



Weather variability has no direct impact on adult survival in a High Arctic carnivore

Clément Chevallier¹, Gilles Gauthier², Dominique Berteaux¹

chevallier.clement@gmail.com



1, 2

Summary

- Natural causes of carnivores mortality are poorly known.
- Our goal was to determine if the weather is a factor causing mortality in wild canids.
- We used satellite collars to determine monthly survival of Arctic foxes during an 8-year study in the High Canadian Arctic.
- We tested local and regional weather variables and their interaction with prey availability.
- We found no evidence that weather affects monthly survival of Arctic fox neither directly nor *via* prey resources.

Introduction

- Understanding the links between biotic and abiotic factors with wild populations is one of the main challenges of this century.
- Local weather may impact individuals through direct effects, modifying the energetic costs of thermoregulation or indirect effects, through changes in predator-prey interactions

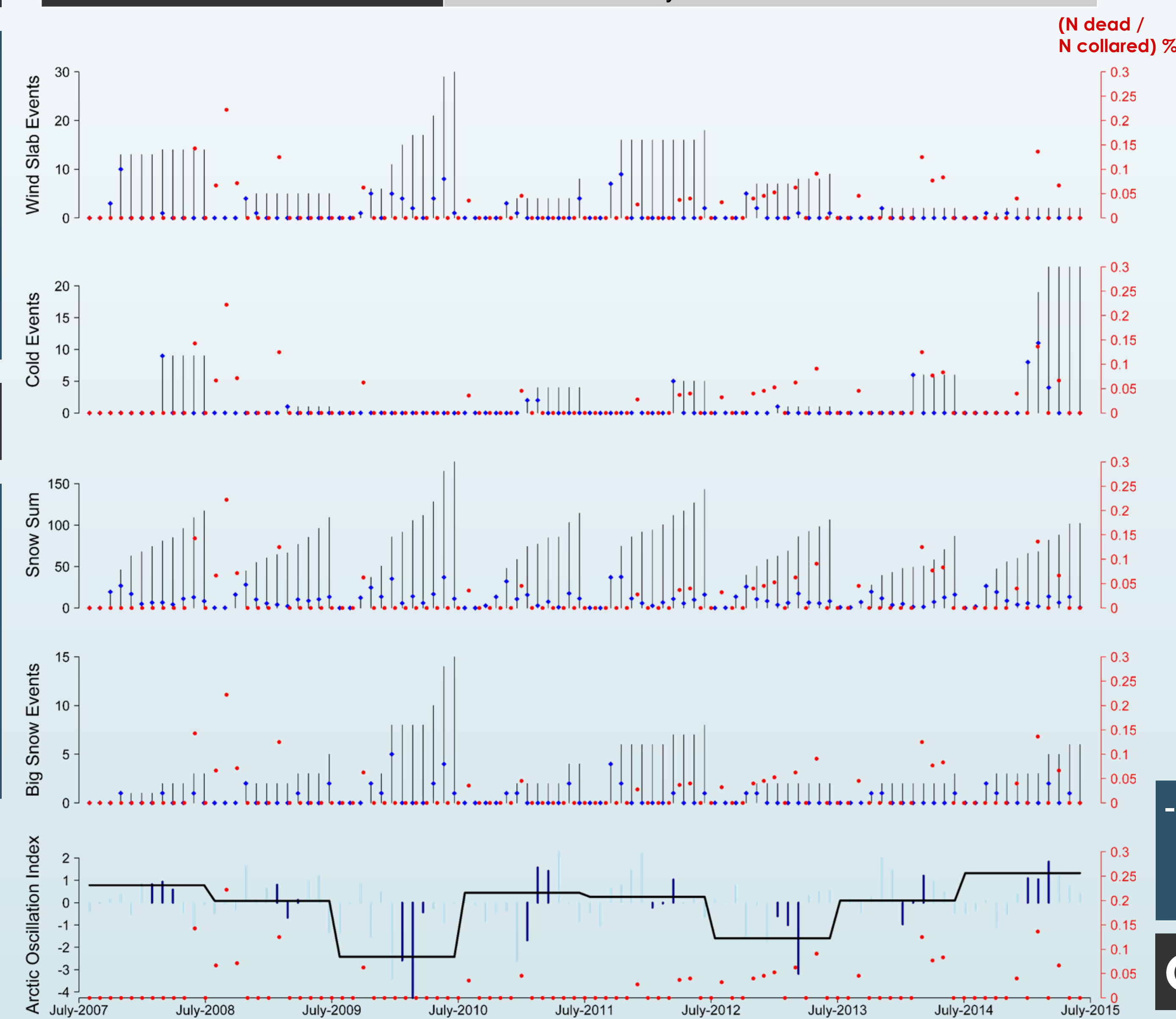
Objectives

- Identify seasons at risk for Arctic foxes.
- Identify the effects of meteorological events on survival rates.
- Decipher the impact of meteorological conditions on arctic foxes survival *via* resources accessibility.

