

The Effect of Snow Percentage Decline in the Arctic Environment on Species Interactions of Arctic Foxes

Kali Van Keuren, Annabella Duncan

New College of Interdisciplinary Arts & Sciences, Arizona State University – West Campus, Phoenix, AZ 85069

Research Questions and Hypotheses:

- As snow cover percentages in the Arctic are declining due to climate change, how will that effect the species interactions of the Arctic foxes?
- Decreasing percentages in snow cover in the Arctic will cause less resource availability, and thus will push Arctic foxes to compete with other species for habitat, food, and much more.

Introduction:

- As climate change decreases snow percentages cover in the Arctic, species that live there are undergoing changes that affect they way they interact and how they survive in the Arctic environment
- Arctic foxes are demonstrating significant altered species interactions as a direct result of snow cover percentage decrease such as competition with other predators for resources, reproductive capabilities, and so much more

Methods:

Conclusions will be drawn from previously published scholarly, peer-reviewed articles

Results:

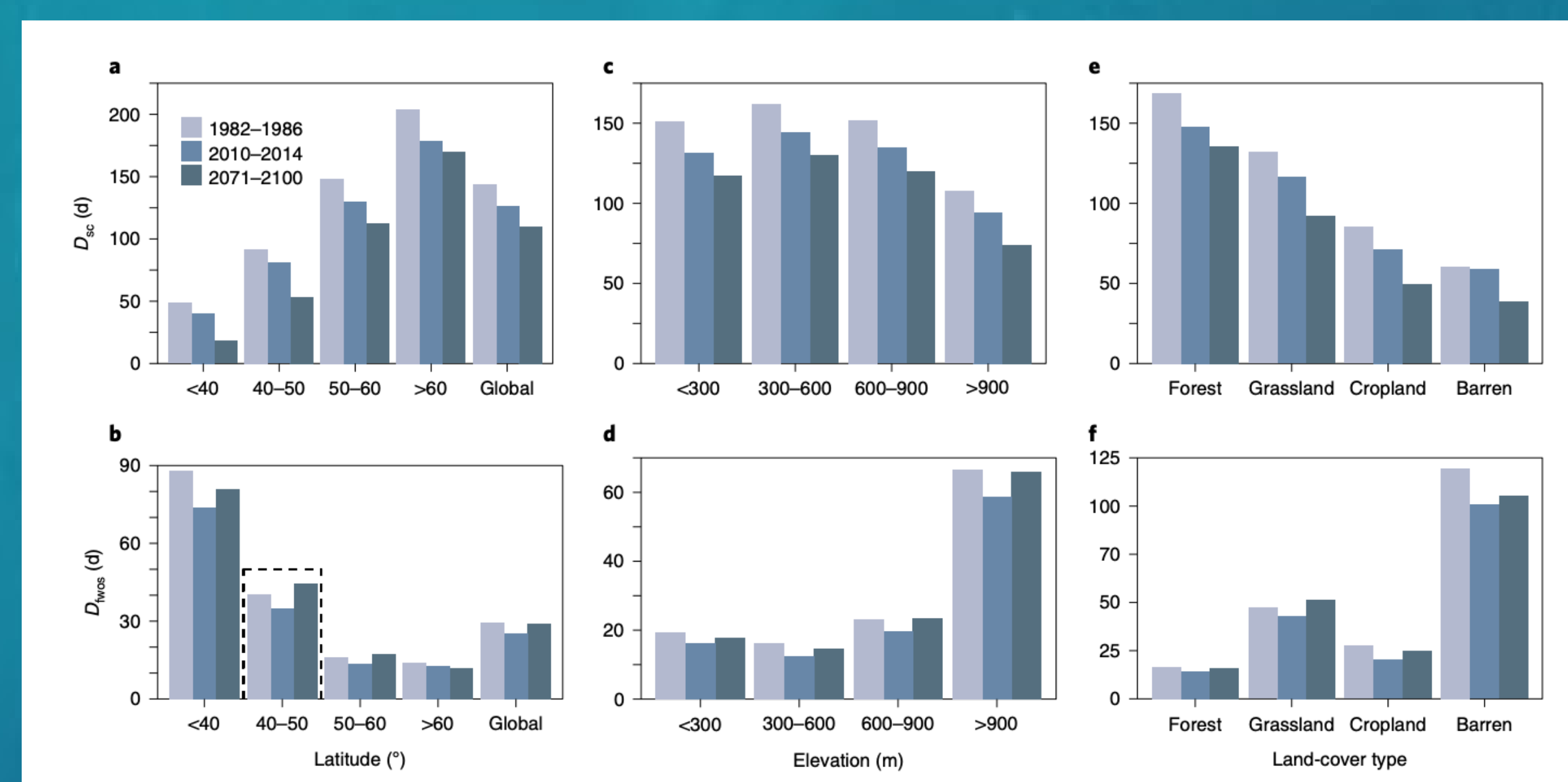


Fig. 2 | Observed and predicted values of Dsc and Dfwos (predictors of subnivium conditions) for historical (1982–1986), current (2010–2014) and future (2071–2100) periods. a, b, Dsc (a) and Dfwos (b) averaged over latitude. Dsc experienced a consistent and widespread decrease and is predicted to decrease in the twenty-first century. Dfwos is predicted to increase at mid-latitudes as highlighted by the dashed line box. c, d, Dsc (c) and Dfwos (d) averaged over elevation. e, f, Dsc (e) and Dfwos (f) averaged over land-cover category. (5)

