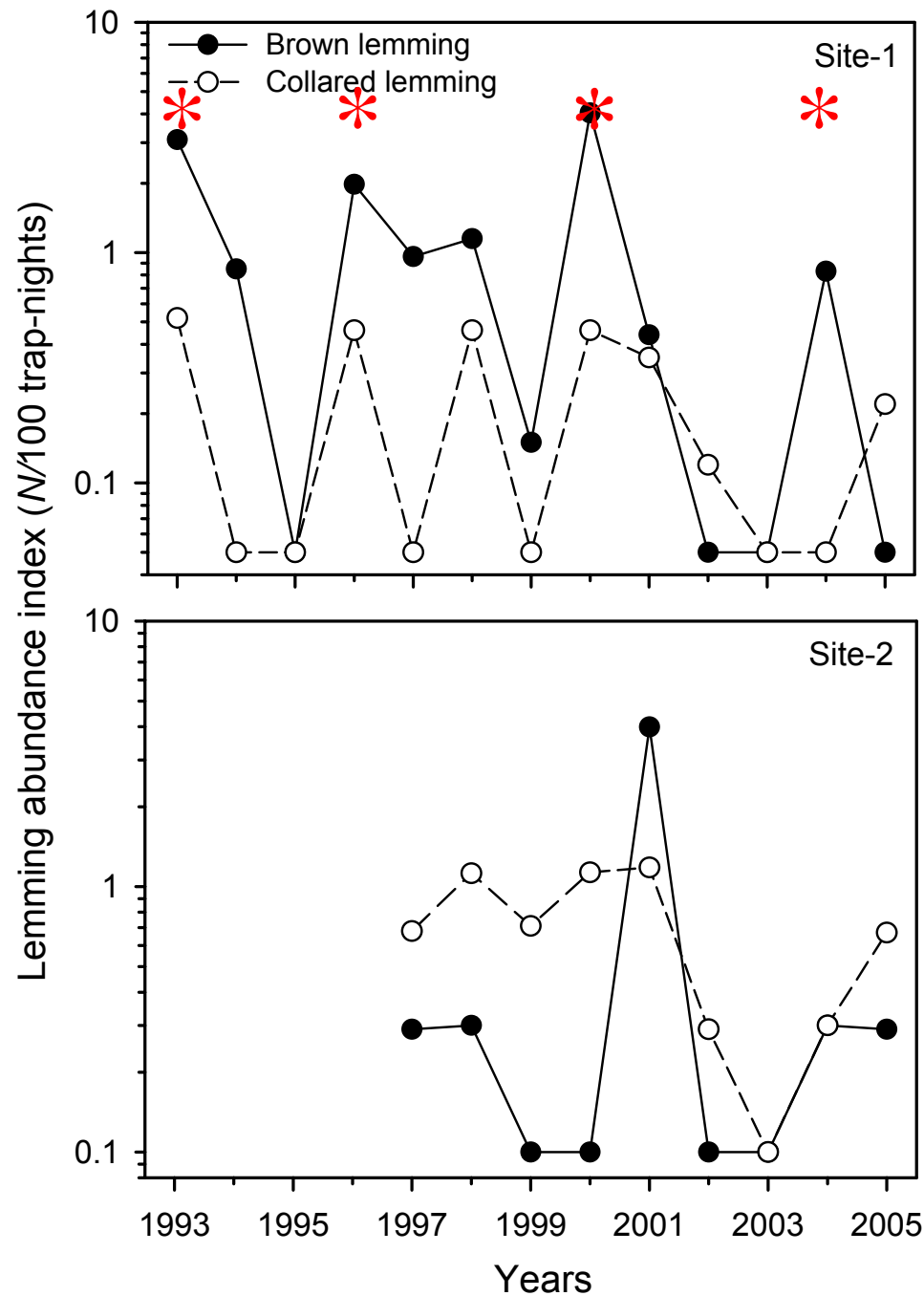
Study area
400 – 600 km²

Fly





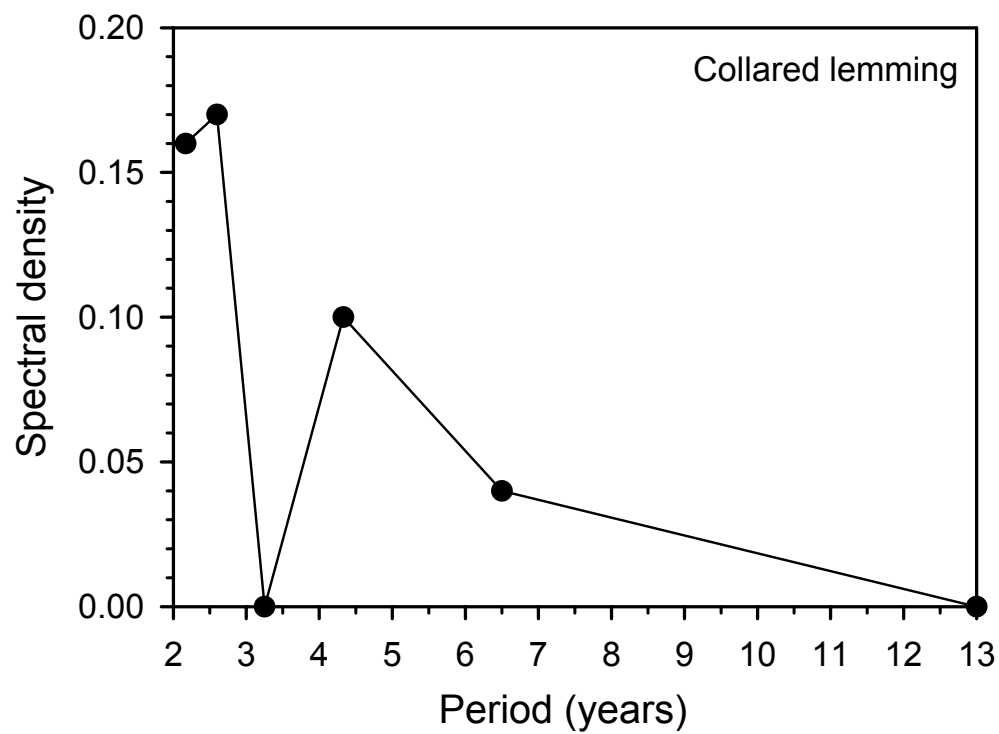
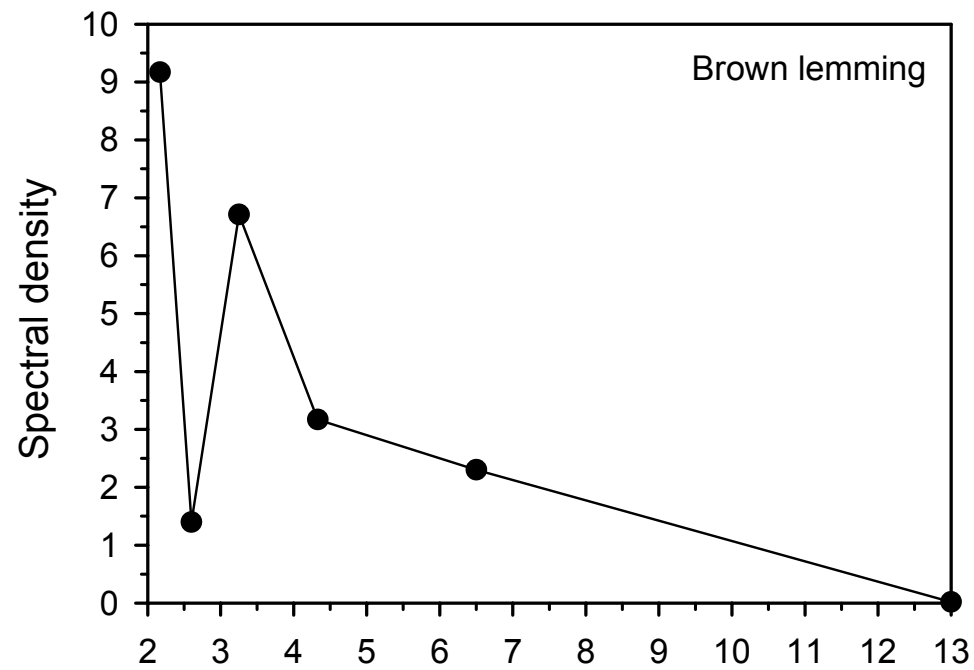
From Cadieux et al. 2008



