USING A MULTICRITERIA RISK MODEL TO GUIDE GROUND SURVEYS FOR EMERALD ASH BORER

Lindsey M. Shartell and Andrew J. Storer

Michigan Technological University, School of Forest Resources
and Environmental Science, Ecosystem Science Center,
Houghton, MI 49931

ABSTRACT

The emerald ash borer (EAB) (*Agrilus planipennis*) is an exotic wood boring beetle from Asia that has become a major pest of ash trees (*Fraxinus* spp.) in the Midwest. The insect has spread from its initial invasion site in southeastern Michigan aided by human movement of firewood, nursery stock, and other wood materials. Well-established populations of EAB have been found in the Upper Peninsula (UP) of Michigan, an area relatively isolated from the initial invasion site. This has prompted questions about the likelihood of other existing populations in the UP and the possible use of landscape characteristics to predict the locations of EAB satellite invasions.

Known locations of EAB were used to determine common characteristics of invaded sites and develop a multicriteria risk model. Known locations of EAB were divided into two groups, one to build the model and one to validate the predictions. The model was assessed by calculating accuracy as the percent of known locations correctly predicted to be at moderate to high risk. Important parameters in the model were distance to roads, land cover type, and proximity to campgrounds. The accuracy of the points used to build the model was 77 percent, with 19 percent of the land area of the UP and northern Lower Peninsula (LP) of Michigan at moderate to high risk. Validation of the model was made using the known EAB points set aside during development with 83 percent of the validation points accurately predicted to be at moderate to high risk.

Using the predictions, we developed a ground survey to visit random points across the UP focusing on high risk areas. At each point, basal area by species was determined and ash trees within a 1/10-acre plot were counted and assessed, recording species, diameter, percent dieback, and vigor as well as any signs and symptoms of EAB including sprouts, splits in the bark, D-shaped exit holes, serpentine galleries, or woodpecker damage. During the ground survey, no new populations of EAB were discovered. The lack of detection could in part be due to the difficulty in locating ash, because only 22 percent of points had ash present. Further information on the spatial distribution of ash resources should improve the model accuracy and success of the ground survey. It is likely that the model overpredicts the area of high risk; it is more realistic to assume that only 4 percent of the UP is at high risk as a result of a limited amount of ash. Future work will involve refining the model and incorporating it into monitoring efforts. The predictions should also prove useful for locating infested trees when detection is made on artificial traps.