ferent ash species are considered separately. Multiple models have been developed for use in management prescriptions to reduce the amount of ash available to emerald ash borer. These models are based on ash species and crown light exposure. Information on ash species and the light exposure for most of the trees in a stand (i.e., forested or open grown trees) may allow managers to use a more specific model to fit their stand.

Other relationships between diameter, surface area, and volume of phloem are being determined. These relationships, in addition to others involving tree vigor, form, and growing conditions, have been integrated into models characterizing the amount of ash phloem in a forest stand. Using these models with trees-per-acre information from a stand and stock table, it is possible to determine diameter limits for cutting to meet prescribed ash phloem reduction targets. By reducing emerald ash borer populations through phloem reduction and decreasing the removal of the smaller trees in a stand, this model will enable the genetic diversity of ash to be optimized during ash reduction efforts. Similar models are available for use when the management goal is to retain large trees within a stand. Applied models help land managers to make scientifically quantifiable decisions relating to ash reduction in forests. Forest resource managers are able to access the models online at *www.ashmodel.org* and determine the diameter limit for removal of ash to achieve the phloem reduction target within the context of other forest management goals.

PREDICTING EMERALD ASH BORER-INDUCED CHANGES IN FOREST TREE SPECIES COMPOSITION

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ABSTRACT

The death of ash trees causes changes in community composition, structure, and successional trajectories of forested areas and may facilitate the invasion of exotic plant species.

To study and predict these changes, we are monitoring plots in forested areas across Ohio and developing modeling methods to predict the successional trajectories of these areas. In addition to recording the identities and sizes of tree species in the plots, we are also monitoring light levels and invasive species as conditions change due to ash mortality. In areas where ash is a dominant species, we will also do seed bank studies. We are tracking the condition of individual ash trees to assess rates and patterns of decline as well as the factors (stand size, ash density, species composition) that may affect decline. Preliminary data from natural areas near Toledo shows the potential for rapid decline in ash condition in infested sites.

We will model the succession of these stands, as well as other stands with data provided by collaborators, using the Forest Vegetation Simulator (FVS). FVS is a non-spatially-explicit model of tree growth and survival that is used by the US Forest Service and National Parks. We will use ordination and cluster analysis to identify different groups of stands that are predicted to behave similarly. We will parameterize the model to explore emerald ash borer effects on invasive shrub species, which are abundant in Ohio. The information generated by our studies will allow land managers to know what their forests will look like during and after emerald ash borer infestation and enable them to develop management strategies.

PATTERNS OF EMERALD ASH BORER-INDUCED ASH DECLINE AND MORTALITY IN THE FORESTS OF SOUTHEASTERN MICHIGAN

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ABSTRACT

The emerald ash borer (EAB), *Agrilus planipennis*, invasion of the forests of the Huron River Watershed in southeastern Michigan may result in drastic changes in forest structure and composition. The objectives of our study were to (1) quantify landscape-level spatial patterns of ash decline and mortality, (2) assess whether patterns of colonization and decline vary among black ash (*Fraxinus nigra*), green ash (*F. pennsylvanica*), and white ash (*F. americana*), and (3) determine whether observed spatial patterns of ash decline and mortality changes over time.

During 2004 and 2005, 31 permanent vegetation plots were established in forest stands within eight state and metro parks within the Upper Huron River Watershed. In 2004 and 2005, surveys were conducted in 11 and 20 stands, respectively. In 2006, all 31 stands were reassessed to quantify progression of ash dieback and mortality. Forest stands were selected to represent a moisture gradient with black, green, and white ash as the major ash component on hydric, mesic, and xeric sites, respectively. Forest stands were also chosen to represent an