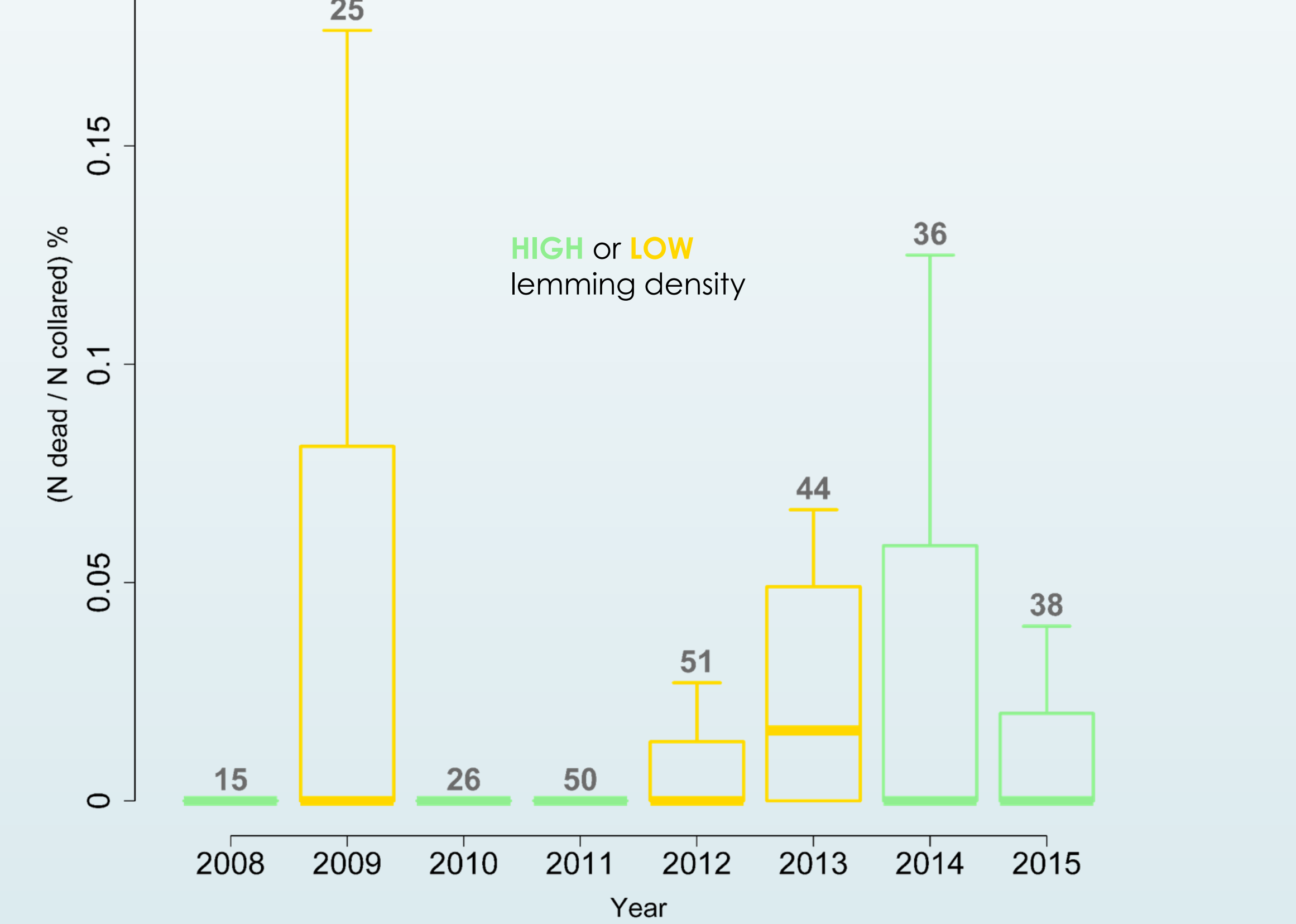
