# Comparative Analysis of Current and Future Niches Between *Antilocapra americana* and *Odocoileus virginianus*

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## Introduction

This study is focused on two deer species: the Pronghorn, *Antilocapra americana,* and the White-tail deer, *Odocoileus virginianus.* The study is based on the two species that are located in parts of Nevada, New Mexico, and the Southeast part of the United States. A combination of research like climate data and the location of these two endangered species was put together for this study to discover the preferred ranges and serve as a good prediction of the future niche environments these species will be forced into due to the changing environment.

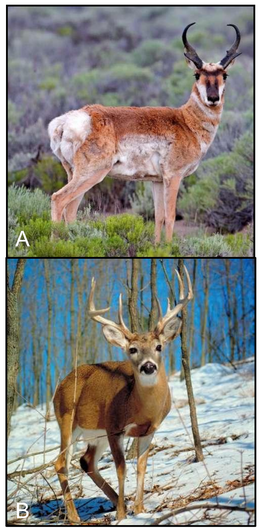


**Fig 1A** *A. americana (britannica.com)*
**Fig 1B** *O. virginianus (britannica.com)*

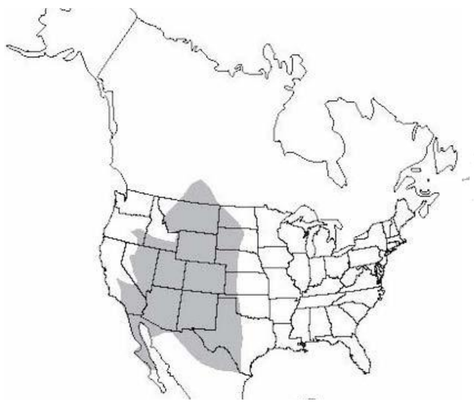

**Fig. 2**: *A. americana* range

**Fig 3**: *O. virginianus* range

## Methods

Our research data was gathered from Global Biodiversity Information Facility (https://www.gbif.org/occurrence/search). We had over 35000 geographic locations for *O. virginianus* and over 1900 for *A. americana*. The software apps Maxent and DIVA-GIS were used to analyze the data collected from GBIF and compile it onto a world map (Figures 4 and 5). For both of our selected species, we compared the current climate to the future climate and how each of these animals are expected to change their niches. The future data is based on predictions from Worldclimb.org in the year 2070. Our results were based on our figures analyzed from DIVA-GIS.

## Results

Figures 4 and 5 show niche models representing the current and predicted future distributions of *A. americana* and *O. virginianus*, respectively. The current distributions are shown in blue and purple, and the future distributions are shown in red and purple. The future distributions are where the populations are expected to be by the year 2070.

As can be seen in Figure 4, *A. americana* is mainly distributed in western North America, with scattered populations in Asia and South America. Most of the populations are predicted to move very slightly north, and will decrease to a small degree. As can be seen in Figure 5, *O. virginianus* is distributed in eastern North America, in much of western Europe, and, to a lesser degree, in South America, eastern Asia, and eastern Australia. The populations are more widespread than that of *A. americana*. The North American populations are predicted to move north and east into Canada and Alaska, and will increase in size. The European populations are predicted to move north towards Scandinavia and Russia. The easterly Asian populations are predicted to move only slightly north, with some predicted to migrate to Russian and Mongolian areas. The South American and Australian populations are predicted to move slightly south or stay somewhat in place. The two species, both in current and future distributions, overlap slightly in North and South America and perhaps slightly in Asia.

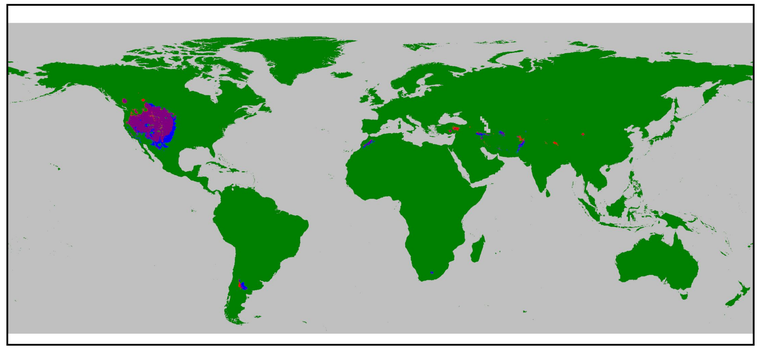

**Fig. 4**: Niche model showing the ranges of *A. americana*

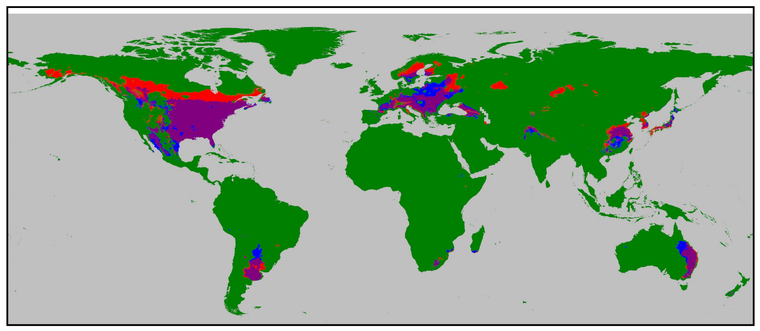

**Fig. 5**: Niche model showing the ranges of *O. virginianus*

## Discussion

Climate change is a very controversial topic split between individuals that grasp the reality of climate change and individuals that do not. However, scientists are finding new ways to retrieve evidence and eradicate the thought of climate change not being real. That is why we look at species of animals and their behaviors to fully understand how humans have been impacting this Earth and the creatures that reside on it. By looking at the current and future niches of both *Antilocapra americana* and *Odocoileus virginianus*, we have discovered what appears to be solid evidence of a direct correlation between increasing temperature and the migration of these two species. There is a clear shift north of both *Antilocapra americana* and *Odocoileus virginianus* towards colder temperatures, but it is evident that the *O. virginianus* is migrating further north. This is troubling information that should not be taken lightly. By analyzing their future migration, it is apparent they are being pushed to the corners of the continent. This is where humans impacting the environment can become threatening to species that do not adapt, because once they run out of areas to migrate towards there could be mass extinctions. There are always clues of how climate change is a significant problem, and this can be shown within species that are struggling to adapt and are instead increasing their migration ranges.

## Conclusions

- The observed current niches and the expected niches overlap, indicating a high chance of accuracy of future niche predictions.
- The ranges of *O. virginianus* will likely shift substantially with climate change, while that of *A. americana* will not shift very much.

## Works Cited

**"File:Odocoileus Virginianus Map.svg."** ***File:Odocoileus Virginianus Map.svg - Wikimedia Commons*****, 9 Nov. 2010, commons.wikimedia.org/wiki/File:Odocoileus_virginianus_map.svg.**

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