Amplitude of fluctuations
Brown: >40-fold
Collared: 4-fold

Synchronisation
Good across species
? across sites

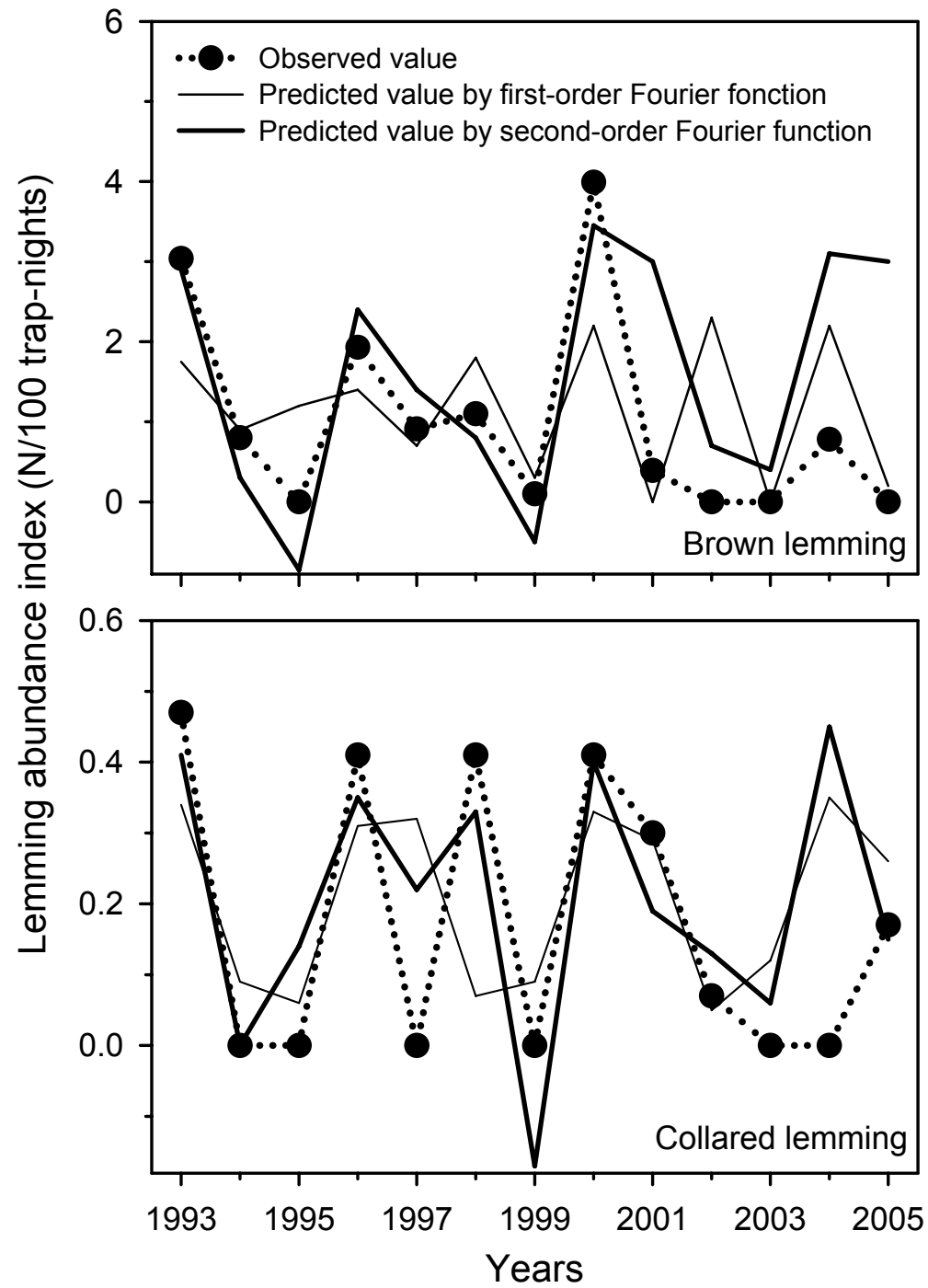
From Gruyer et al.
Can J. Zool. In press.



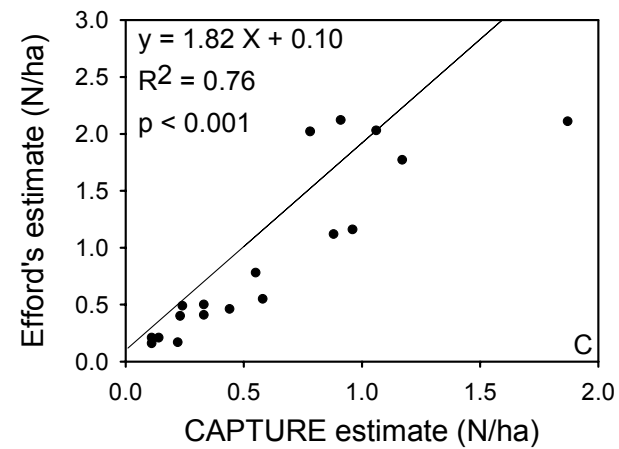
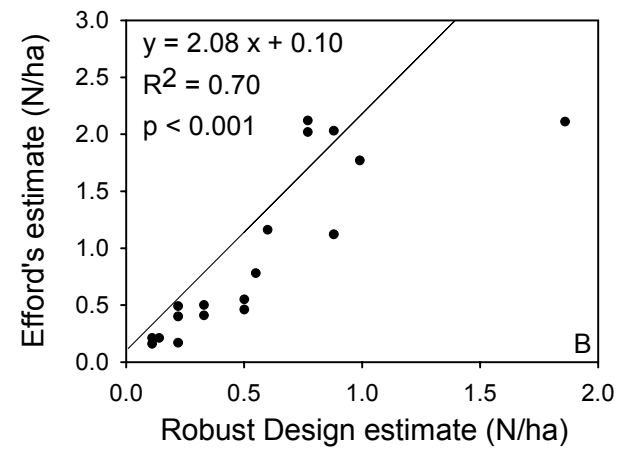
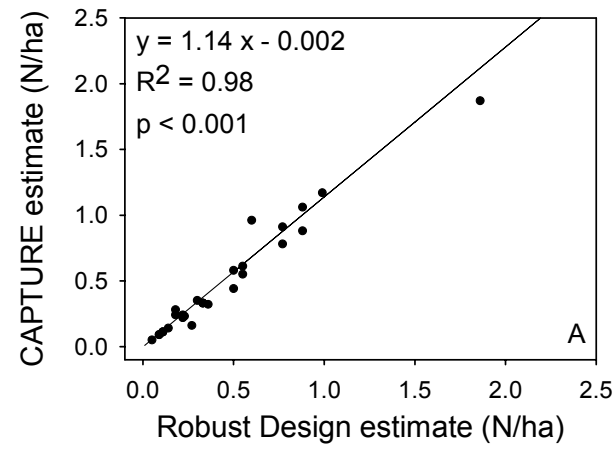
Period of
cycles

