Background

American Kestrels (Falco sparverius) are the smallest species of raptors in North America, weighing at usually about 80-160 grams. Unfortunately, their numbers have been reported to be in decline across the United States 1. Many state nest box programs across the country claim that they have seen less and less breeding pairs in their nest boxes 1. Little is known for the cause of the decline of these species, some speculations include an increase in predator populations like Cooper’s Hawks or destruction of habitat. This research aims to investigate whether the nest boxes installed are in suitable places and to determine other suitable areas in the region for future nest boxes. A map will be created to compare with current nest box sites and their status of occupancy.

Methods

Wisconsin was used as a study site for this project. The program boasts of high occupancy rates compared to other kestrel nest box programs. The landscape factors investigated were distance to water features and major roads, land cover and vegetation type, and population density 2. All layers were converted to rasters, clipped to the state extent and assigned appropriate values. All layers were to be reclassed and summed in a raster calculator to calculate suitability.

Results

The largest concentration of suitable blue areas are found in the northwest corner and southern-most center edge of Wisconsin. Most of the nest boxes installed are in the southern most central edge of Wisconsin, designated as suitable areas.

Conclusion

Although nest boxes installed were in suitable areas, there are still a lot of unoccupied boxes in the same area. This may be due to errors in weighting factors. To further investigate, we recommend creating regression models to determine the weight of each variable. Other factors to consider would be openness in areas and comparing other state sites.

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Data Sources:
- Wetlands – United States Geographical Survey (USGS) National Hydrography Dataset
- Vegetation - Multi-Resolution Land Characteristics consortium
- Roads/Census/State Borders – US Census Bureau
- Population Density by tract data was used for population density. Data was downloaded from US Census Bureau. Raster files were converted into rasters and reclassified to assigned value. Areas with higher densities were given lower values, as they would disturb kestrel habitat.
- Forest type vegetation were given higher values.
- Roads only major roads were used (interstate and US roads). Data was downloaded from US Census Bureau. Buffers were created around the roads using Euclidean Distance. Higher values were given to further distance from roads since they may pose a risk to kestrels.
- Census by tract data was used for population density. Data was downloaded from US Census Bureau. Shapefiles were converted into rasters and reclassified to assigned value. Areas with higher densities were given lower values, as they would disturb kestrel habitat.
- Vegetation data was downloaded from USGS. The data was broken up into three parts: habitat and non-habitat typical to the kestrel and forested vegetation. This map shows an example of forest vegetation cover that was reclassified. Habitat-type vegetation were given higher values.
- Wetlands data was downloaded from USGS National Hydrography Dataset. The shapefiles were converted into rasters and reclassified. Higher values were given to areas closest to wetlands as they provide open hunting grounds for kestrels. Forested wetlands were excluded.

References: