

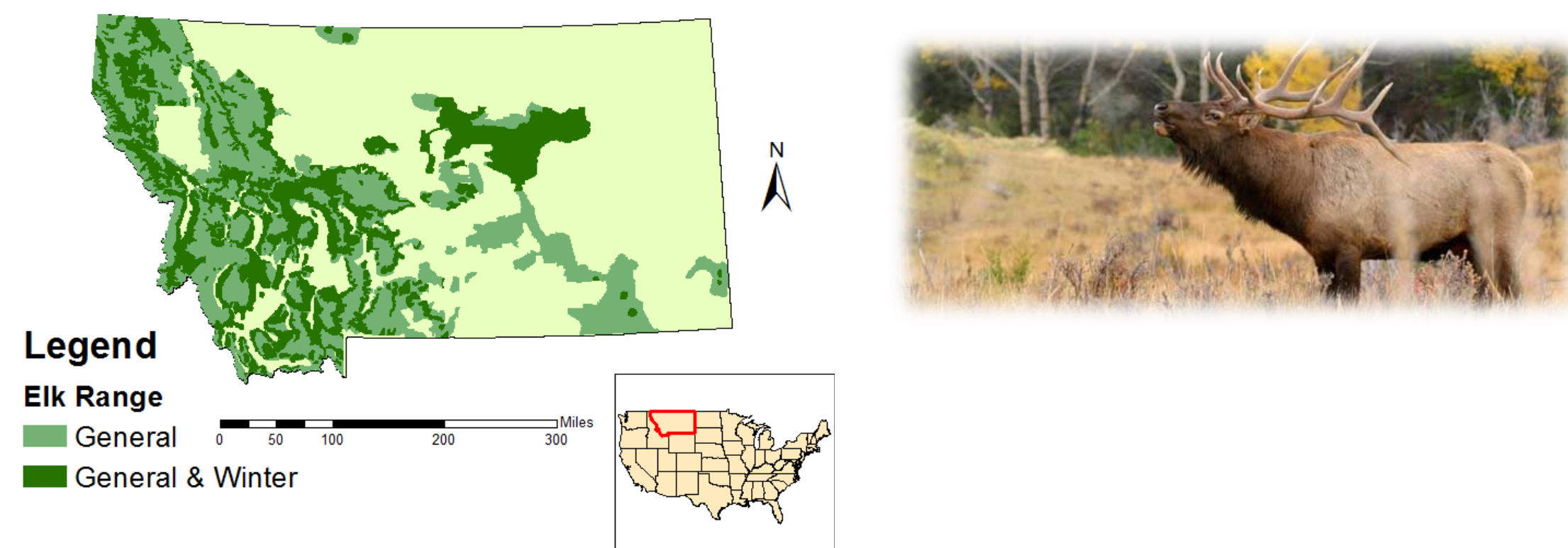
Suitability Analysis for Elk in Montana

Cartographer: Nathan Justice
 Date: December 2013
 Projection: NAD_1983_StatePlane_Montana_FIPS_2500_Feet
 Data Source: Montana FWP, Montana GIS Portal, Montana Cadastral
 References: USDA NRCS, Montana FWP Field Guide

BACKGROUND

Elk (*Cervus canadensis*) are an important resource in the state of Montana. They are a key source of food and recreation for many individuals, and their exploitation supports much of the state's income. The Montana Fish, Wildlife, and Parks department (FWP) strives to preserve sustainable elk populations for hunters and wildlife enthusiasts to enjoy. The FWP researchers have done considerable work tracking, recording, and protecting elk herds. The following map depicts elk distribution utilizing data collected by the FWP:

Elk Distribution in Montana



METHODOLOGY

Elk are a resilient and adaptable species. Elk populations range across a variety of different habitats, some of which are more suitable for elk than others. There are also factors within their distribution that negatively influence suitability. This project's purpose is to expose areas with higher elk suitability within their distribution. To determine suitability, preferred habitats and negative influential factors were considered.