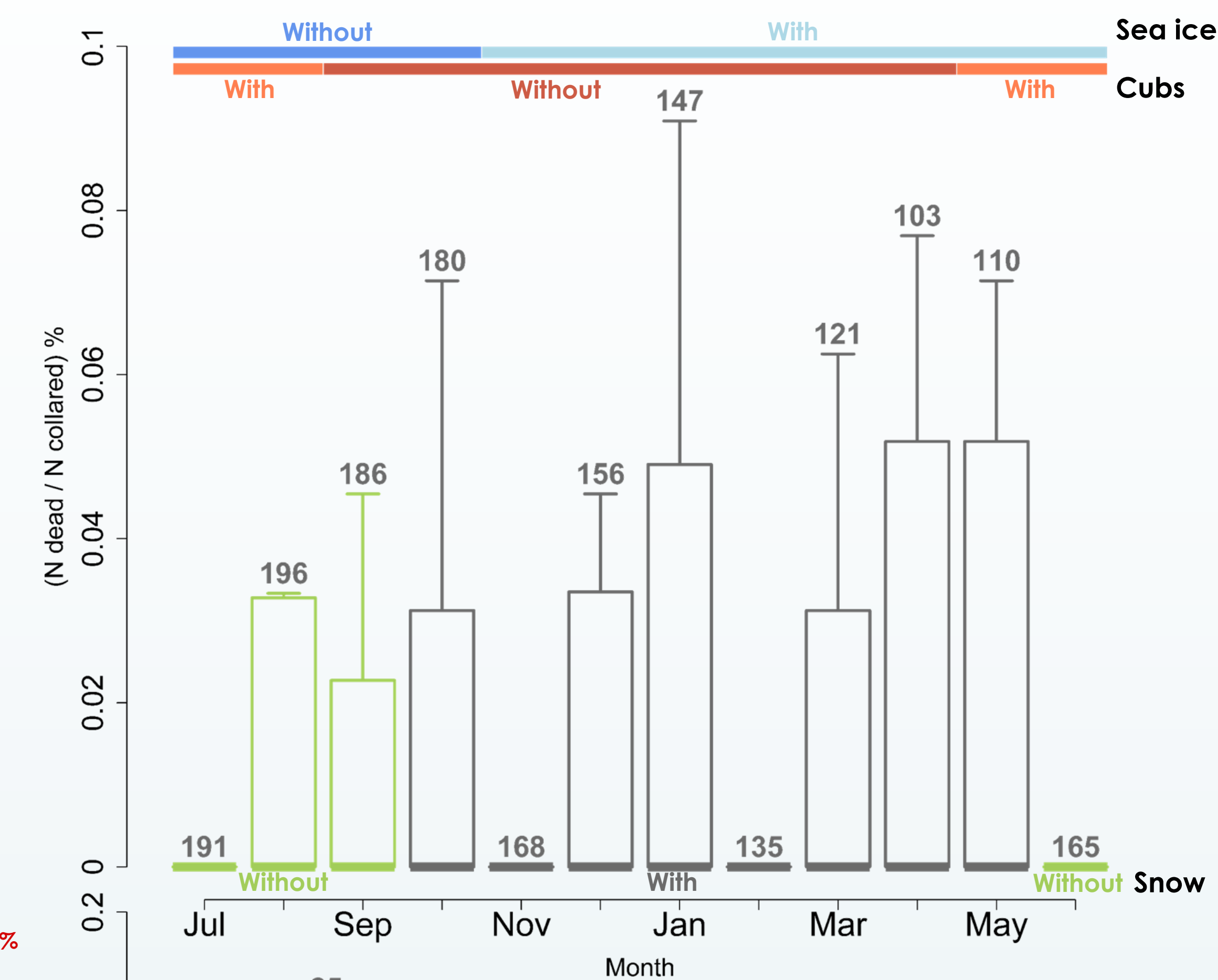
Methods

