

Hemlock Woolly Adelgid Degrading Trail Experiences

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Hemlock Woolly Adelgid ovisacs found on the underside of hemlock branches are the most obvious evidence of the insect's presence. (Photo from <http://na.fs.fed.us/fhp/hwa>)

Introduction

When I was a boy it was always an adventure to visit my grandparents who lived in an old log cabin in the Jennings Creek community near Buchanan, Virginia. We lived on the eastside of the Blue Ridge so once we crossed the Blue Ridge Parkway and descended the other side through Powell Gap and down to McFalls Creek, a tributary of Jennings, it was like moving into another world. I felt myself at the heart of that world when the big hemlocks began to dominate the deepest hollows and creeksides.

In those days I did not have the vocabulary to describe what I felt, and perhaps I still do not have it today. But even to a boy, those places were to be felt more than seen. There was a stoic silence to these trees, and yet I felt a longing to know about all that they had seen and lived through. I pictured deer lying beneath them for cool shade in the summer and a place of comfort in the white woods of winter. I pictured trout with smoothly wafting tails as they lay in pools cool in the deep shadows of big hemlocks. I pictured that centuries ago Indians had enjoyed campsites in the openness beneath big hemlocks such as these.

As the years went by, my cousins and I would play and fish along the banks of Jennings Creek beneath the hemlock and an array of hardwoods. Later I would enjoy the hemlock of Pennsylvania where my good friend Jim “Lonewalker” McClenahan and I hunted deer and grouse and snowshoed in the winter woods. The hemlock always gave a personality to the woods and something special to sites on which they grew. The attraction of a certain mystique was always there, always theirs.

In the 1990s, I started returning to the Jennings Creek area with my horses to camp and trail ride where my family roots, although economically poor, were rich in nearly 200 years of history. Over the years, I had occasionally returned to visit relatives while they still lived there and later just drive-throughs to refresh memories. But by the nineties, things were noticeably changing, and not for the better.

What I had not known was that this tree that gave such personality to the landscape and that had been so important in my life experience was under attack by an exotic insect called the Hemlock Woolly Adelgid (*Adelges tsugae*) (HWA). Within a few years, our favorite campsite at the headwaters of Jennings Creek was soon ruined by the deaths of big hemlocks under which it became too dangerous to camp. The densities of standing dead trees slowly increased along the trails and marred the panoramic views of the mountainsides.

I remember on one of my last rides there when my mourning for the lost hemlock was exacerbated by a major attack by gypsy moths. I sat on my horse and observed swarms of thousands of adult moths, the caterpillars (pupa stage) of which had defoliated almost all of the hardwoods. It seemed that I was riding in the skeleton of a dead or dying forest.

My dreams of riding in the Virginia Blue Ridge Mountains in the shadows of big hemlocks; lurching and napping while my high-lined horses rested in cool shadows along a mountain stream, and pitching my tent in the openness of a hemlock stand were coming to an end. When I searched in vain for hemlock seedlings that might replace their fast disappearing parents, I sadly accepted as highly unlikely that future generations of riders would ever know the feeling of big hemlocks cooling themselves and their horses and comforting their very souls.

Forest scientists are telling us that the ecological impacts of the loss of hemlock from the eastern forests may rival those of the loss of American chestnut due to chestnut blight in the 1920s. What I know about the aftermath of chestnut blight is that chestnut root suckers are still common throughout the Blue Ridge range. When I look at them, I always think of what might have been. When I find the remnants, which are now rare, of large, disease-killed chestnut trees, I dream of what was. When I think of the tasty, highly nutritious chestnuts, I think of how well both humans and wild animals were once fed by this species. And when I hear optimistic reports that scientists are making a breakthrough to restore to the forest a tree that is genetically at least 94 percent American chestnut, it gives me joy, even though it is unlikely I shall live to see it on a meaningful scale.

In contrast, when I see dead and dying hemlock, I can only mourn for what was. None of its prodigy is on hand to salve the wound. Once fallen, the dead trees melt away, the botanical version of “dust unto dust.” No more will children make Indian necklaces of its small cones as did a friend of mine in the fourth grade. Few if any scientists are optimistic about ultimately saving the species. As the planet

relentlessly moves into the future, hemlocks of the eastern forests likely will become only a note in the paleontological record. There will be no footnote of those of us who enjoyed and loved it, who walked, played, rode, hunted, fished and dreamed in the romance of its mystical shadows.

The Beast

The HWA is an exotic, invasive insect species native to Asia and introduced to both the East and West coasts of the U. S. in the early 1950s. While hemlocks of the western forests had a natural resistance to the insect, those of the eastern American forests, Eastern Hemlock (*Tsuga canadensis*) and Carolina Hemlock (*Tsuga caroliniana*) were highly susceptible.