Though found in diverse habitats, elk preference can be narrowed to the following 6 types: agriculture, grasslands, meadows, salt flats, conifer forests, and burnt forests. These habitats were isolated from a land cover layer and categorized based on research. *Figure 1* exhibits these habitats masked to the elk distribution area. In this analysis, more suitable areas represent more instances of these habitats. *Figure 2* is a density map for preferred habitats masked to the distribution area.

Some habitats cannot support elk. These habitats were also isolated from the land cover layer and categorized based on research, and include: urban or developed areas and mines. *Figure 3* is a density map for unsuitable habitats masked to the distribution area. *Figure 4* represents urban and developed areas. It features a layer of Montana towns and the largest twelve by population are symbolized differently for reference. A density analysis, present in *figure5*, was performed by town population rather than location density, and masked to the distribution area. Research suggests elk also avoid roads, notably open highways. A layer of highways in Montana was derived from a TIGER roads layer. A Euclidian distance analysis for two miles was performed on the highways. *Figure 6* shows the results.

Final suitability was determined by calculating reclassified rasters (taking into consideration positive and negative influence) of each factor. The outcome is presented in the conclusion.

RESULTS

Preferred Habitats

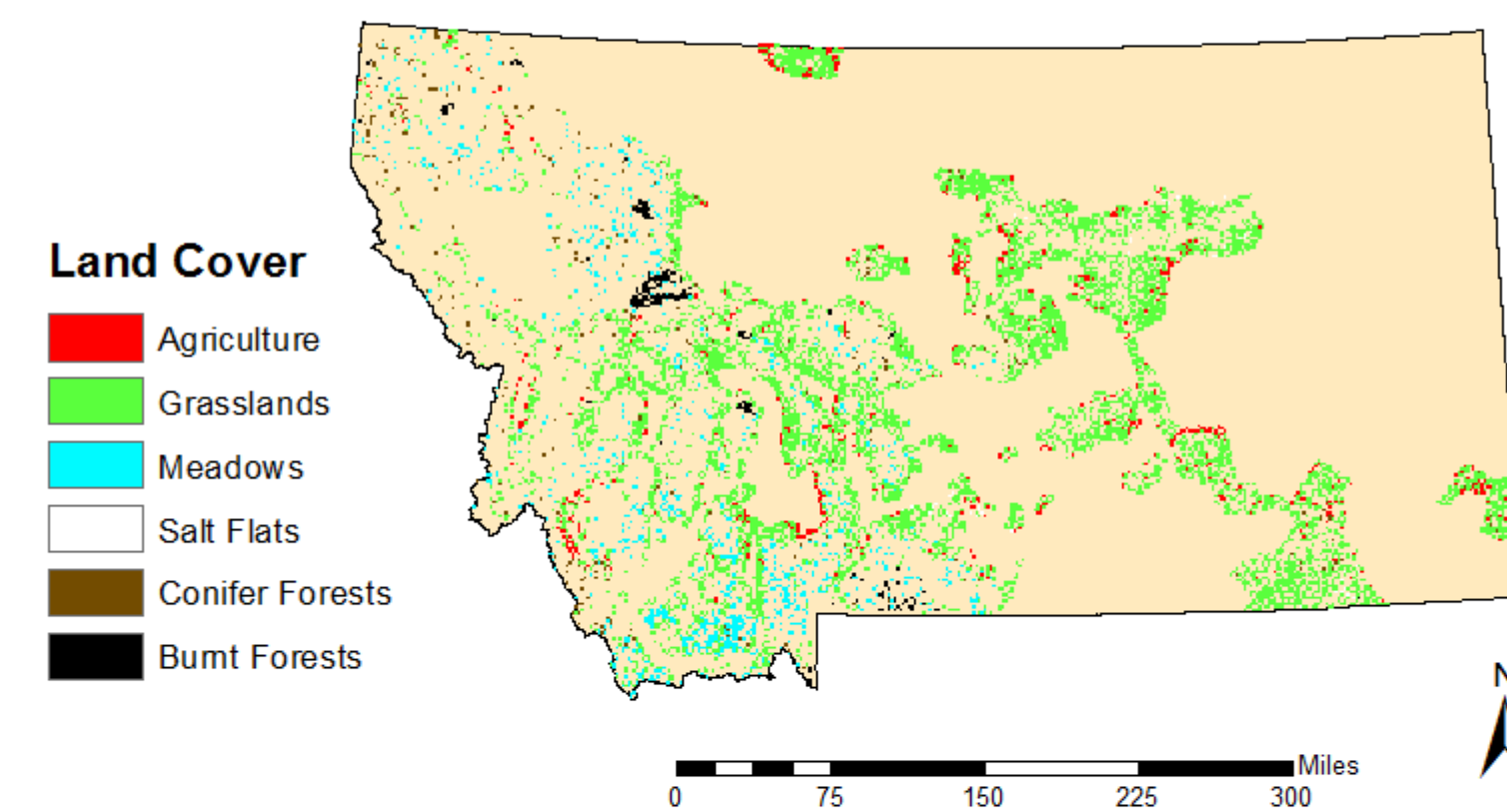


Figure 1.

