

beetle was recaptured at the furthest trap, 305 meters from the release point. This beetle was collected less than two weeks after its release. Male and female recapture patterns are similar. Also resident feral beetles were captured in patterns similar to marked released beetles. We also analyzed feral beetle capture rates by trap height for all three trap types. A Chi-square analysis showed that, for panel traps and purple prism traps on ash, significantly more beetles were caught on high traps ($P = 0.001$). Chi-square analysis of purple prism trap height on non-ash trees showed no significant difference between beetles caught on high and low traps.

MODELING POTENTIAL MOVEMENTS OF THE EMERALD ASH BORER IN OHIO

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ABSTRACT

The emerald ash borer (EAB, *Agrilus planipennis*), is threatening to wipe out native ashes (*Fraxinus* sp.) from North America and so far is accomplishing this across large sections of Michigan, Ohio, Indiana, and Ontario—with infestations in Illinois and Maryland as well. We are attempting to model its future movement by adapting a model developed for the potential movement of tree species over a century of climate change. We have two model variants: an ‘insect-flight’ model and an ‘insect-ride’ model to assess potential movement.

Both models require spatial estimates of basal area of ash available to the insect and the relative abundance of the insect. We used classified Landsat data, calibrated with Forest Inventory and Analysis (FIA) data and other plot-level data, to estimate ash quantities per 270x270 m cell. For initial conditions of EAB abundance, we estimated zones of infestation for each year from 1998-2005 using known EAB location information and other data.

With the ‘flight’ model, probability of movement depends on EAB abundance in the source cells (270 m cells), the quantity of ash in the target cells, and the distance between them. To estimate abundance, we assume an 11-year cycle along a normal curve, with maximum abundance at year 6 and minimum abundance at the initial colonization time as well as after the ash trees have died within the cell. With the ‘insect-ride’ model, we utilized GIS data to weight five factors related to potential human-assisted movements of EAB-infested ash wood or just hitchhiking insects. The five factors are roads, urban areas, tree nurseries, various wood products industries, and especially campgrounds. For campgrounds, we are developing a gravity model that considers traffic volumes and routes between areas of EAB infestation and distances to campgrounds. Each layer has buffer weights that, when combined, result in a map of zones of enhanced probability of EAB colonization.

The ‘flight’ and ‘ride’ models were then combined to yield a map of colonization potential in the central part of Ohio being modeled. When actual EAB finds were overlaid on this probabilistic map, 62 percent of finds fell within our highest class of probability, and 83 percent of finds fell within a zone of high probability of colonization.

In Ohio, the movement of EAB so far has been greatly hastened by human movements, and 67 percent of the outlier EAB finds in Ohio occurs within 2 km of major roads. This seems to implicate ‘hitchhiking’, in which the insect catches a ride on a vehicle (radiator or defroster or some other place on the vehicle). However, firewood, nursery stock, and wood products also are implicated for some outliers.

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