Similarities between the Niches of Vulpes Vulpes and Canis Latrans

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Introduction

In this study, we focused on two closely related species; the red fox, *Vulpes vulpes,* and the coyote, *Canis latrans*. Both species can be found in regions of North America, with *Canis latrans* having a widespread distribution, and *Vulpes vulpes* being located predominantly on the East Coast, as well as the European subcontinent and Australia. By using data based on GPS coordinates of known species from the GBIF database, we can make predictions about the optimal climate that each species can inhabit suitably, and whether climate has an effect on if they inhabit and compete in similar regions. In this study we also will employ niche modeling and used it to help determine whether climate effects presently observed niches of the species and future niches.

Fig. 1. *Vulpes vulpes*
(littleowlblog.com)

Fig 3. *Canis latrans*
(wikimedia.org)

Methods

We started our research by collecting data for the coordinates of niches for Canis latrans and *Vulpes vulpes*. We did this by using the geographic information system (GIS) (http://www.gbif.org/) . We took this data from the GIS and exported it into Microsoft Excel to create a csv. File . The csv. file that contained the longitude and latitude of niches for both the *Canis latrans* and *Vulpes vulpes* was transported into DIVA-GIS (http://www.dive-gis.org) A map was developed from the data showing where each species' niches can be found in North America. Then we imported the csv. files of the coordinates of both species into the Maxent program and created a niche model .With our data we were able to predict and map the future distribution of niches of the species we investigated and the climates associated with them. Lastly we compared the niche distribution of *Canis latrans* and *Vulpes vulpes* to each other as well as their future niche distributions under climatic conditions.