Density of Preferred Habitats

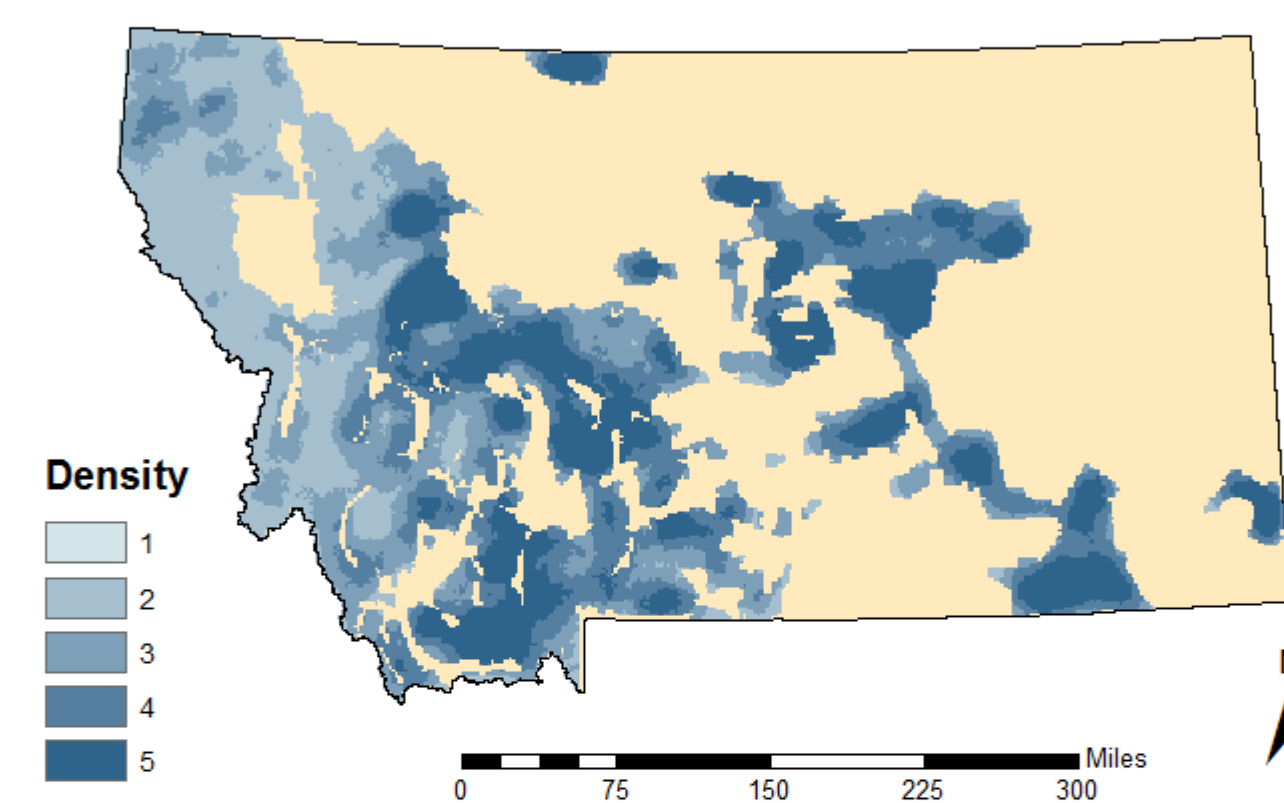


Figure 2.