Brown: 3.7 yrs
Collared: 3.9 yrs

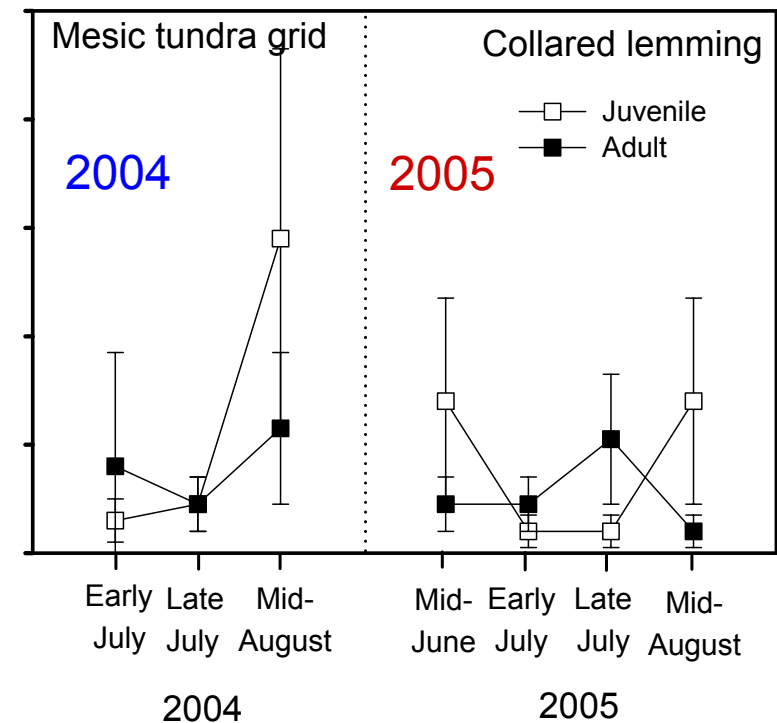
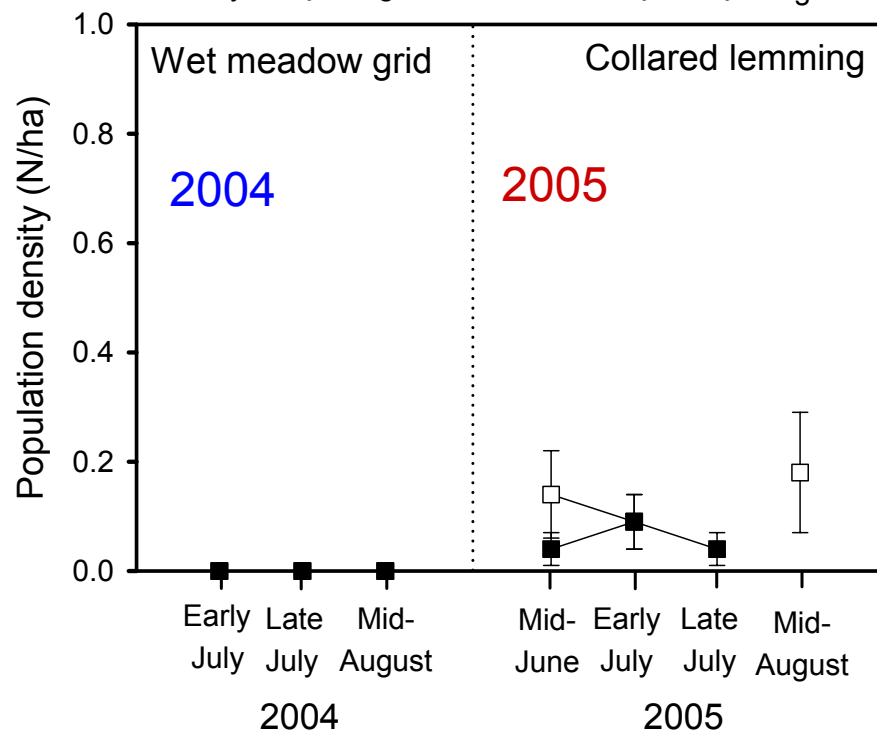
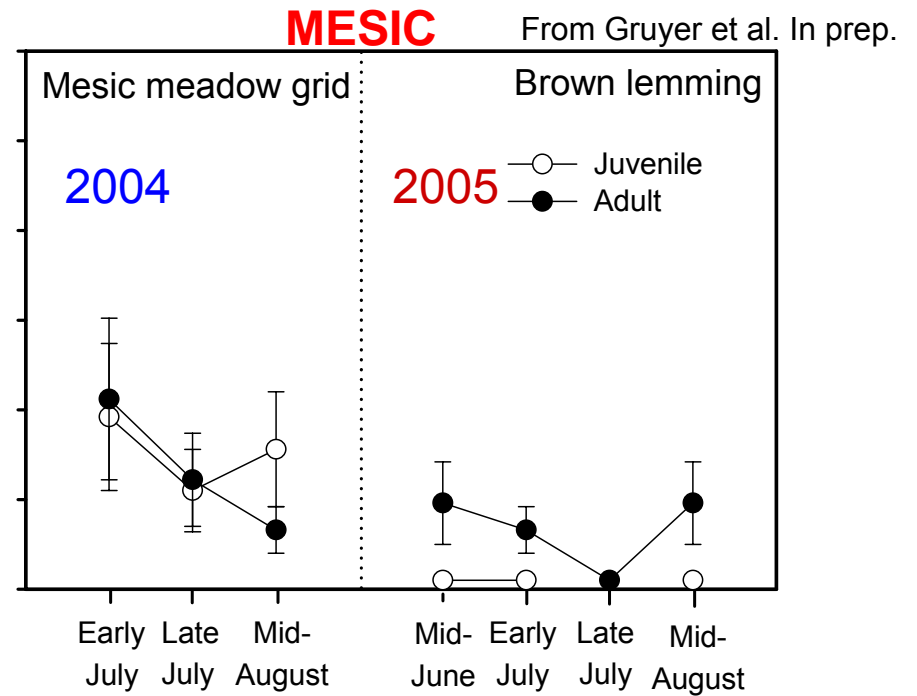
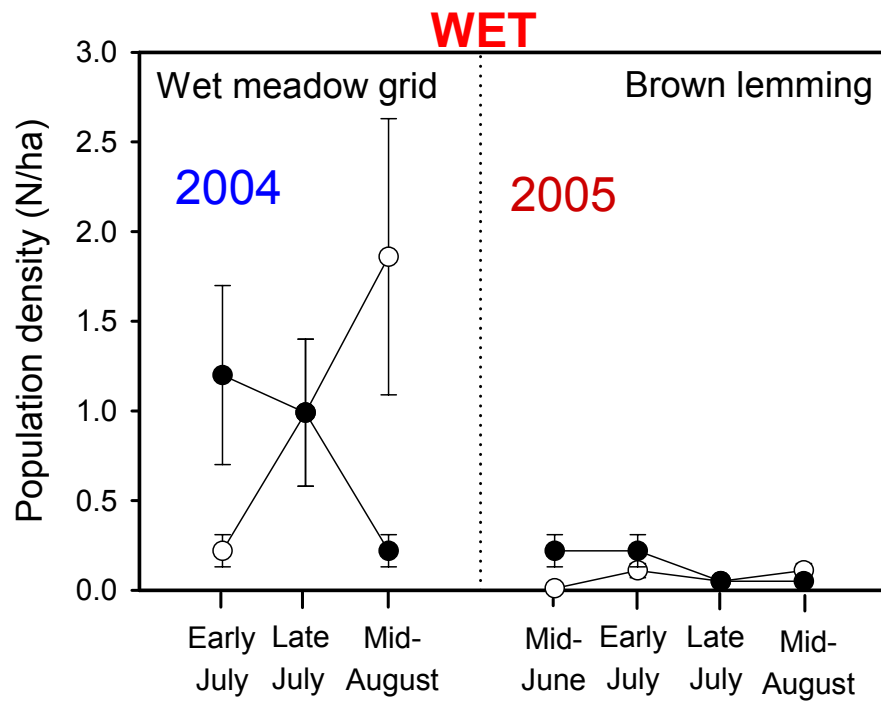
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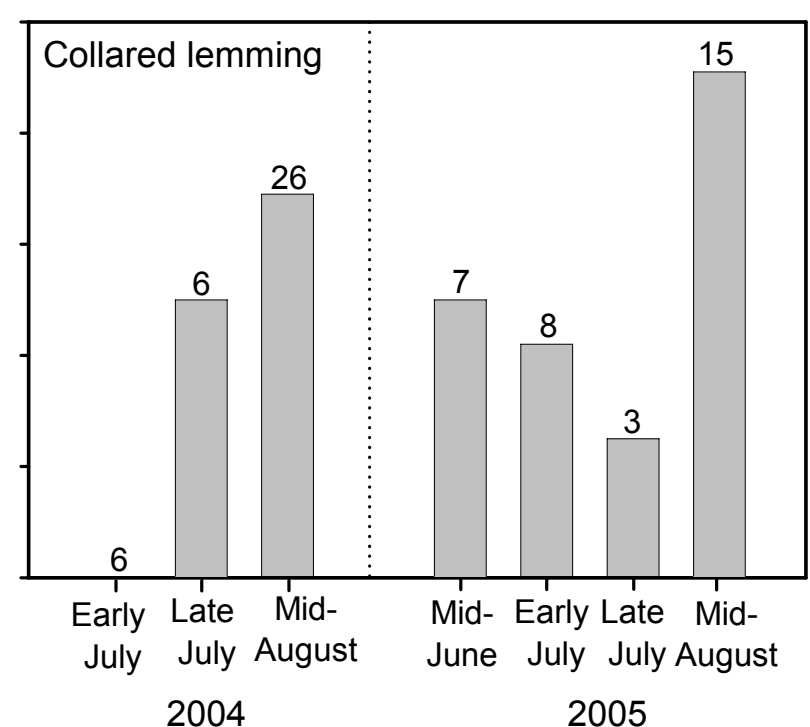
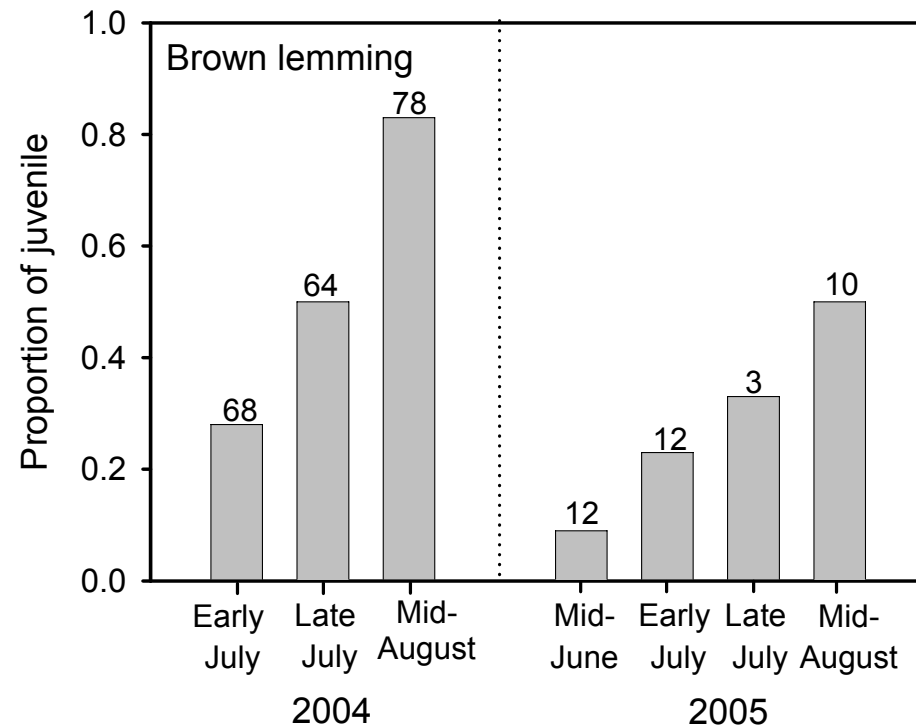
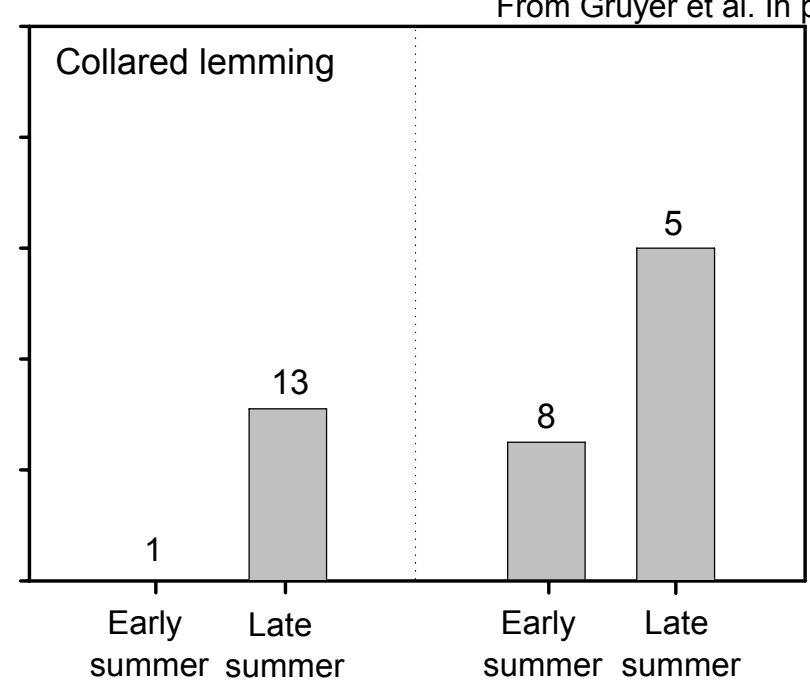
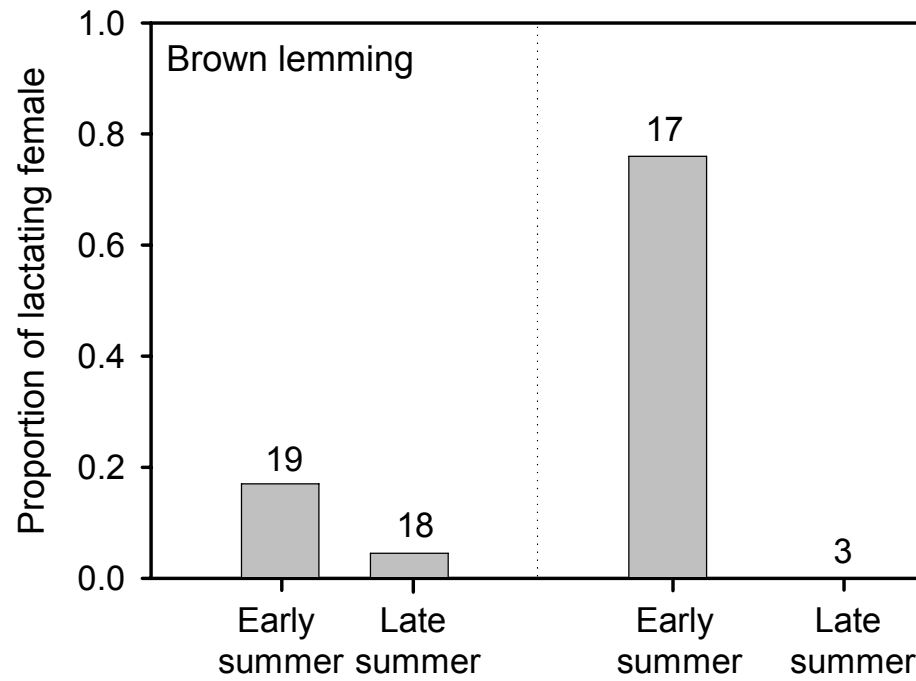