Results

Our maps of the distribution of *Canis Latrans* (fig. 5) and Vulpes Vulpes (fig. 4) in North American showed that both species' niches are located in similar areas. Both species mainly live in areas located in America, and only a few are dispersed in Canada. According to our data the *Canis Latrans* species are dispersed over a larger region than Vulpes Vulpes. *Canis Latrans* are seen in higher numbers on the on the Western side of America and in Mexico.
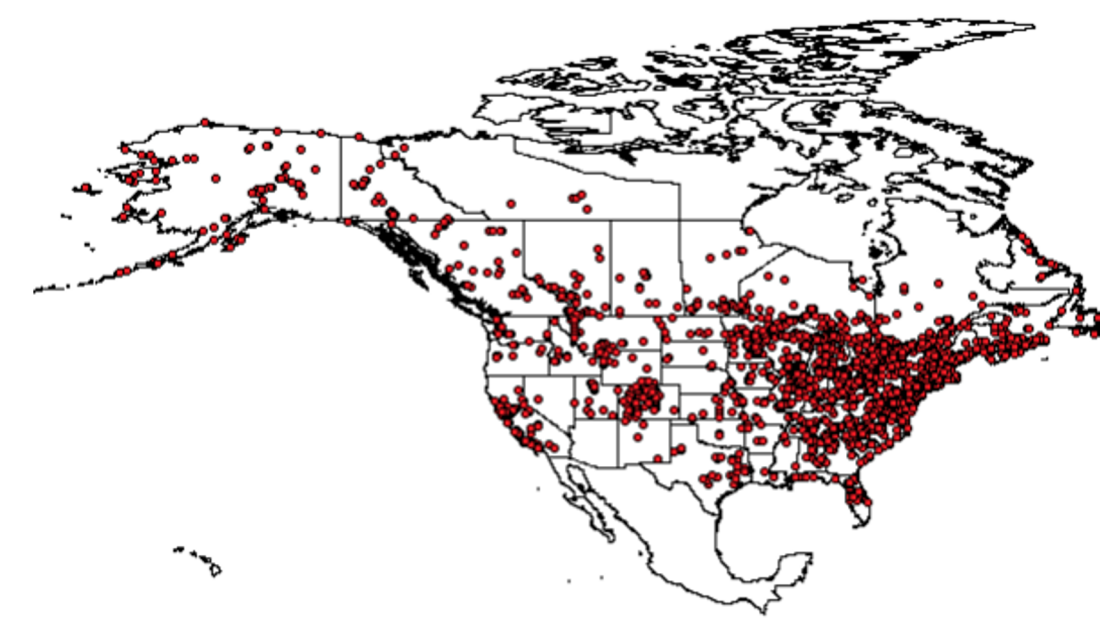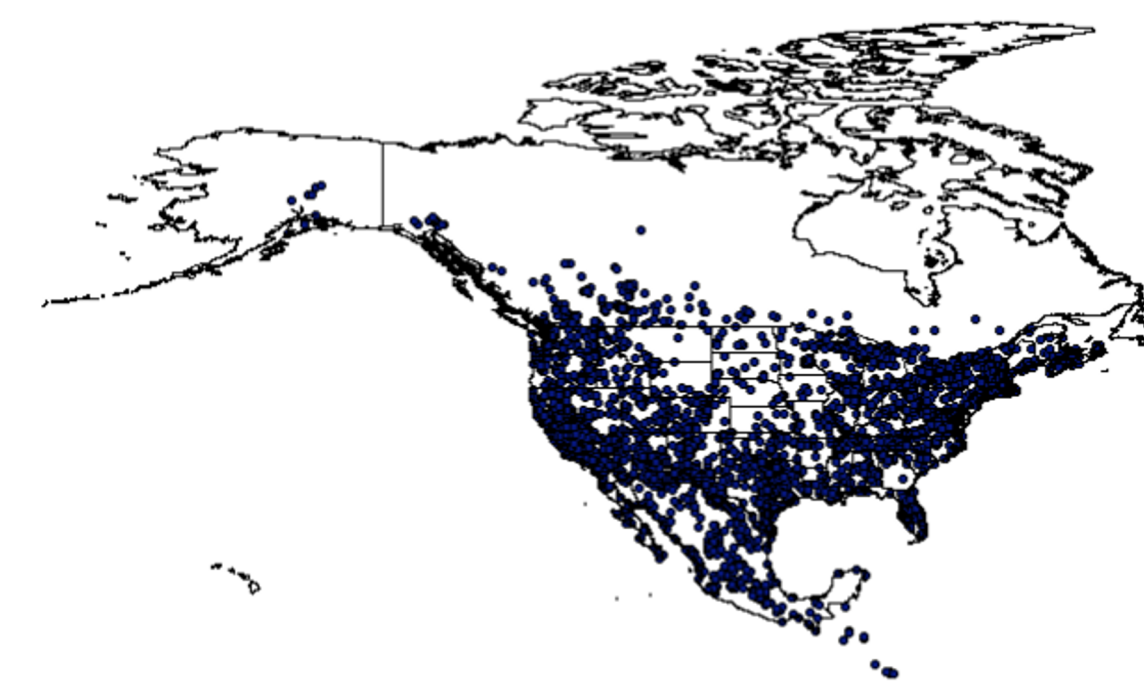
Fig. 4. Distribution of Vulpes Vulpes