Density of Unsuitable Habitats

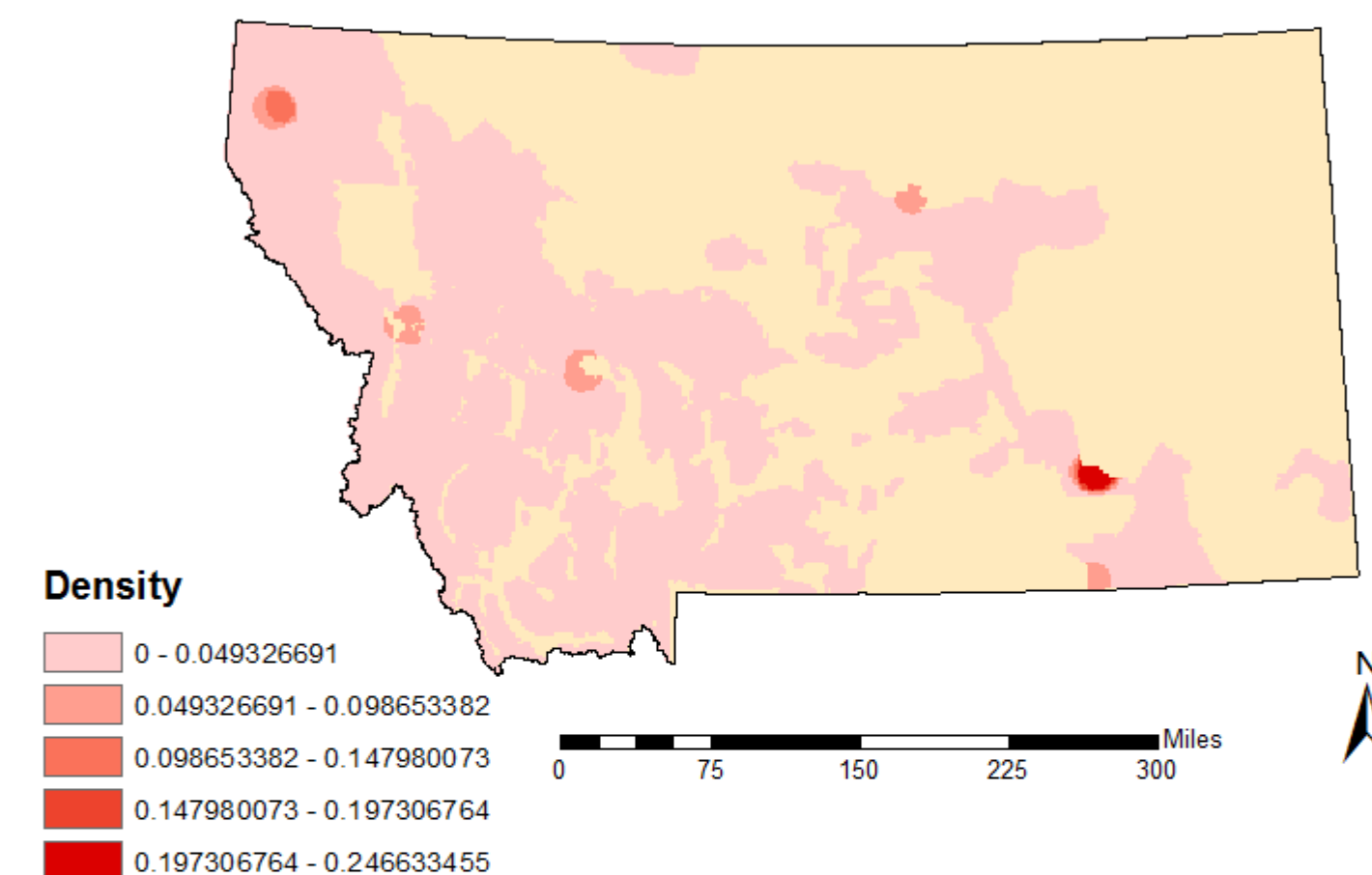


