Increase in hemlock forest offsetting effect of invasive hemlock woolly adelgid for now

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Despite the accumulating destruction of a non-native invasive insect called the hemlock woolly adelgid, hemlock forests in the eastern United States appear to have held their own for now, according to new research by the U.S. Forest Service.

The key word is "appear," said Talbot Trotter, the study's lead author and a research ecologist with the U.S. Forest Service's Northern Research Station.

In many regions, particularly in the southern Appalachians, the loss of hemlock to hemlock woolly adgid has been devastating. However, when Forest Service scientists used regional Forest Inventory & Analysis (FIA) data to get a big picture view of the status of hemlock in the eastern U.S., the results surprised them. "In analyzing FIA data from the 1950s through 2007, we expected to see a more pronounced impact on hemlock stands," according to Trotter.

The data suggests that increasing tree density associated with the past century of reforestation and succession in the eastern U.S. may have offset the negative impacts of the adelgid at the regional scale.

The study, "Changes in the regional abundance of hemlock associated with the invasion of hemlock woolly adelgid," was recently published in the journal *Biological Invasions* and is available at: http://www.nrs.fs.fed.us/pubs/45316

A native of Japan, the hemlock woolly adelgid was first detected in Virginia in the 1950s and for decades remained a primarily urban pest. That had changed by 1980, when the effects of infestation began to be evident in forestland within the tree's native range. Hemlock's native range forms a triangle from northern Georgia and South Carolina through the Appalachian Mountains into Pennsylvania, Canada and Minnesota.

Hemlock trees in the United States do not have natural defenses against hemlock woolly adelgid, which coupled with a lack of natural predators has resulted in high levels of tree mortality in the 18 states where it is known to have spread, particularly in southern states. Trotter believes that this study, which is based on forest data through 2007, may have caught hemlock at a tipping point in the balance between losses from hemlock woolly adelgid and increases due to forest regrowth.

"Repeating this analysis as new FIA data becomes available may show if we are beyond a tipping point and are now losing hemlock," Trotter said.

Even if there were continued increases in hemlock abundance in northern climates, where cold temperatures slow damages from hemlock woolly adelgid, the loss of trees in the south is a loss to the species, Trotter said. "Losing trees in the South results in less genetic variation for hemlock," he said.

"Non-native forest insects like the hemlock woolly adelgid are devastating on many levels because trees are so important to a region's culture and economy," said Michael T. Rains, Director of the U.S. Forest Service's Northern Research Station and the Forest Products Lab. "Forest Service research is working hard to more aggressively control non-native insects and make our forests healthier and more resistant to these disturbances."

Co-authors on the study included Randall Morin, a research forester with the Northern Research Station, Sonya Oswalt, a forester with the Forest Service's Southern Research Station, and research entomologist Andrew Liebhold with the Northern Research Station.

The study included data from 432 counties in 21 states: Alabama, Connecticut, Delaware, Georgia, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin.

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