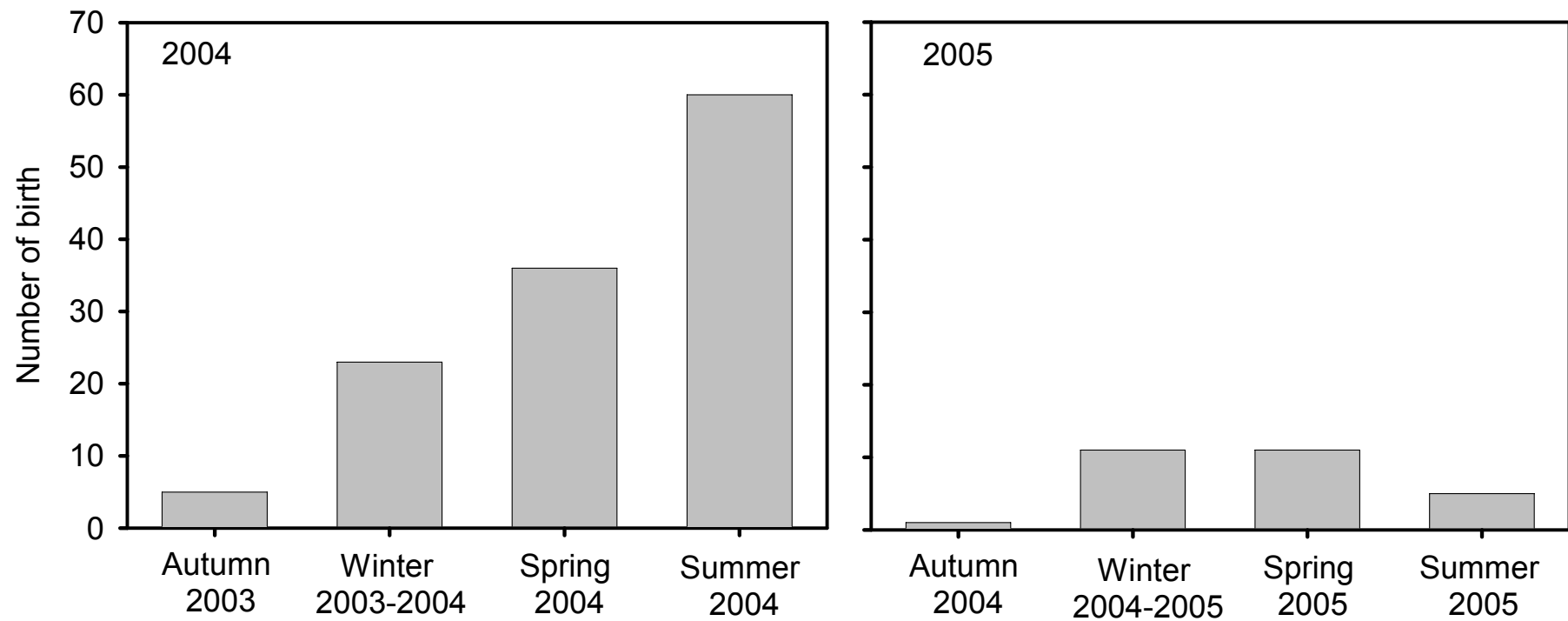
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From Gruyer et al.
In prep.







From Gruyer et al.
In prep.