Figure 3.

Montana Towns

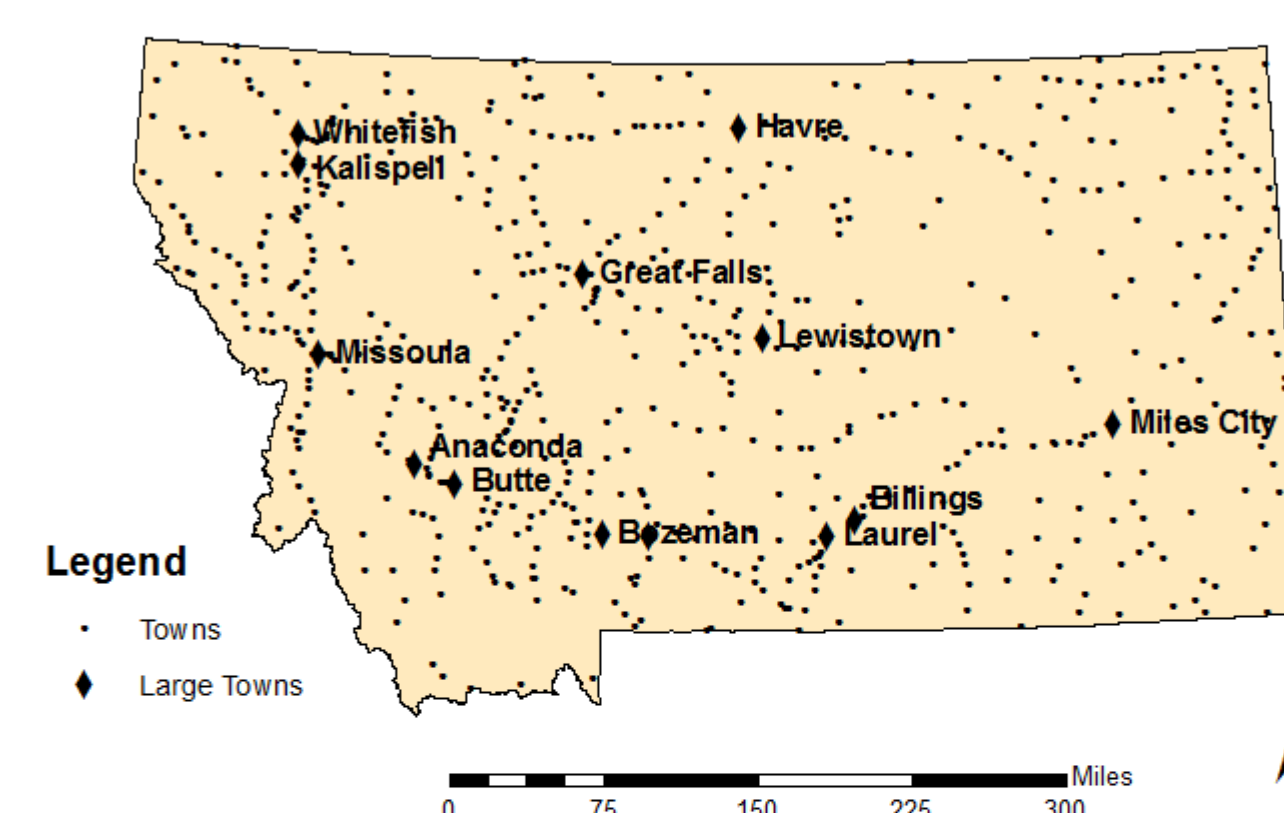


Figure 4.

