Determining habitat suitability of Asian longhorn beetle *Anoplophora glabripennis* in Massachusetts, U.S. using the Mahalanobis typicality approach

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### Introduction

The introduction of invasive species to new ecosystems is an unexpected ecological consequence of international trade. Invasive species in the U.S. account for billions of dollars annually in economic and environmental damage and control costs.

Insect pests that target tree species are of particular concern due to extensive forest ecosystems throughout the U.S. that support native biodiversity and regional economies. New England mixed deciduous forests are highly vulnerable to invasive insect species and have already experienced drastic changes in forest structure throughout the region.

### Study Area

The study area is composed of ten towns in the center of Worcester County, MA and is approximately 227 square miles. The dominant land cover is deciduous and mixed forests.

### Data

Independent predictors include PRISM data for average annual precipitation from 1971-2000, elevation from MassGIS, MODIS temperature data, and an NDVI image. Point data from the city of Worcester denoting presence of infested host trees were not available for this analysis due to privacy of residents. Therefore points were digitized based on a USDA map of outlying infestations using a streets layer as guide. This analysis used 157 presence locations.

### Discussion

The Mahalanobis algorithm determines typical species locations using the combined mean value for each independent variable based on all the sites of presence. The coarse temperature and precipitation data somewhat constricted typicality outputs. The NDVI predictor was the most important independent variable for both typicality surfaces. The distance analysis is based on an average rate of dispersal of 2,490 meters per season, however adults are capable of migrating over 1 kilometer per day. The distance image shows baseline projections of how the infestation might spread outward from urban Worcester on a season by season basis.

### References


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