1. Lemmings

- Methods

2. Foxes

- Use of dens

- Use of other prey

3. Lemmings x Foxes

Foxes

Dens found through systematic search, 475 km², **80 to 100 dens**

Den survey through study area

Dens found opportunistically, 100 km², **3 to 50 dens**

Den survey around camps

1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007

Year







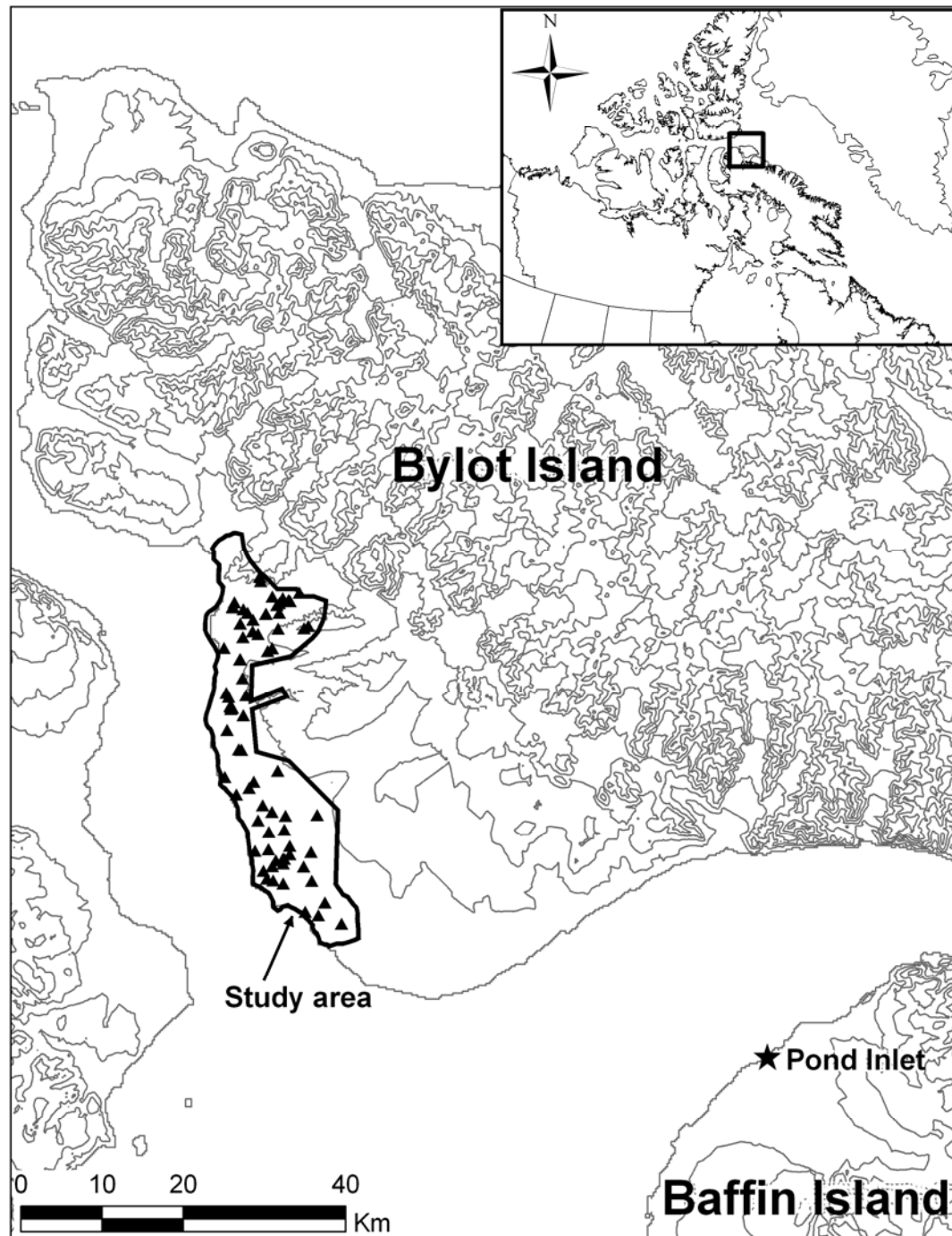








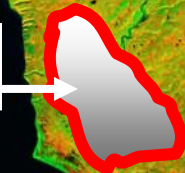




From Szor et al. 2008
Polar Biol. 31:351-362

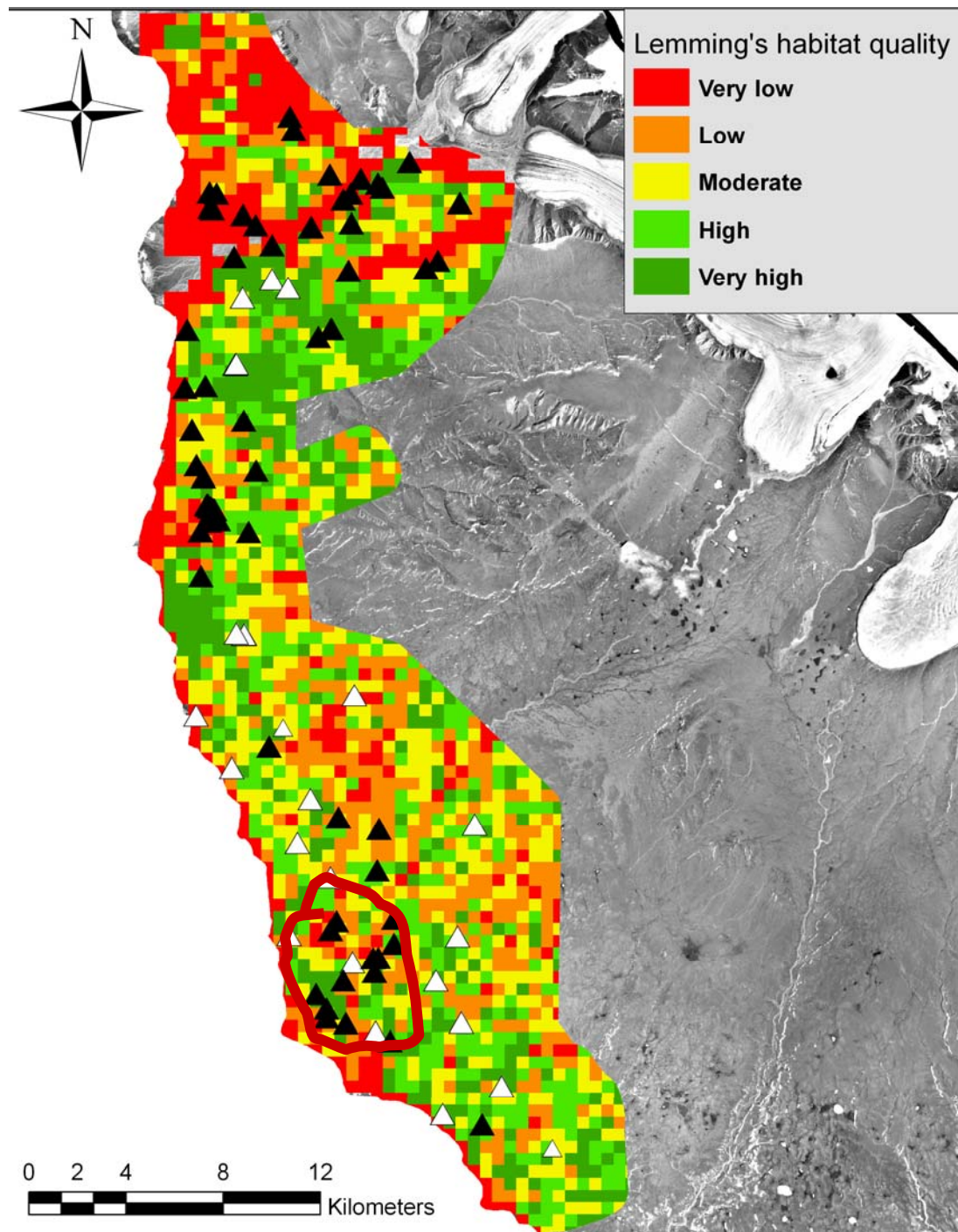
South plain of
Bylot Island (NDVI)