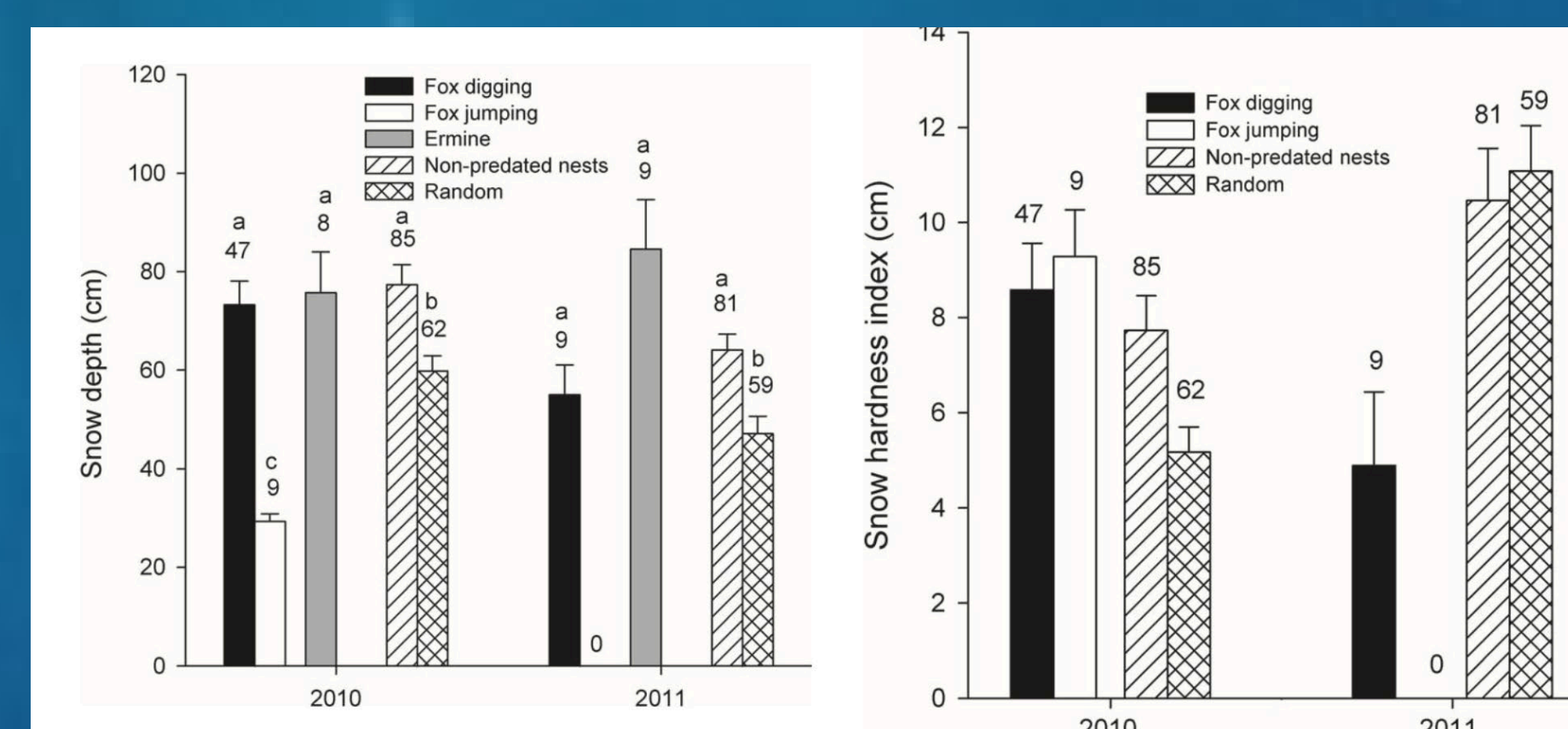
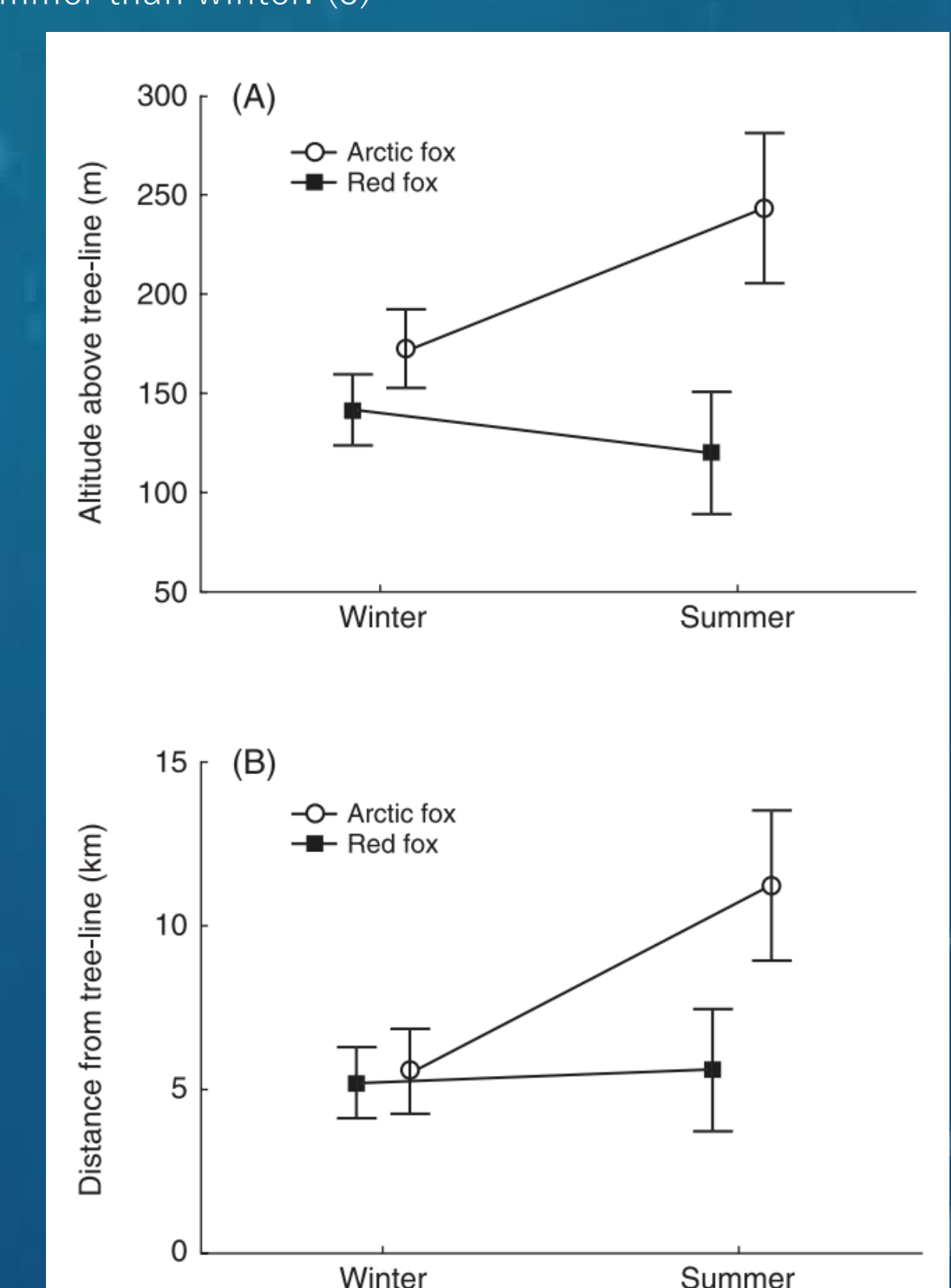


