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The hemlock woolly adelgid is a small insect that feeds on hemlock needles and is a serious threat to all hemlocks in Kentucky.

Hemlock Woolly Adelgid Update

by Alice Mandt and Brandon Howard

The hemlock woolly adelgid (HWA) is a small insect that threatens the health of the eastern hemlock (*Tsuga canadensis*). This insect damages trees by feeding on their starches, a process that begins during the late fall when nutrients are abundant and predators are scarce. Once a tree becomes fully infested it typically takes 4 to 6 years for it to succumb to the insect and die.

HWA occurs naturally and has been genetically traced to Asia and the western United States. In its native range, the insect causes little to no damage. The first report of HWA in the eastern United States was in 1951 near Richmond, Virginia. Since that time, HWA has spread from Maine to Georgia leaving a 90% mortality rate in its path.

In northeastern North America, HWA are all female and develop asexually. They have six stages of development and two generations per year. Adults from the first generation lay up to 300 eggs and crawlers from the second generation deposit an average of 75. This allows populations to build to incredible numbers and makes HWA a devastating forest pest.

HWA in Kentucky

HWA was first discovered in Kentucky in Harlan County in 2006 and has since been reported in 21 additional counties. According to U.S. Forest Service inventory and analysis data, there are more than 76 million eastern hemlock trees at risk across the state.

Hemlock trees are most often found in the deep ravines of eastern Kentucky where they serve as a foundation for streamside communities and are responsible for casting deep shade. Their dense

canopy regulates light penetration to the forest floor which in turn maintains air, stream and soil temperatures. Hemlock trees are also an important determinant in stream chemistry and sedimentation rates. It is feared that impacts from HWA will not only result in a loss of millions of trees, but will eventually lead to a significant alteration of a long established ecosystem.

HWA Management in Kentucky

In 2007 a partnership of citizens, nonprofit organizations and government agencies formed under the name Save Kentucky's Hemlocks (SKH). The mission of this group is to share limited resources in an effort to lessen the impacts HWA will have in Kentucky. As a beginning strategy, the group focused on raising public awareness by organizing events. One such event was the Tsuga Art and Music show in Lexington, Kentucky.

In 2010 the Kentucky Division of Forestry (KDF) partnered with the U.S. Forest Service to create a full-time position for an HWA coordinator to expand the efforts of SKH. Since that time, KDF has developed a program that specifically addresses HWA with respect to partnership coordination, monitoring, education, chemical acquisition, public outreach and funding.

HWA control



methods in Kentucky cover three different strategies: cultural, chemical and biological. Cultural control methods are mainly used by private landowners with smaller acreages to protect. There is very little that can be done to control the natural spread of HWA, but there are things landowners can do to reduce the likelihood of HWA thriving in their backyards. They include maintaining tree health, keeping trees watered during dry seasons, removing bird feeders during the spring and summer, pruning limbs that are likely to come into contact with foot traffic and not using fertilizers if you are located near an infested area. Regular monitoring of trees for infestation is an effective way to catch HWA in its early stages.

Managing HWA over thousands of acres is a much more difficult task. The goal of large scale HWA management is to preserve the genetic integrity of the eastern hemlock long enough to allow the species to survive and recover. Insecticide treatments are currently the most effective approach, making them a key part of Kentucky's suppression efforts. Chemical control efforts began across the state in 2006. Since that time, thousands of hemlock trees have been treated on state, private and federal properties.

One of the leaders in HWA suppression is the Cumberland Gap National Historical Park (CUGA). HWA was first found in CUGA in November 2006. Over the next year, areas were prioritized according to location of trees near facilities, trails and roads. Chemical treatment of individual trees began during the following winter. After all the potentially hazardous trees had been treated, efforts to save hemlock trees progressed to the watershed level. Today, the park is working mainly in the back country area, continuing watershed level treatments. Since 2007, the park has treated over 37,600 trees. Chemical treatments will continue this winter and next spring in the back country areas.

Examples of similar treatment programs are happening across Kentucky. Some of the most aggressive HWA programs are currently taking place at the Daniel Boone National Forest, Kentucky Ridge and Kentenia State Forests, Blanton and Bad Branch State Nature Preserves, Cumberland Gap and Big South Fork National Parks, Lilly Cornett Woods, Stone Mountain and Shillalah Creek Wildlife Management Areas, Cumberland Falls and Natural Bridge State Parks. To see your favorite public land on the list, please contact a local KDF office to start a volunteer program in your area.

These large scale treatment programs can become both costly and labor intensive. The long term management strategy for HWA lies in biological control. Natural predators from the native range of HWA are being intensely

studied and tested for release into our natural areas. If this method proves effective, predator populations will build with HWA populations giving large scale control of HWA.

Research into HWA impacts and biological control is currently underway in southeastern Kentucky. The University of Kentucky Entomology Department has been instrumental in leading the effort, alongside Virginia Tech who has also established research plots on Kentucky Ridge State Forest. Current projects include examining the impacts of hemlock loss to the ecosystem, developing field insectaries for HWA predators and determining if both chemical and biological control methods can be used in close proximity, a method previously thought to be detrimental.

Tree Harvesting

Complete control of HWA in an urban or residential setting can be practical, but when landowners are faced with deciding what options are available for large tracts of hemlock, a more detailed degree of planning must be considered. One of the hemlock's most important contributions to the environment is how they regulate the temperature of the streams year round. Areas along streams containing water year round or during rain events are called "Streamside Management Zones" (SMZs). Caution should be used when logging near streams. Information regarding "Best Management Practices" (BMPs) for logging in SMZs can be found through the KDF or UK Extension office.

On a commercial value scale hemlocks are commonly near the bottom in most markets, but commercial operations can be viable if the volume of hemlocks is large enough to attract a buyer. Some specialty markets, such as log home construction, exist in certain parts of the state. These markets may be willing to pay more than typical prices for hemlocks.

Landowners may find more value in using their hemlocks for building materials on their land. If so, a portable band mill could be used and would remove the need to haul logs to an off-site mill. Using a portable band mill will allow the landowner to cut different size lumber for specific needs on their land. An ideal use of hemlock lumber is siding on a house, barn or other out buildings where the landowner is well served by the rot resistant characteristics of hemlock. If a hemlock can't be saved by chemical methods that are cost prohibitive due to the volume of hemlocks on the property, utilization of the timber might be a better option than leaving it to decay in the woods. The lumber should still be viable if the tree has green needles. Considering your options before the trees are in major decline can provide you with building materials (or profit), a stable ecosystem and peace of mind.

About the Authors:

Alice Mandt is the Hemlock Woolly Adelgid Coordinator with the Kentucky Division of Forestry. Kentucky Division of Forestry, 627 Comanche Trail, Frankfort, KY 40601, Phone: 502.564.4496, Email: alice.mandt@ky.gov

Brandon Howard is the managing forester for Kentucky Ridge and Kentenia State Forests. Kentucky Division of Forestry, Bert T. Combs Forestry Building (P.O. Box 130), Pineville, KY 40977, Phone: 606.337.3011, Email: brandon.howard@ky.gov



This hemlock has responded favorably following chemical treatment in the previous year.

Photo courtesy: Alice Mandt