- Arctic fox monitoring: 132 foxes (64 ♂ and 68 ♀) recorded 1,832 times as alive and 30 times as dead with radio collars.
- Weather covariates were used monthly and seasonally. Seasonally values were obtained by accumulation since the beginning of the season
- Known Fate Capture-Recapture models, selection by AICc

Meteorological covariate	Definition
Extreme Cold Event	Days/month with daily mean temp. <-40°C
Sum of Snow precipitation	Sum of monthly snow precipitation
Wind-Slab Event	Sum of days/month with both mean wind speed >5 m/s and mean snow fall >0.3e-04 kg/m ² /s or mean wind speed >5 m/s with a snow fall mean >0.1e-04 kg/m ² /s during the 10 days before
Big Snow Event	Sum of days per month with mean daily snow precipitation > 0.4e-04 kg/m ² /s
Arctic Oscillation	Monthly Arctic Oscillation index



Results



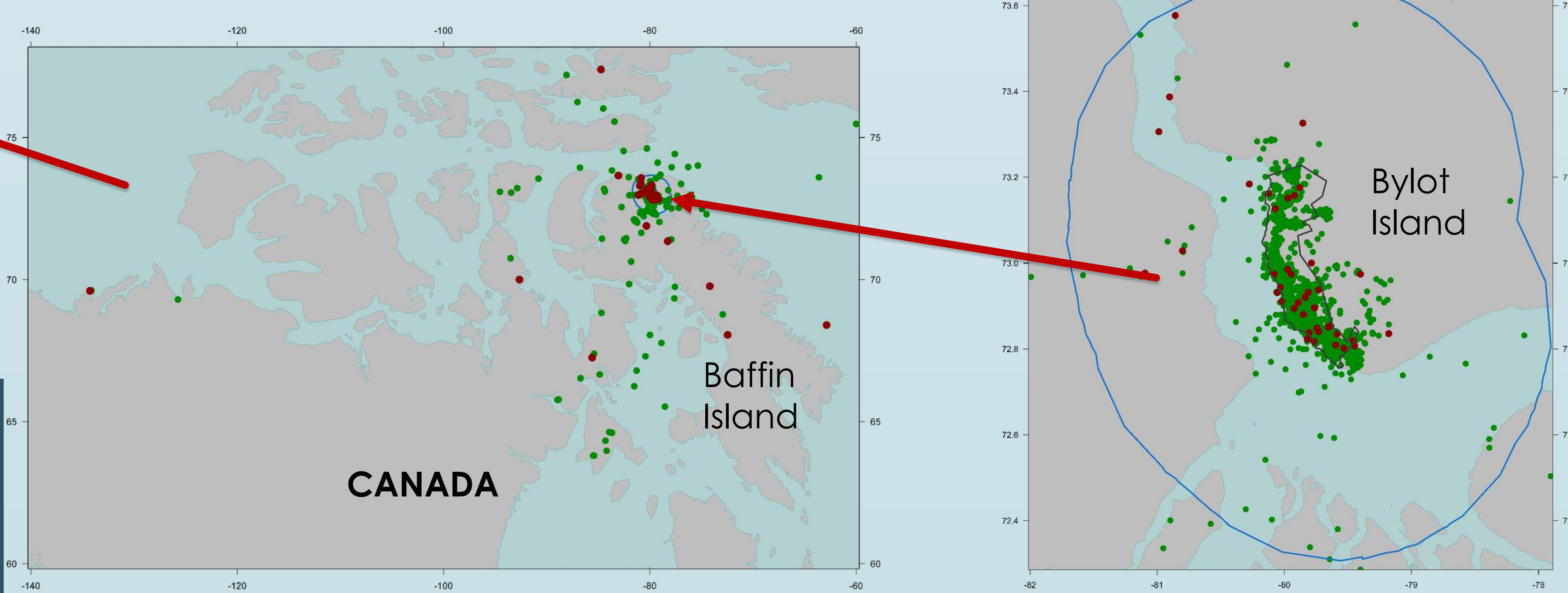
- No direct or indirect effects (*via* prey accessibility) of meteorological covariates on survival probability of Arctic foxes.

Conclusion

- The survival of terrestrial predators is difficult to understand from just few factors.
- Survival variability may rather be linked to numerous minor effects such as local hunting/trapping, diseases, predation by red foxes, starvation, accidents, etc.
- We suggest to focus future investigations on winter resources dynamics as we lack data on this topic.

Acknowledgments

We thank the people who helped us on the field and who worked directly or indirectly on the arctic fox project. We thank the Bête-Berteaux, and Gauthier Laboratories. We also thank Guillaume Souchay and Nicolas Casajus for their advice on analysis. The following organizations provided support in a form or another :



Sirmilik National Park, Bylot Island, Nunavut, Canada
Study area: ≈ 600 km²
≈ 100 dens

● Fox recorded dead ● Fox recorded alive ○ Buffer (foxes recorded out of this buffer are not considered)