Fig. 4 | Snow depth measured at tunnels where foxes (*Vulpes lagopus*) made predation attempts on lemmings by digging or jumping, at lemming nests predated by ermines (*Mustela erminea*), at non-predated nests, and at random locations, Bylot Island, Nunavut, Canada. Error bars represent SE and n values are shown above bars. Bars with the same letter are not significantly different ($P < 0.05$). (2)

Fig. 5 | Snow hardness index measured at tunnels where foxes (*Vulpes lagopus*) made predation attempts by digging or jumping, at non-predated lemming nests, and at random locations, Bylot Island, Nunavut, Canada. Error bars represent SE and n values are shown above bars.

Figure 3 | Mean relative altitude (A) and distance from tree-line (B) of Arctic and red fox fecal samples in winter and summer. Feces from red foxes were found at the same altitude and distance from tree-line during winter and summer, whereas Arctic fox feces were found at higher altitudes and further from the tree-line during summer than winter. (3)



Discussion:

- As the global temperatures rise, it is causing decreasing snow percentage cover in the Arctic, demonstrated in figure 1 (1).
- As snow cover decreases, the main food source for Arctic foxes, lemmings, will be easily available to other predators because the snow depth is not significant enough to protect them and therefore may cause competition with other predators in the ecosystem. Figures 4 and 5 demonstrates how Arctic foxes can reach them easier due to declining snow percentage change (2)
- Climate change has directly affected the duration and extent of the subnivium which protects against the freezing winter temperatures, refer to figure 2.(5)
- Due to declining snow cover, Arctic foxes are moving further north due to food and habitat availability scarcity which causes competition with red foxes who predominantly live there. The red foxes will also compete with Arctic foxes for reproductive areas and Arctic fox cubs often undergo predation from red foxes. Their proximity leading to competition is shown in figure 3 (3).

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