

Arctic fox range shifts in a warming Arctic

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Introduction

Arctic warming is occurring four times faster than the global average, and species there are highly vulnerable to the impacts (1).

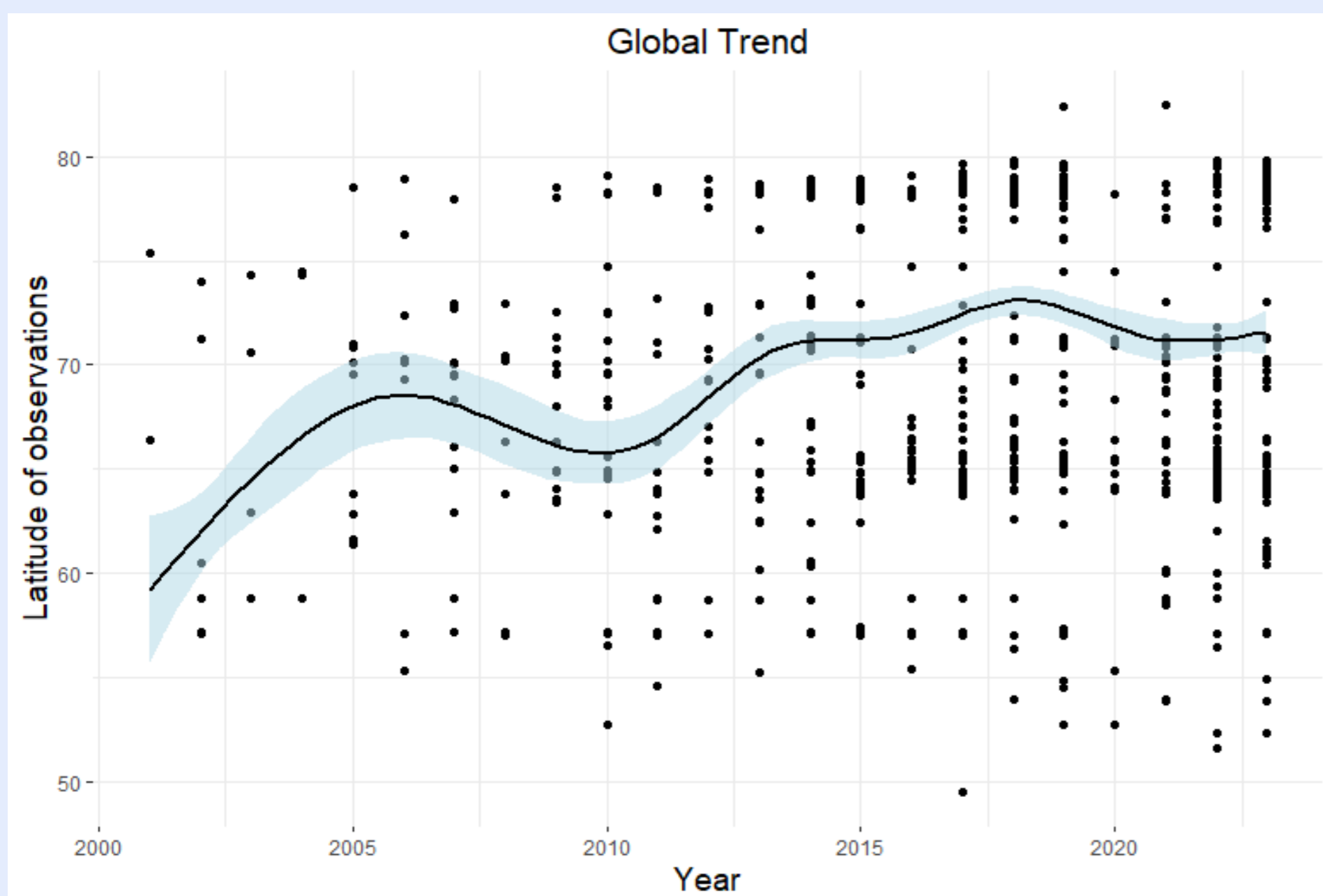
Arctic foxes (*Vulpes lagopus*) is one such species. They serve as vital indicators of high-latitude ecological dynamics (2).

We hypothesize that Arctic fox distribution is shifting to higher latitudes due to the impacts of global warming.

