Predicting the Spread of European Buckthorn in Waterloo Region
Sarah Endicott and Michael Drescher
School of Planning, University of Waterloo, Waterloo, Ontario, Canada, N2L 3G1

Introduction
• European buckthorn (*Rhamnus cathartica*) is an invasive species, noxious weed and host for soy bean aphids and oak crown rust. It can take over the understory of forests and alters soil chemistry
• Purpose: to create a spatially explicit model for predicting the spread of European buckthorn across regional landscapes

Methods
Completed
• 15 sampling areas with 224 25m x 25m grid cells each, randomly chosen within Waterloo Region, excluding agricultural fields and urban areas that are more than 400m from the nearest forested area
• Presence or absence of buckthorn determined and a core taken from the largest buckthorn within each cell
• Used Generalised Linear Mixed Model (GLMM) to relate habitat characteristics to the presence or absence of buckthorn and account for the clustered sampling structure.
• Age of the largest buckthorn in each grid cell determined from cores, used to represent the historical spread of buckthorn

In Progress
• Another GLMM will be used to determine how the habitat suitability and the distance to older buckthorns influences the likelihood of a cell transitioning from buckthorn absence to presence.

Preliminary Results
• Of 3324 cells sampled, 818 contained buckthorn
• The oldest tree sampled was 56 years old and the average age of buckthorns sampled was 19 years old.
• The habitat characteristics included in the maximal model were: surficial material, permeability, distance to forest patch edge, distance to nearest property line, compound topographic index, and land cover type.
• The minimum acceptable model was created by backward selection and included the permeability, distance to forest patch edge and land cover type (Figure 1).
• The probability of buckthorn presence decreases with increasing distance to the patch edge and is highest for medium-low permeability and forest land cover types (Figure 2)
• There is habitat highly suitable for buckthorn scattered throughout Waterloo Region (Figure 3)

Conclusion
• European buckthorn is most likely to be found near forest edges, but is also present in 23% of built up pervious areas
• The AUROC of 0.634 means model has higher probability of correctly predicting the presence of buckthorn than random chance (AUROC 0.5)
• Next Steps: Including the influence of dispersal by analyzing the historical spread pattern should improve the model.

References

Follow Up
Sarah Endicott: sendicot@uwaterloo.ca