

# Mapping Susceptibility Associated with the Hemlock Woolly Adelgid



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## INTRODUCTION



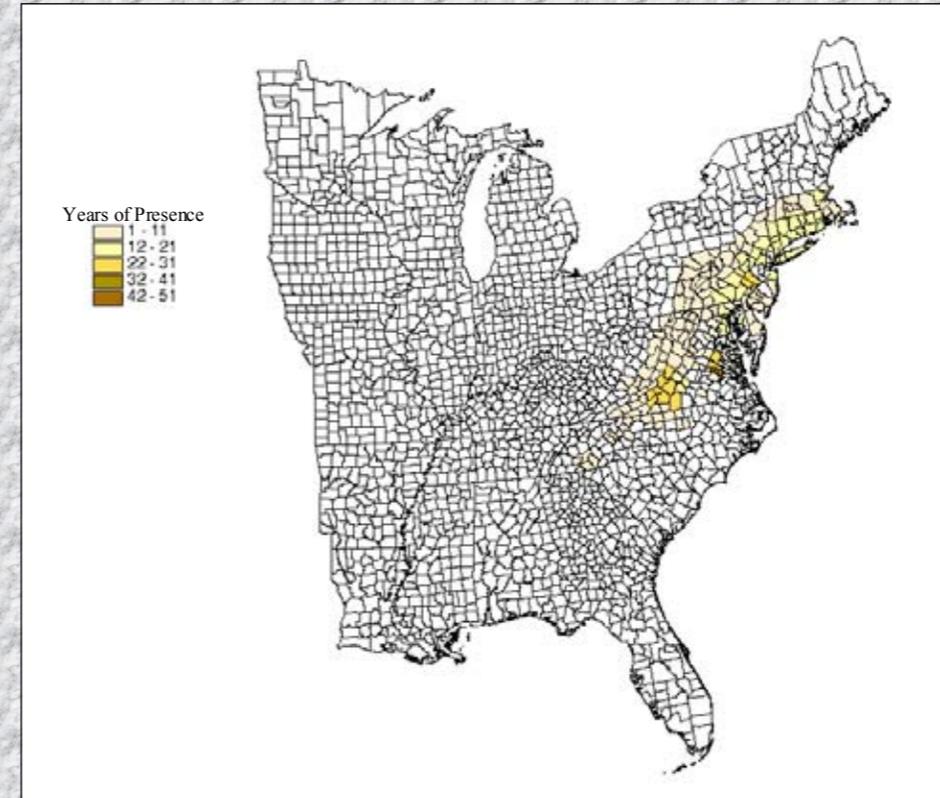
Hemlock branch infested with hemlock woolly adelgid



Hemlock stand heavily damaged by hemlock woolly adelgid

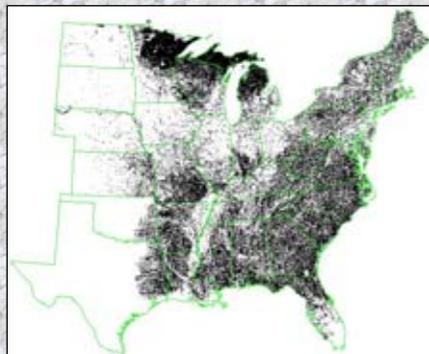
The Hemlock Woolly Adelgid, *Adelges tsugae*, is native to Asia and was first introduced to North America in British Columbia in the 1920's and was later discovered in the Shenandoah Mountains of Virginia in the 1950's. It has gradually been expanding its range, largely to the North. Adelgids feed by sucking sap from hemlock twigs and when they reach very high densities they can cause dieback and mortality of their hosts. In the eastern US, the adelgid's principal host is eastern hemlock, *Tsuga canadensis*. The range of this species is largely limited to moist, cool sites; it is most abundant in the New England states. The adelgid has only recently invaded southern New England and is now poised to expand its range into areas with large quantities of hemlock. Thus, the hemlock woolly adelgid is likely to cause considerable damage in the future as it expands into areas with large quantities of hemlock.