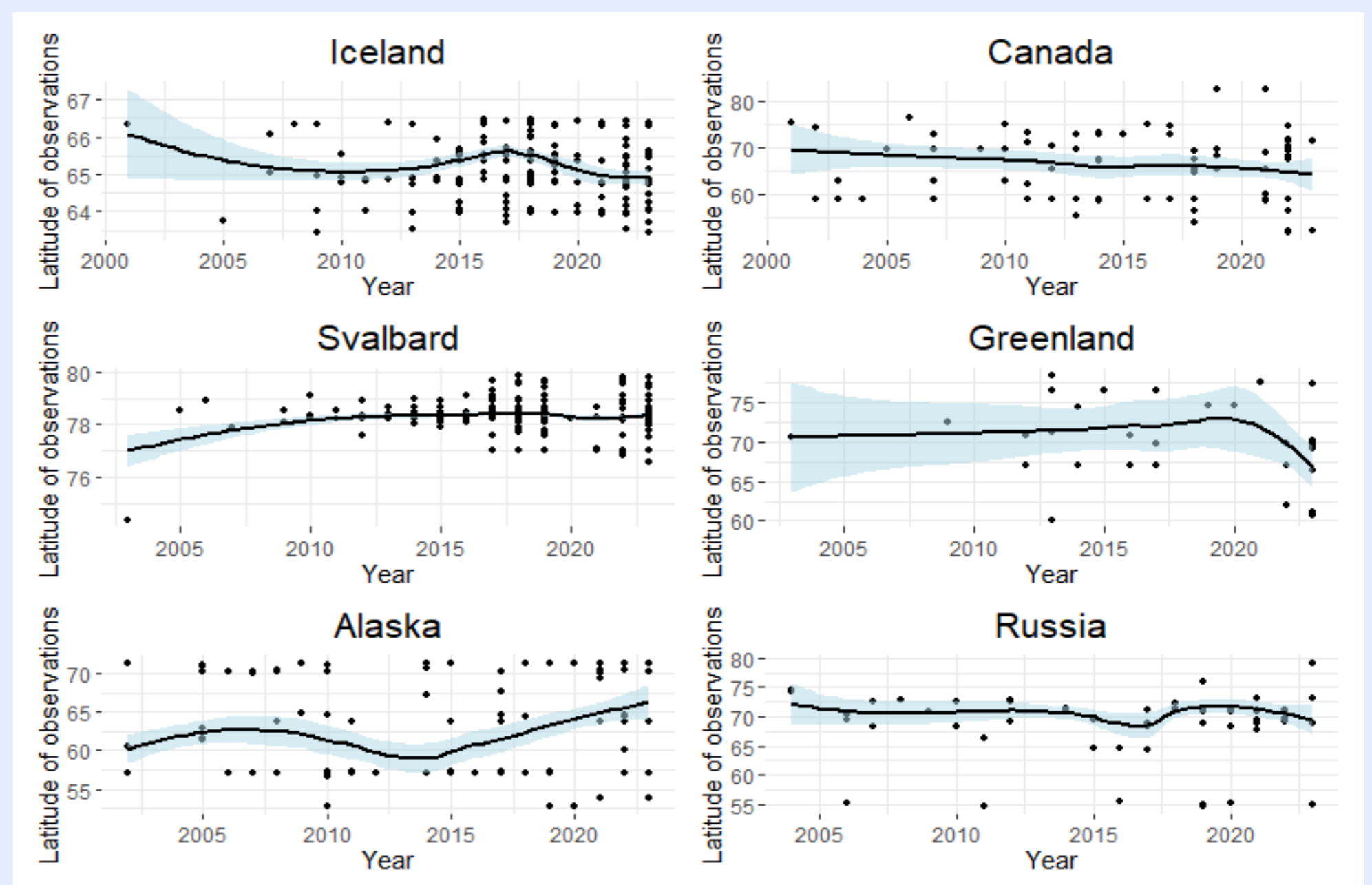
Methods

We collected Arctic fox data from the GBIF database for the years after 2000. Utilizing R, we generated scatterplots featuring trendlines and GAM models to evaluate the significance of latitude changes over time. This analysis was conducted for both 1) the entire dataset and, 2) regions with the highest number of observations.

Results



Our results revealed a shift to higher latitudes over time for the overall data (p -value $< 2e-16$).



Observations increase in latitude in Alaska (p -value = 0.001) and decrease in Canada (p -value = 0.035) over time.

In other regions there was not a significant change in latitude.

Discussion

The observed rise in latitude can be explained by the significant increase in Alaska. The relatively warm conditions along the Pacific coast of Alaska, influenced by warm ocean currents, contrast with the colder northern part (3), which can lead to the movement of Arctic foxes towards the north.

Northern Canada is overall colder than other regions of the same latitude. This may limit the Arctic fox's movement to higher latitudes. Instead, they might be shifting southward or exploring higher altitudes.

Various factors, such as competition with red foxes and changes in prey abundance – indirect consequences of climate change – may also contribute to the Arctic fox distribution dynamics.

Conclusion: There is a trend towards higher latitudes, but there are indications of a potential northern limit, influenced by the interactions of multiple factors shaping the Arctic fox's habitat.



References

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