Goose colony

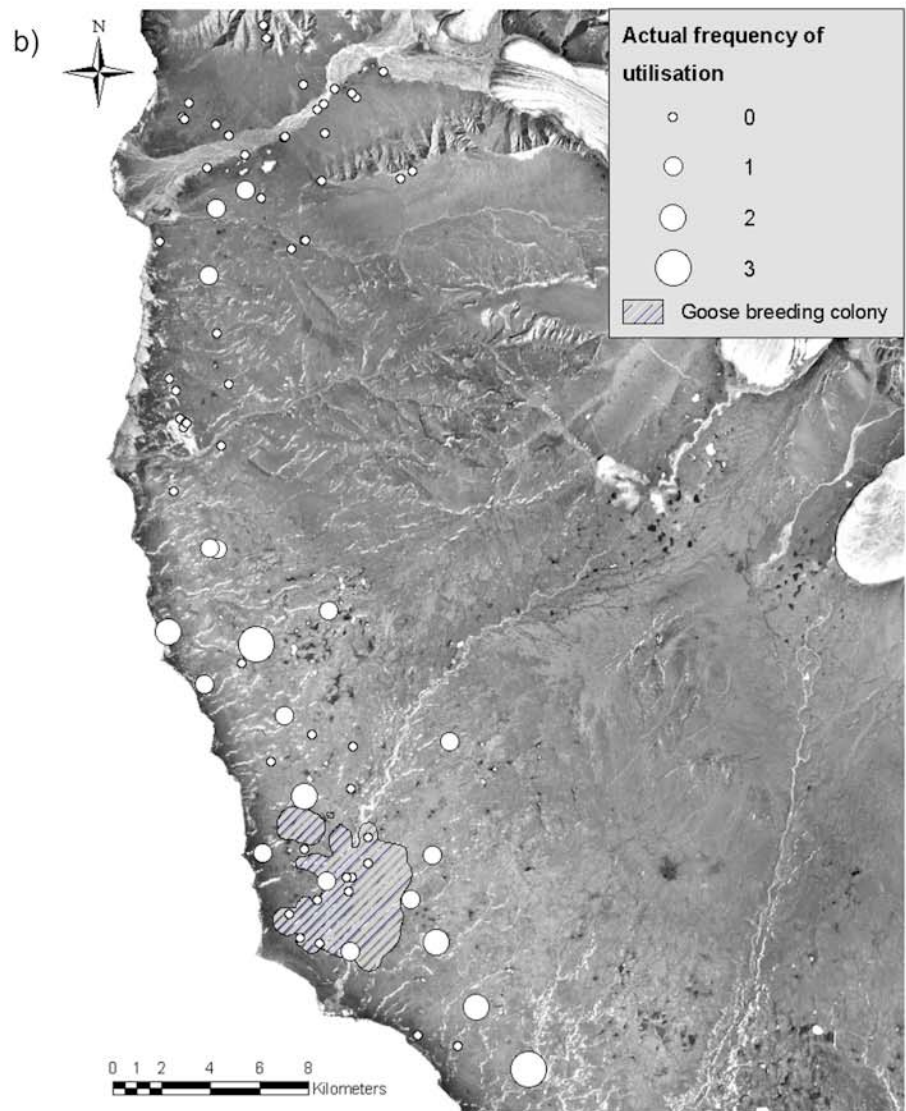
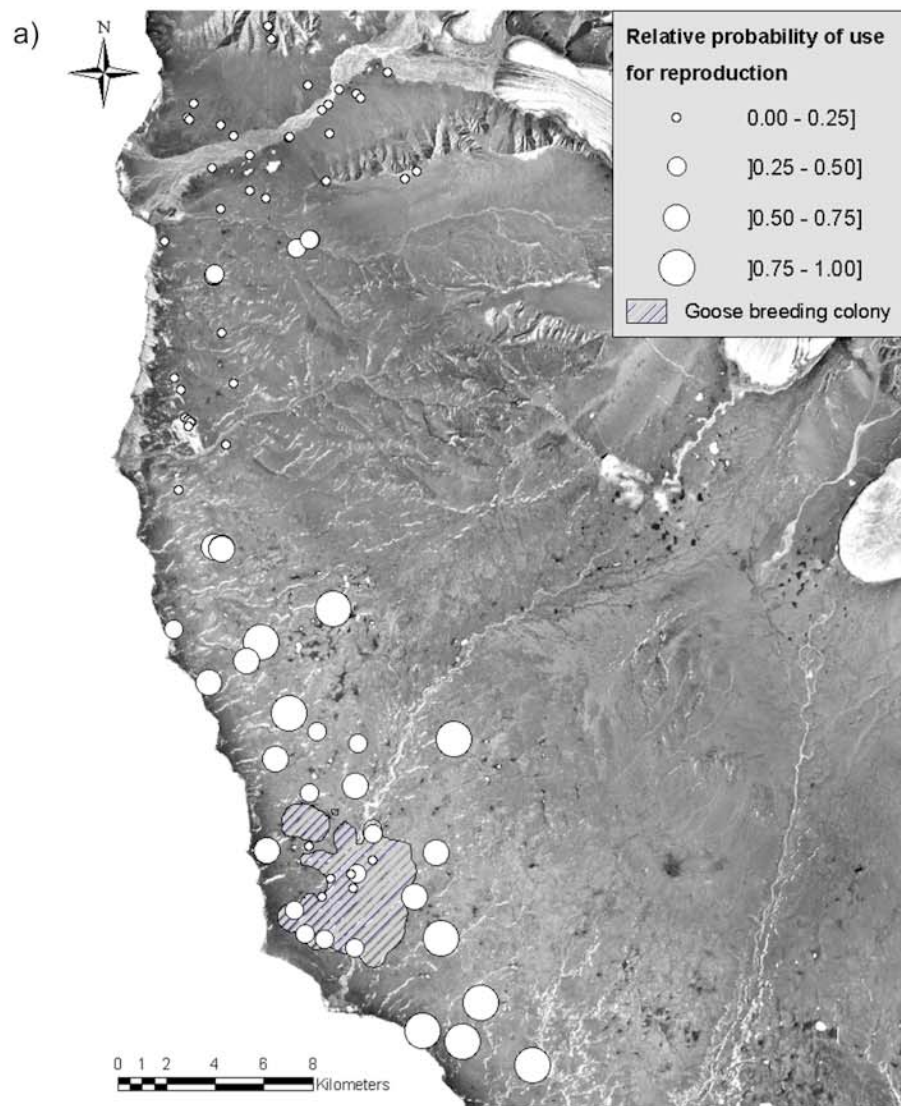


Habitat type	Description
Habitat classification based mostly on vegetation	
Graminoid Wet Meadow	
Moist Meadow	
Moist Shrub-Tundra	
Mesic tundra	
Grass Mesic Meadow	
Shrub Heath Tundra (<i>Dryas</i>)	
Shrub Heath Tundra (<i>Cassiope</i>)	
Habitat classification based mostly on topography	
Moist Polygons	
Mesic Polygons	
Stream edge	