The HWA adult is black and about 1/16 inch long. As it matures from the final nymph stage, the bug covers itself with a white “woolly” wax material which becomes an ovisac where its eggs are stored and protected from predators and desiccation.

All HWAs are females and reproduce asexually. Of the two generations of young produced each year, the winter generation is by far the most important. Winter generation ovisacs contain up to 300 eggs while those of the spring generation contain only 20 – 75 eggs. The winter generation develops from early summer to mid-spring of the following year (June – March). The spring generation develops from spring to early summer (March – June).

Shortly after hatching, the nymphs insert piercing/sucking mouthparts at the base of hemlock needles to feed on nutrients stored in young twigs. The nymphs remain at their feeding sites until they develop into the adult stage and begin reproduction. As the nutrient reserves, primarily starches, are depleted, the needles die and fall off, impairing the health of the tree. Severe needle loss over a period of several years usually results in death of the tree. Mortality is increased when trees are subjected to other environmental stresses, such as prolonged drought.



Woolly Adelgid adult (left); adult and eggs surrounded by waxy filaments (wool) (right). Photos by Michael Montgomery, USDA Forest Service, Bugwood.org (<http://wiki.bugwood.org/Archive:HWA/Introduction>)

Location and Spread

Since 1951, the HWA has gradually spread in the eastern forest north and south from central Virginia with the southerly rate of spread being considerably faster and having greater insect population densities and impacts. The current average annual rate of spread is estimated at 15-20 miles per year. The vectors for spread are wind, wildlife (primarily birds) and human activity that is primarily associated with the translocation of infested plants and plant parts.

The HWA presently occurs from Georgia to southeastern Maine and presently impacts at least 50 percent of the hemlock range in the eastern forests. For a map of the approximate distribution of HWA in 2009 see:

<http://na.fs.fed.us/fhp/hwa/maps/2009.pdf>.

Impacts

Ninety-six species of birds and 47 mammal species are associated with the hemlock type forest of the northeastern United States. Of these, eight bird species and 10

mammal species are strongly associated with the hemlock type, though none is limited to it.

Where hemlock is a substantial component of the eastern forest, its disappearance is projected to result in major changes in nutrient and water cycles. Impacts on temperatures of cold water streams may be severe. The deep shade provided by large hemlock trees growing on or near streambanks is considered a major factor in maintaining appropriate temperatures for trout habitat.



Dead and dying hemlock trees along the Chattooga River, Andrew Pickens Ranger District, Sumter National Forest, South Carolina. (Photo by G. W. Wood, May 2009)

The aesthetic quality of mountain viewsheds, especially in the Appalachians, already has been and continues to be diminished as numbers of standing dead trees present the evidence of the HWA's devastating effects. As mortality of hemlocks along trails and in campgrounds increases, needs for maintenance efforts to remove hazard trees as well as trees that have already fallen increase.

Control Measures

So far, at the landscape level, there are no known practical control measures for the HWA. An array of predatory insects feed on the species, including predatory beetles imported specifically for control purposes. None has been found to be able to develop population levels to a point where they were effective in controlling HWA population levels and spread.

Horticultural oils and insecticidal soaps have been used as sprays to treat trees in lawn and garden situations, but application at the landscape level in rural and wildland areas is usually logistically impossible and almost always cost prohibitive. Injection and implantation of pesticides into individual tree trunks have been used, but such methods are rarely practicable at the landscape level.

The Outlook

The future of Eastern and Carolina hemlocks is bleak at best. Heavily infested trees may live four to ten years, but during that time their foliage density, tree vigor and beauty are in obvious decline. Where hemlock stands have suffered 100% mortality, no seedlings can be found coming from what was traditionally a major seed bank in the soil. The hemlock of the eastern North American forest is simply disappearing before our eyes, and so far we are helpless to do anything about it.

Rider Reactions

There does not appear to be anything we can do to prevent the ultimate, inevitable end. However, we can take measures to make sure that we do not hasten that end. First, never translocate any part of a hemlock tree in the eastern forest. While this should be a mandate in known infested areas, it is a good practice in any area as the HWA potentially could be present but undetected. Second, when riding, pay attention to hemlocks along the trail and watch for the white, woolly clusters on the undersides of branches. This evidence should be most abundant in the late winter and spring months. Third, inform the land managers of your observations unless you know that the infestation found by you is already known to them. And finally,

**appreciate the beauty and enchantment of hemlock trees and stands of these trees.
Be glad that you have lived in a time when the mystique of hemlock's deep shadows,
the inviting openness of its forest floor, the songs of the wind in its high branches,
and its stoic courage when laden with snow were all yours if you only had the mind
to gather such treasures while they lasted.**