Human Population Density

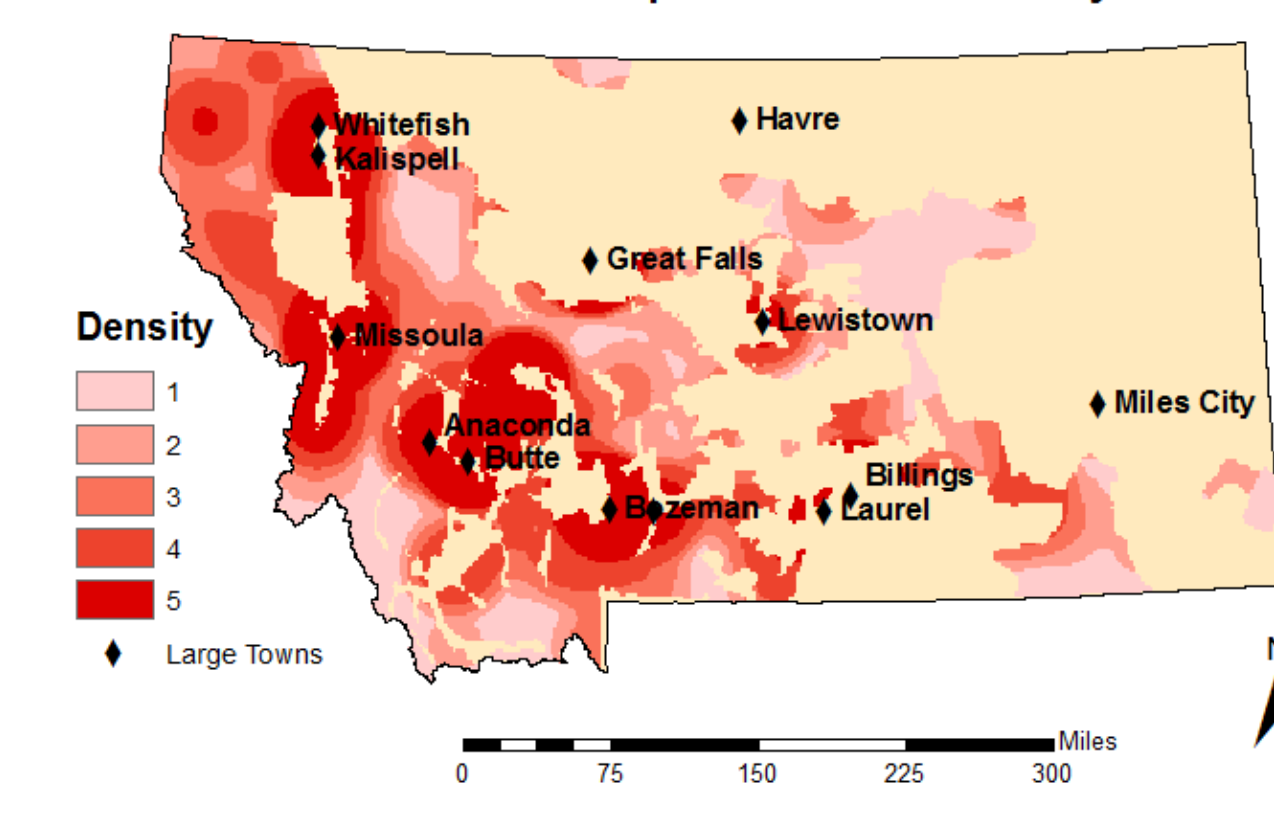


Figure 5.

