Identifying White-Tailed Deer Travel Routes in Portland Urban Neighborhoods using Least Cost Path Analysis

Introduction

As urban growths and population densities increase, accessing safe travel routes in urban areas has become more difficult for wildlife. Their native habitats have been fragmented, which forces deer and other animals into roads and highways while seeking food, prey, mates, nesting habitats and migration paths. In addition to endangering animal populations, Wildlife Vehicle Collisions (WVC) are a threat to human safety. The Oregon Department of Transportation (ODOT) reports that there have been more than 9,400 reported wildlife-involved collisions in Oregon, thirty of which resulted in human fatalities between 2005 and 2013. While WVCs have gained recognition as an important public safety issue, most of the studies related to WVCs focus on highway collisions. This has left a need for further studies on urban wildlife travel routes and habitats in non-highway locations. The purpose of this study is to identify white-tailed deer travel networks and areas with potentially high risk factors for WVCs in the Southwest Portland urban area using weighted multi-criteria analysis and a least cost path analysis.

Methods

Cost Surface Classification

The travel cost path surface for white-tailed deer was based on:
- Portland Metro Taxlots
- Outdoor Recreation and Conservation Area (ORCA) sites
- Roads
- Trails
- Streams
- Slopes
- Vegetation and canopy cover

The taxlots, ORCA sites, trails, and roads were classified as land cover classes and merged into a single-shapefile. Each class was then given a weight value based on travel cost suitability. Slopes, canopy cover, and streams were classified as subclasses, and were later added or subtracted from the land class values using the ArcGIS Map Algebra tool. The roads shapefiles were inundated extracted from the Portland Metro tax lot data. The roads attributes were derived form RILS polyline street files by buffering according to rank class.

Results

The results of this study show that there are several trouble spots where the modeled travel routes intersect with major roads such as the Barlow-Tellus Highway and Canyon Road. In many locations, these trouble spots coincide with the intersection of Creeks and Major Roads. This may be a result of creeks having too much influence over the cost path values. However, the weighting scale for the land classes and subclasses was based on species specific data, which ranked creeks as a highly desirable class for white-tailed deer travel routes.

Conclusions

After going out into the field to verify the results of the model, the least cost path analysis technique seems to have accurately predicted areas which have a high risk for wildlife vehicle collisions. The results of the least cost path analysis were adequate for identifying potential high risk locations of deer crossings in the Southwest Portland Metro area. Future studies on wildlife vehicle crossings using least cost path analyses should include travel point nodes outside of the work area to accurately predict travel routes along the perimeter of the study area. To enhance the accuracy of our study, actual deer movement data should be collected and used to assess the validity of the methods in this study.