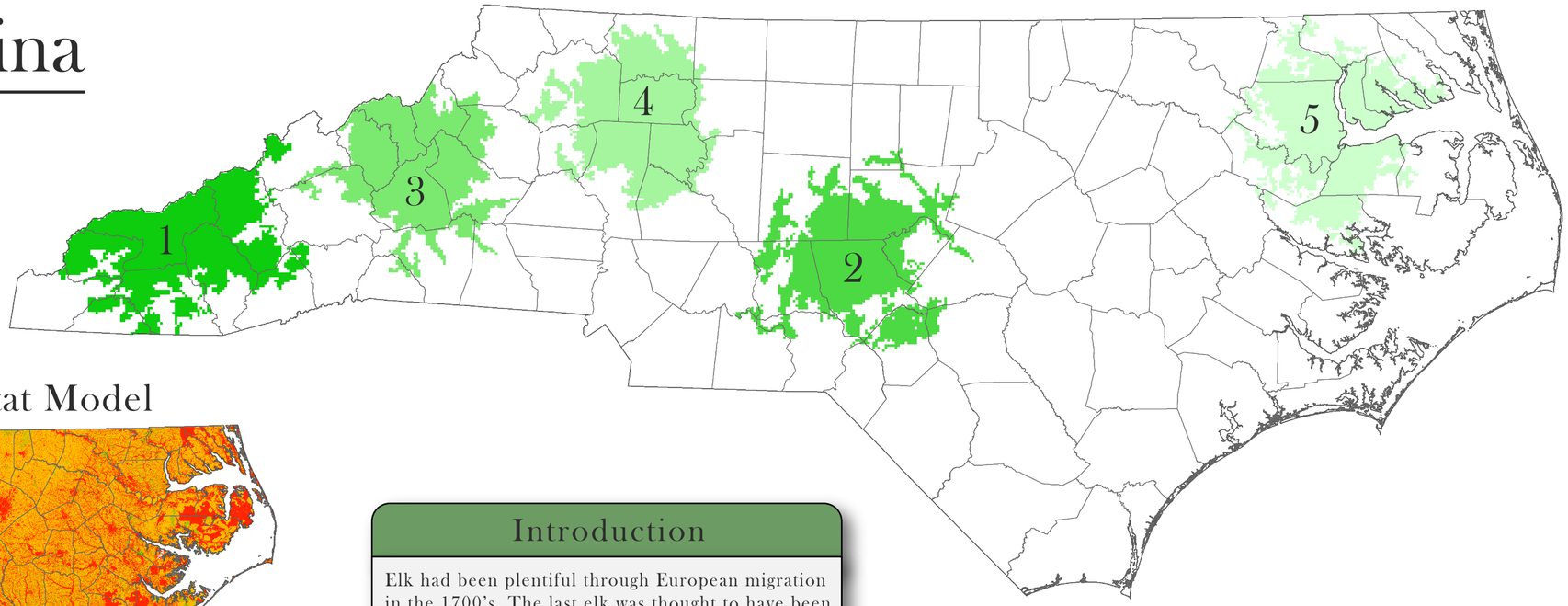
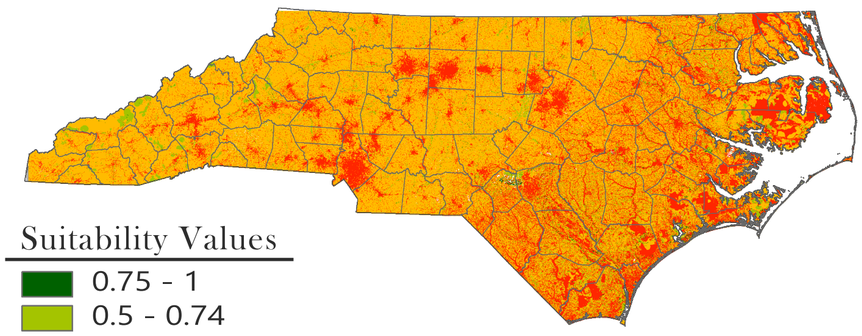
Elk Habitat Suitability Model for North Carolina

By Miguel Fernandez

Site Selection for Potential Elk Habitats

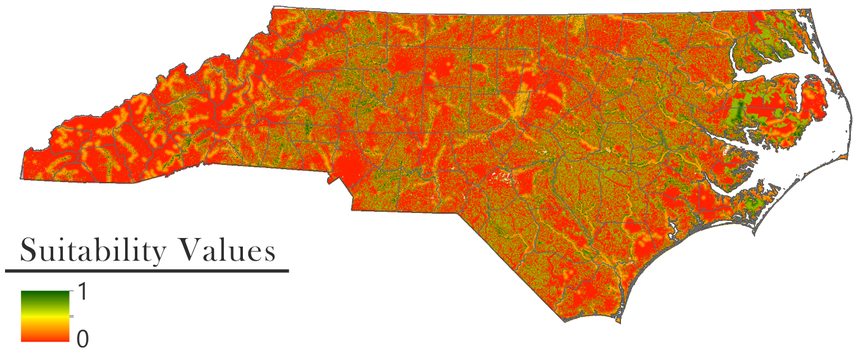


Final Habitat Model



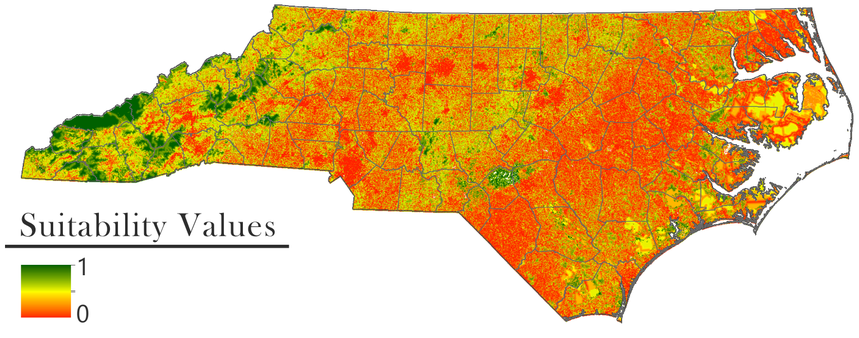
Suitability Values
- 0.75 - 1
- 0.5 - 0.74
- 0.25 - 0.49
- 0 - 0.24

Food Habitat Submodel



Suitability Values
- 1
- 0

Security Habitat Submodel



Suitability Values
- 1
- 0

Introduction

Elk had been plentiful through European migration in the 1700's. The last elk was thought to have been killed around the middle of the 19th century. There were several attempts to reintroduce elk on the east coast but all ended in failure due to hunting, disease, and removal due to crop damage. It was not until the early 2000's that a sustained elk population in the Great Smoky Mountains National Park existed and the National Park Service declared it a success. A study from NC State (Williams et al. 2015) cites the increase of woodlots and decrease of agricultural lands as a reason for the success of elk in North Carolina and the possibility for a wider range for elk populations. The purpose of this map is to identify suitable locations across the state of North Carolina. A large sustained population could generate revenue from park admissions or perhaps, hunting licenses.

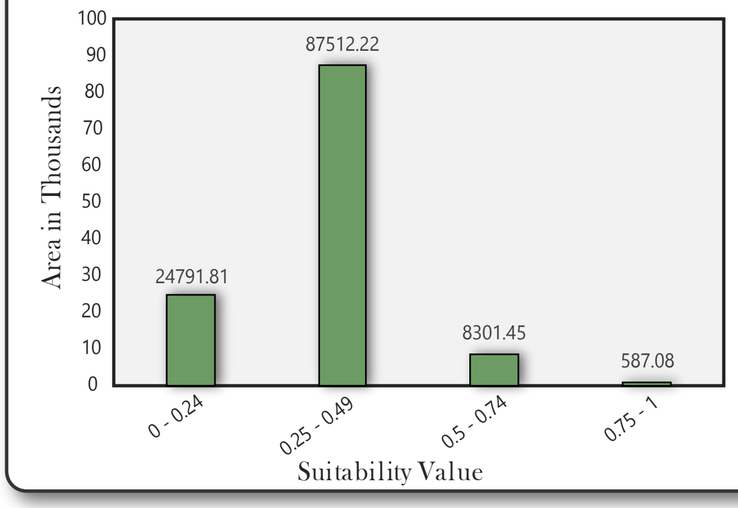
Methods

The food sub-model consists of land cover data as sources of food and surface water data. Distances were calculated from sources of food. A study by the National Forest Service (Innes, 2011), revealed that elk prefer habitats within 800 meters of surface water. The measures from sources of water were linearly rescaled on a scale from 1 to 0. The newly transformed values were combined to create the food sub-model.

The security sub-model contains data from protected lands (federal, state, and conservation), roads, and land cover as sources of cover. Distances were calculated before being linearly transformed on a scale from 0 to 1. The layers were combined to create the security sub-model.

The two sub-models were combined into one final habitat model. Five areas were located that were larger than 500 km^2 (Williams et al, 2015) that had the highest average suitability values as potential elk habitat sites.

Total Area for Elk Habitat Sites in km^2



Conclusion

Less than one percent of North Carolina contained land that was highly suitable, 6 percent had medium suitability, 72 percent had low suitability, and 20 percent was not suitable. The most suitable area based on this study shows the location of the small existing population of elk. The absence of major roads and large areas of protected land could be the factor that caused this area to be the most suitable. The second most suitable location contains the Uwharrie National Forest which could protect a new elk population. The results of this study could be updated periodically to capture recent changes in the landscape to keep the most suitable sites for an elk population current.

Sources:
Innes, Robin J. (2011). Cevus elaphus. *Fire Effects Information System.* U.S. Department of Agriculture. Retrieved from https://www.fs.fed.us/database/feis/animals/mammal/ceel/all.html
Manson, S., Schroeder, J., Van Riper, D., & Ruggles, S. (2017). *IPUMS National Historical Geographic Information System: Version 12.0* [Database]. Minneapolis: University of Minnesota. Retrieved from http://doi.org/10.18128/D050.V12.0
North Carolina Department of Transportation. (2018). NCRouteArcs Shapefile Format. Retrieved from https://connect.ncdot.gov/resources/gis/pages/gis-data-layers.aspx
U.S. Geological Survey. (2010). National Land Cover Data. Retrieved from https://www.mrlc.gov/nlcd11_data/php
Williams, S.G., Cobb, D.T., & Collazo, J.A. (2015) Elk Habitat Suitability Map for North Carolina. *Journal of the Southeastern Association of Fish and Wildlife Agencies, 2,* 181-186. Retrieved from http://www.seafwa.org/27%20Williams%20et%20al%20181-186.pdf