From Szor et al. 2008
Polar Biol. 31:351-362

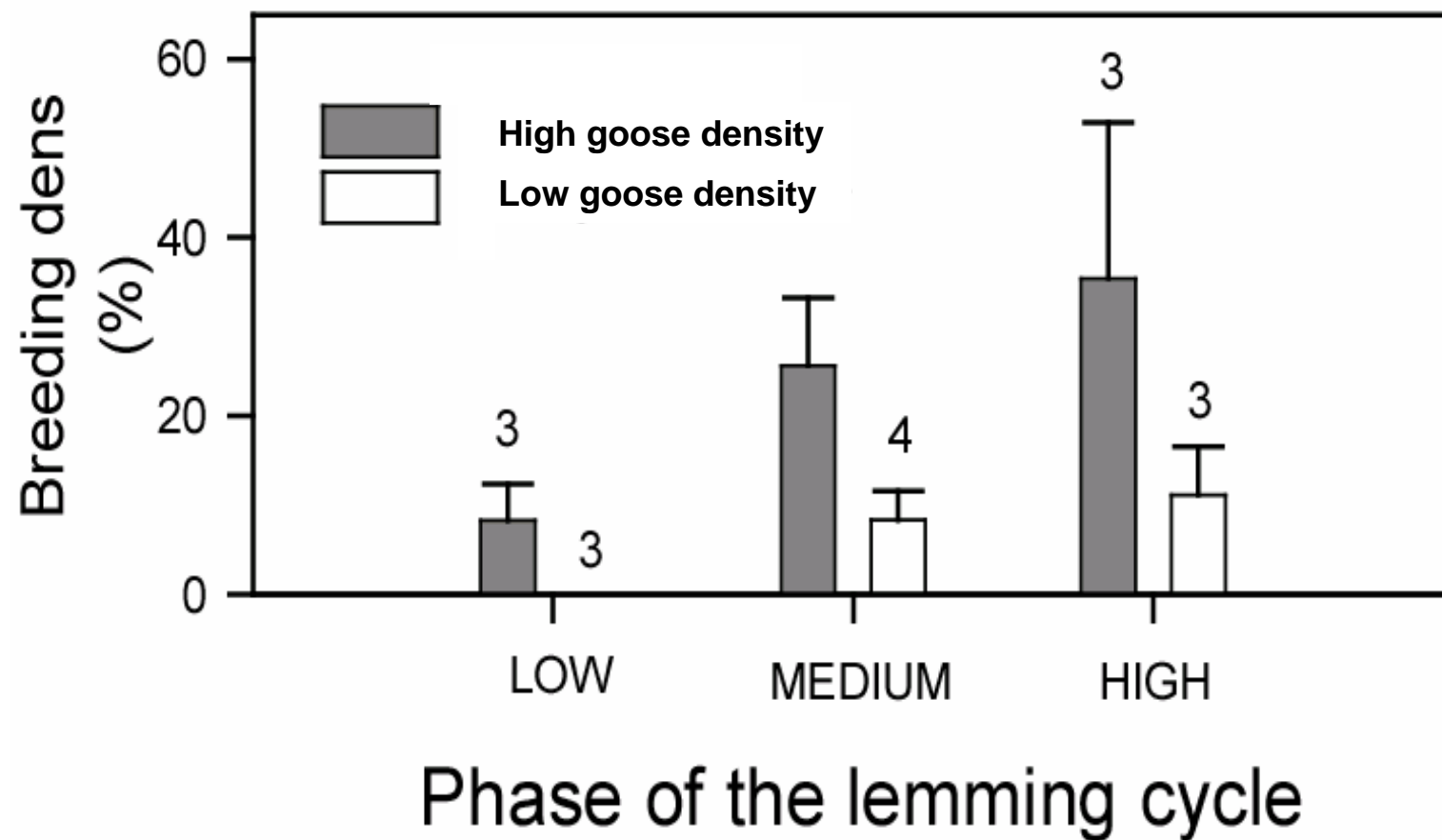


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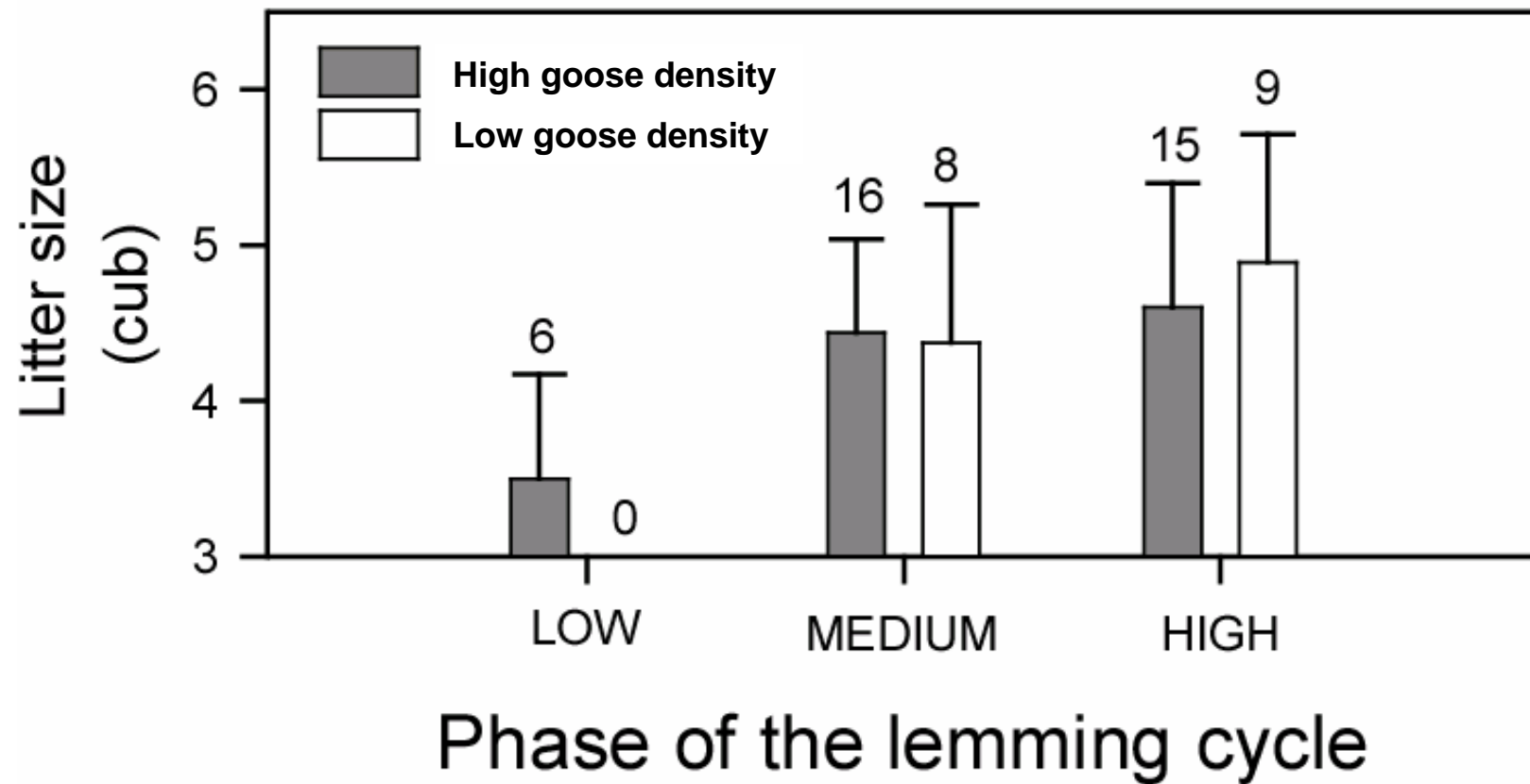


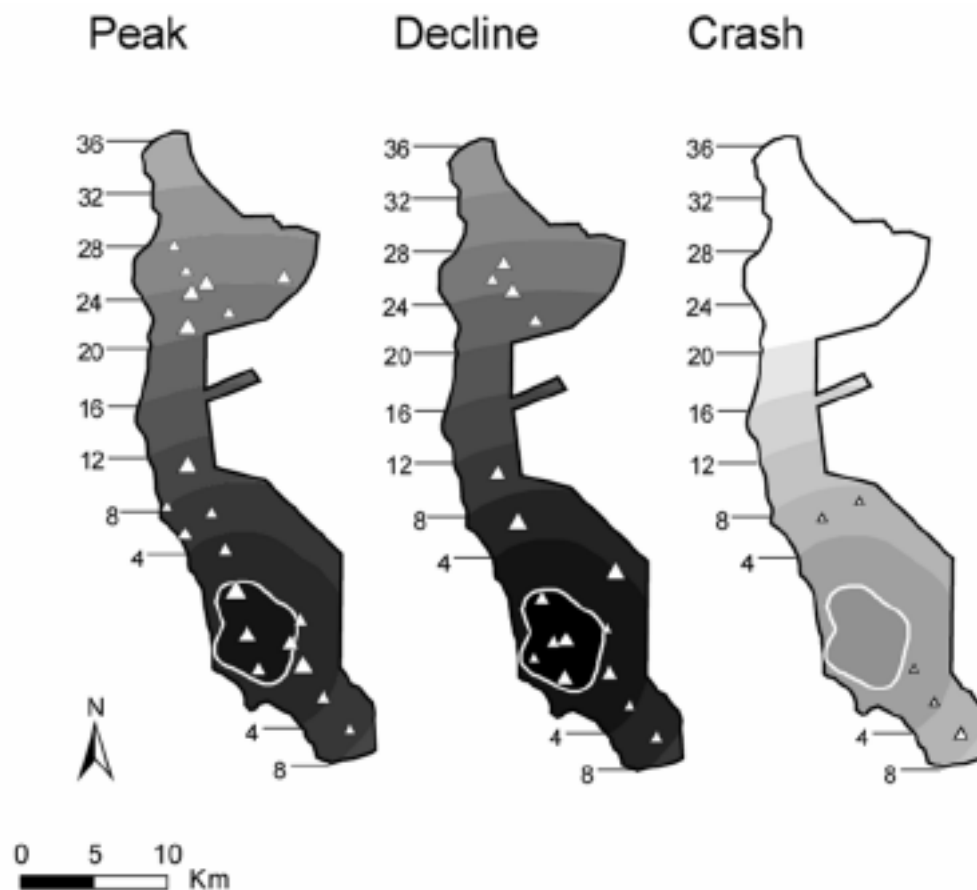
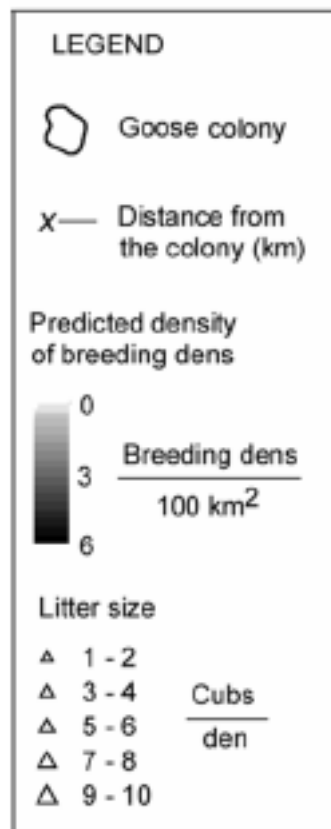
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Greater percentage of breeding dens in the sector of high goose density
Lower percentage of breeding dens during the low phase of the lemming cycle



Goose density and phase of the lemming cycle did not explain variations in litter size





From Giroux et al.
In prep.