Distance of 2 Miles from Highways

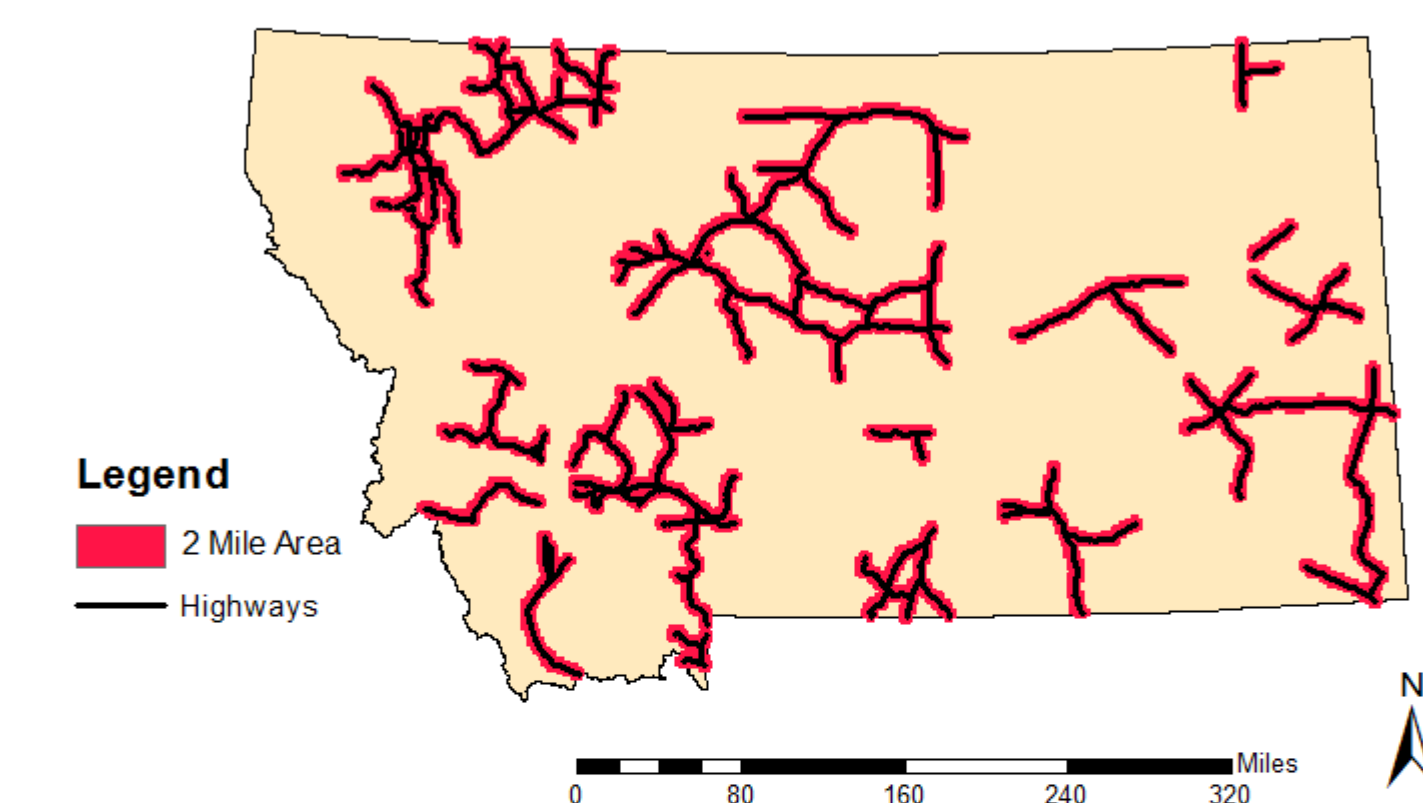
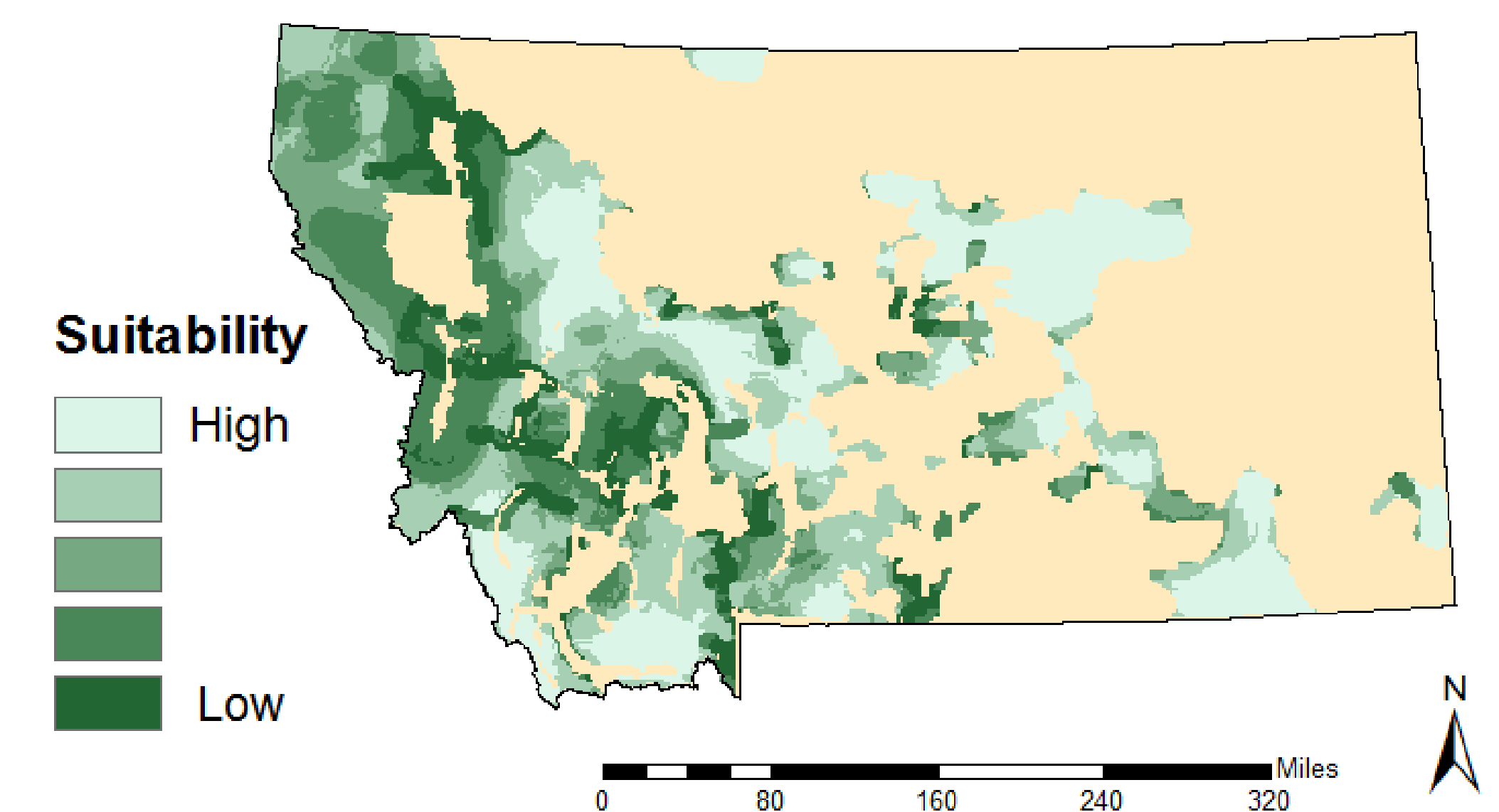


Figure 6.

CONCLUSION

Calculated Suitability



While this study includes many factors indicative of elk suitability, it is not an exclusive representation of their locations. Elk are a tolerant species, and their generalist nature makes them difficult to pin point. From this analysis we can determine areas elk are most likely to be found based on distance from preferred habitats, unsuitable habitats, human development, and highways (highlighted in the map above). This knowledge can help individuals locate regions that should be emphasized for hunting, wildlife watching, or conservation efforts.