## HISTORICAL RANGE EXPANSION

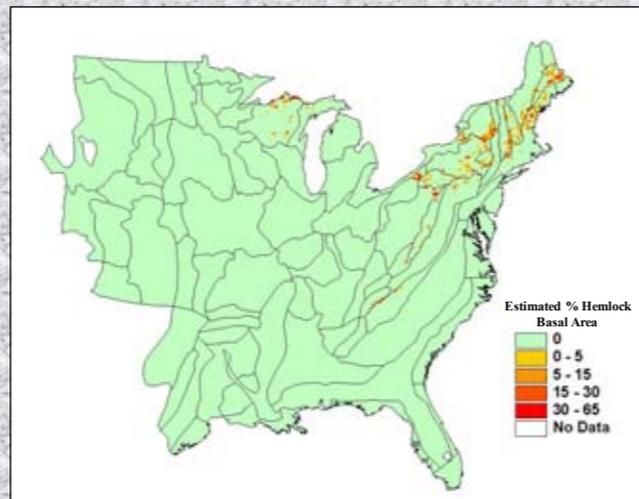


The range of hemlock woolly adelgid has been spreading since the 1950's when it first appeared in eastern Virginia. It is currently expanding into areas with higher concentrations of eastern hemlock. The next step will be to adjust the percent hemlock map (shown below) by a predicted hemlock woolly adelgid spread map.

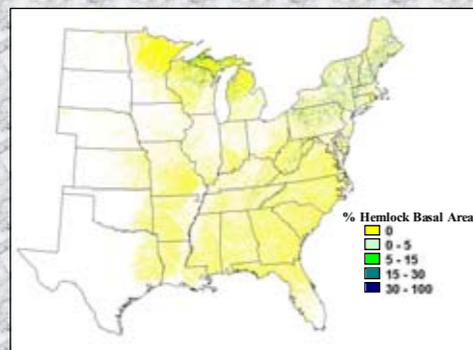
## METHODS AND RESULTS



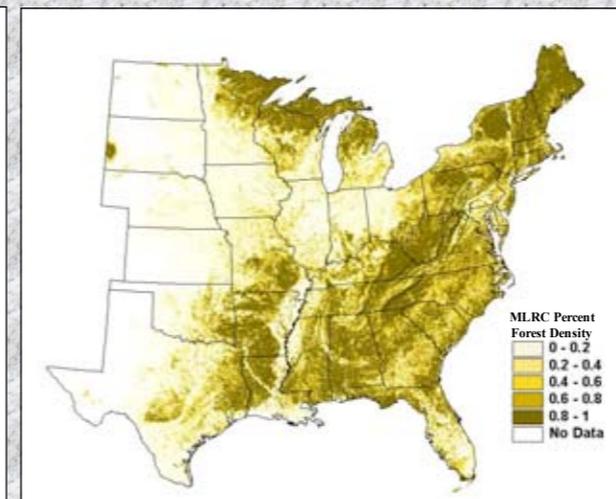
The most recent survey from each state was downloaded from the Eastwide FIA Database. Plots with less than 10 sq. ft. of basal area were removed. Therefore, 88,687 plots were included.



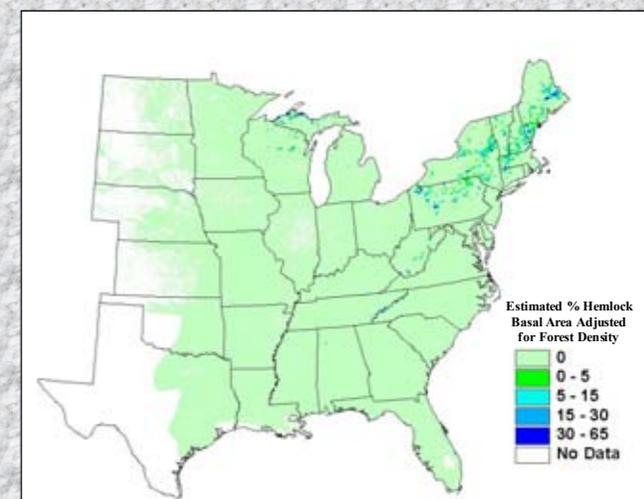
The percent eastern hemlock basal area was calculated for each plot.



Median indicator kriging was repeated separately for each ecoregion section in the East to estimate the percent basal area of eastern hemlock. The results were combined as a mosaic.



The estimates were adjusted for forest density using a land-cover map (proportion forest) generated from the Multi-Resolution Land Characteristics Consortium (MLRC) data. Each 30-m pixel was classified as forest or non-forest and then pixels were aggregated into 1-km percent forest pixels.



The forest density map values were multiplied by the percent hemlock map to create an adjusted hemlock woolly adelgid susceptibility map.