Fig. 5. Distribution of Canis Latrans

The niche models for *Canis latrans* (fig. 6) showed that there is little change from the distribution of current and future niches. The purple region on the map displayed the region that the *Canis latrans* species will inhabit in the future and currently inhabit. This is the largest region on the niche model. A small portion of the map shows a difference in the future and current niche distribution. The red portion of the map indicates where the future niches of *Canis latrans* will be located. From this, we can deduce that *Canis latrans* will begin to migrate north in coming years.
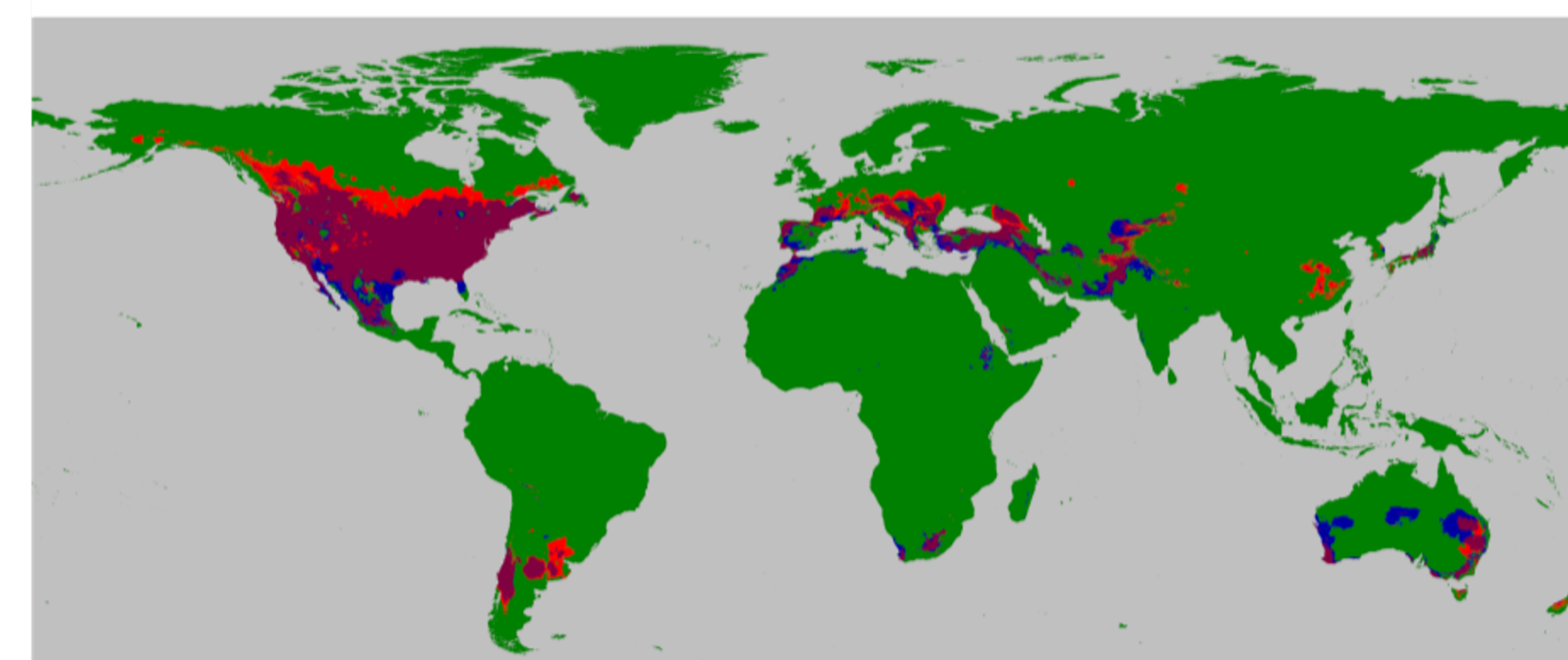
Fig. 6. *Canis Latrans* niche model for current and future distributions

Discussion

The model we have compiled from the DIVA-GIS data we used shows the beginnings of what may be a look into the future. With global warming and climate change being very real threats to our environment, data like this can show just how these factors can play into the future of a species. Looking at our niche model results received in the experiment, it appears that *Canis latrans* populations will begin moving northward in the near future. It is reasonable to say that the cause of this is increasing global temperatures and climate change, which can affect factors such as precipitation and humidity, rather than just temperature. A change in precipitation could be cause for the move as well, with changes in this affecting the food, water, and vegetation *Canis latrans* depends on to survive, either directly or indirectly. However, due to the movement being directly northward, rather than south or east to more precipitous locations on the coast in the US, temperature is most likely the driving force for this potential migration. Examining the future niches of this one species shows the massive impact climate change can have, and the effect it has on the plants and wildlife of the U.S. alone is astounding. One animal's migration has the power to totally shift another animal's livelihood, as well as the livelihood of the environment around it.

Fig. 8. *Canis Latrans* (wikipedia.org)

Conclusions

• The future niche predictions are not very different regionally from the current niche models, so the results are probably accurate
• *Canis latrans* will have to migrate to maintain optimal habitat temperature
• Climate change is the main factor contributing to species migration

Works Cited

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