1. Lemmings

2. Foxes

3. Lemmings x Foxes

- Cycles
- Reproduction

Foxes

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Den survey through study area

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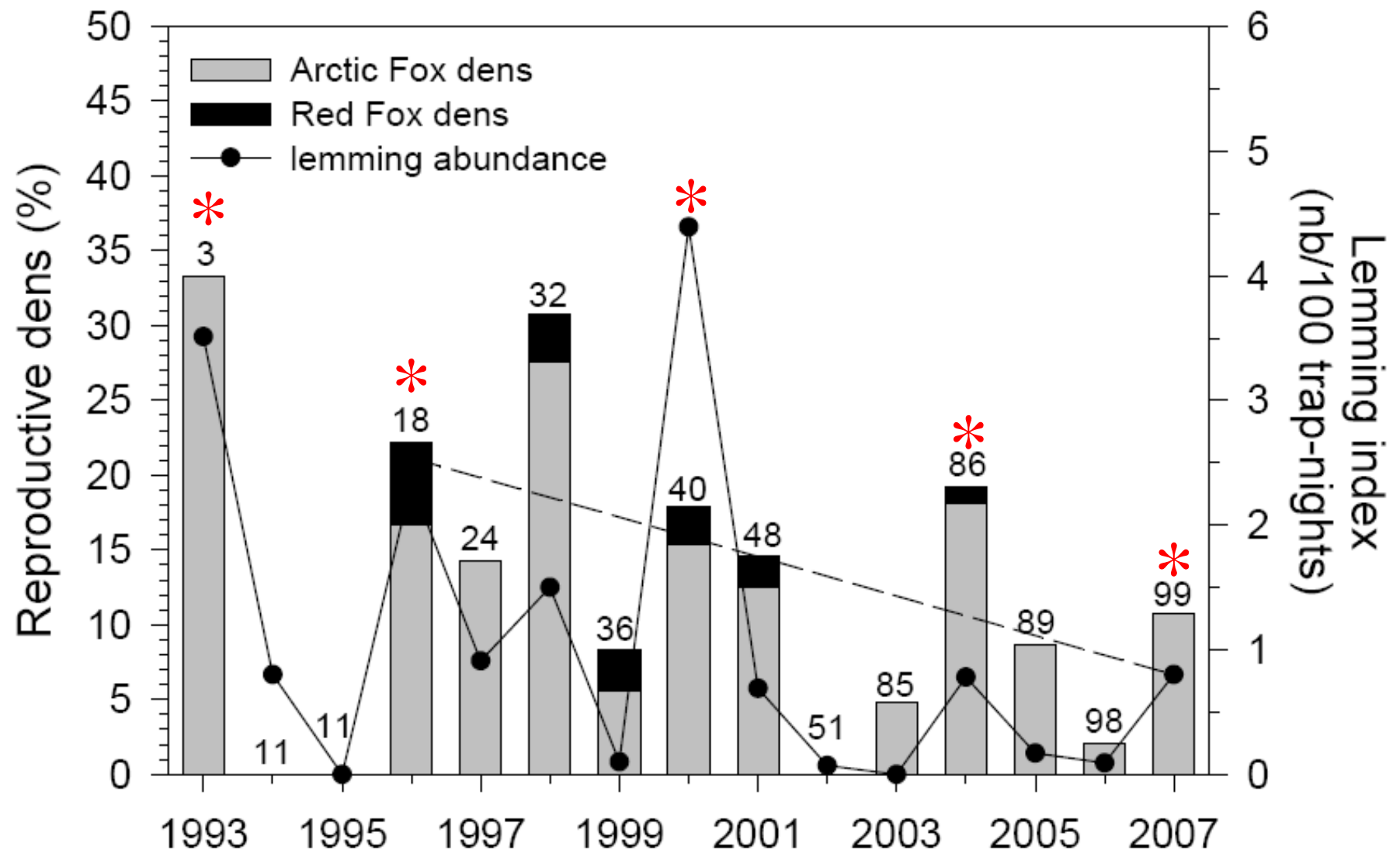
Snap trapping site 1

Nest survey

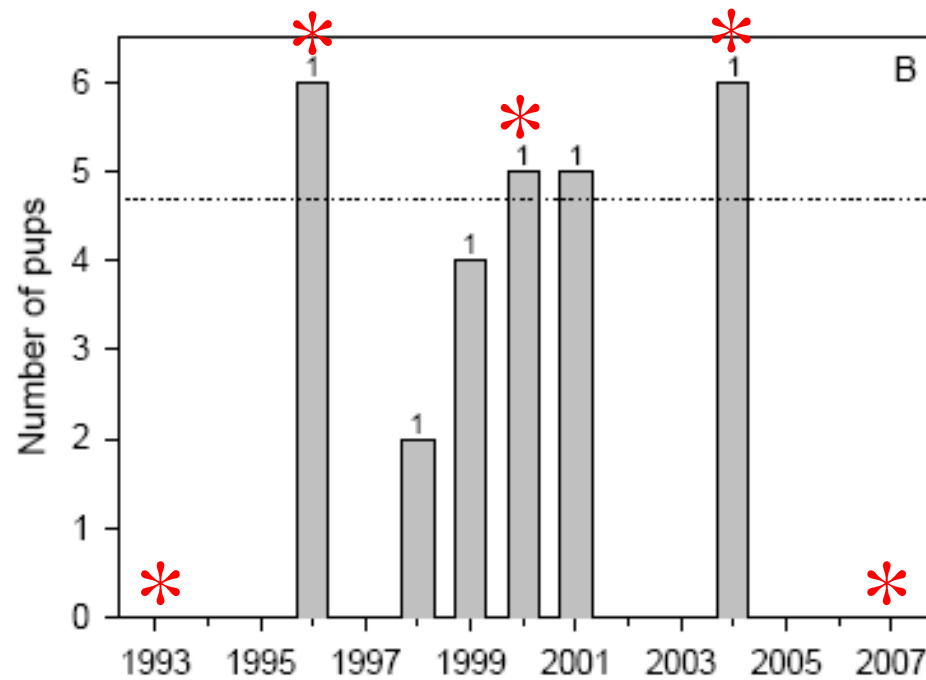
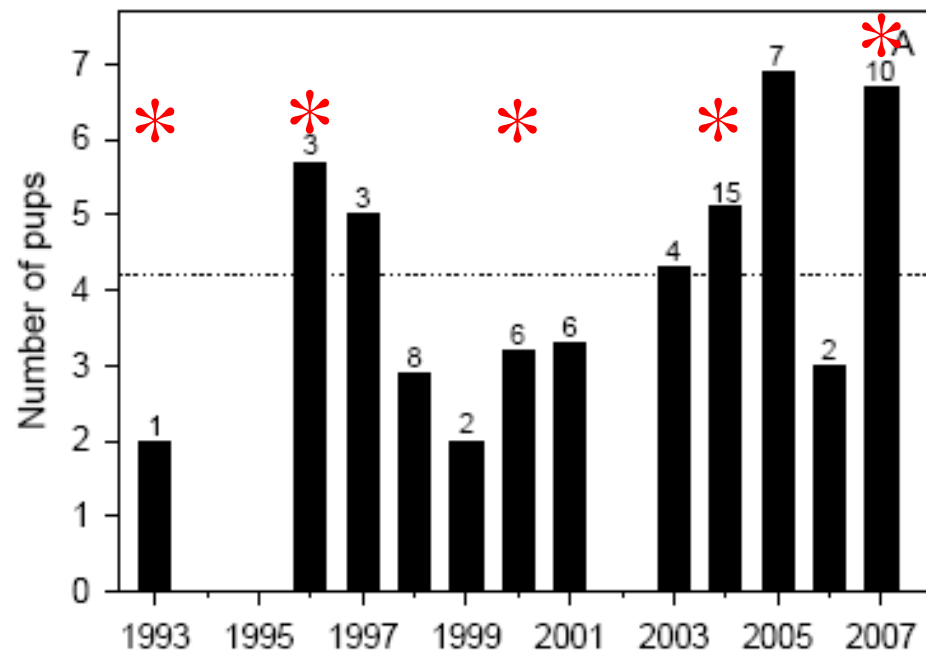
Lemmings

1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007

Year



From Cadieux et al. 2008



From Cadieux et al.
2008

Summary

- Nice 3-4 yr cycles
- Brown lemmings much more abundant than collared lemmings

1. Lemmings - Cycles fading out??

- Dens where the food is (geese or lemmings)
- Food affects % of reproductive dens but not measured litter size
- Red foxes present but at low densities
- Densities of Arctic fox decreasing??

3. Lemmings x Foxes

- Strong effect of lemmings on population dynamics of foxes
- Foxes also use bird colonies and sea ice





спасибо





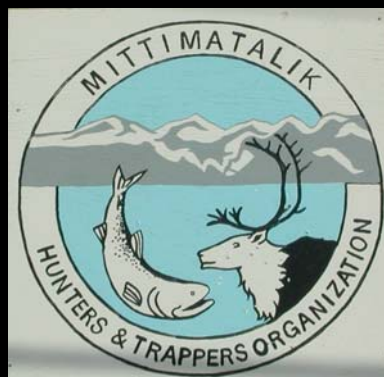
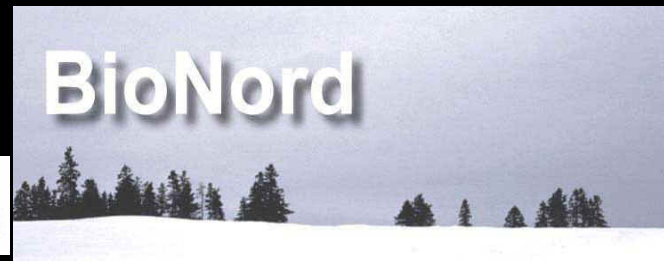
BioNord

ArcticNet

$\triangleright \rho \triangleright^{\text{fb}} C^{\text{fb}} \triangleright \Gamma^{\text{b}} \quad \triangleright \rho \sigma \triangleleft^{\text{fb}} \Pi^{\text{c}}$



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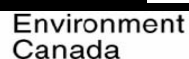


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