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Allegheny Plateau Partnership Works to Conserve Hemlocks

By Joseph M. Smith

This past August, Kirk Johnson, executive director of Friends of Allegheny Wilderness, made an unwelcome discovery on the northwestern shore of the Allegheny Reservoir: a hemlock tree infested with hemlock woolly adelgid (HWA).

"This is a day I've been waiting for with trepidation," he told the *Times Observer*, of Warren, Pennsylvania, which ran a front-page article about the pest's arrival after the USDA Forest Service confirmed it.

Andrea Hille, forest silviculturist on the Allegheny National Forest, knew this day was coming, too. So, she decided to pursue funding to help start a collaborative hemlock conservation effort.

"Kirk Johnson and Susan Stout have been talking about this for close to a decade. I just happened to be successful in receiving some funding from the State and Private branch of the Forest Service and used that funding to initiate this partnership with The Nature Conservancy (TNC) to have a landscape-scale approach to hemlock conservation," she said. "When we began this, we did not have HWA anywhere in northwestern Pennsylvania, so we kind of viewed it as an opportunity to be proactive and, hopefully, have some sort of strategy in place before the adelgid arrived."

Today, that partnership—now known as the High Allegheny Collaborative Hemlock Conservation Partnership—is a collaborative effort made up of stakeholders from state agencies (in both New York and Pennsylvania), environmental organizations, county conservation districts, universities, tribal nations, businesses, and elected officials.

For Hille, the Forest Service's role is to bring people to the table and facilitate communication to address what she referred to as a "common problem" for all landowners.

Susan Stout agreed.

"We know that the insect isn't paying any attention to ownership boundaries, and that's been one of the challenges with all of these invasives," she said. "They are following their ecology and, historically, broken up ownerships have been a barrier to effective conservation."

To that end, the partnership's goals are straightforward—establishing collaborative partnerships to enhance working across ownership boundaries, acting quickly after new infestations are discovered, and prioritizing conservation areas to make more efficient use of limited resources.

To enhance that participation and accomplish that prioritization, the Forest Service and TNC organized a pair of workshops. The first, which took place on February 14, 2013, served as a forum for educating collaborators about the ecological value of hemlock, the biology and impact of the hemlock woolly adelgid, treatment options,



High Allegheny Collaborative Hemlock Conservation Partnership members Andrea Hille (left), Kirk Johnson (middle), and Dale Luthringer converse in a stand of old-growth hemlock in the Hearts Content National Scenic Area on the Allegheny National Forest.

and TNC's proposed strategy for hemlock conservation.

The second, which took place on August 8, brought stakeholders together to look at maps of hemlock-rich areas across the Allegheny Plateau and go through valuation exercises to prioritize and rank them.

The collaborators' personal knowledge of hemlock stands on the plateau was instrumental to the process, said Sarah Johnson, conservation GIS analyst with TNC.

"What I was really leaning on was the participants' field knowledge," she said. "There were a lot of resource managers and people who use the woods on a very frequent basis in that part of the state, and what I wanted them to do was look at these maps and tell me where they know there are great native populations of brook trout sheltered by hemlock, or the places where the hemlock is really aesthetically pleasing and a lot of people go there to hike."

When the prioritizing was over, the areas at the top of the list were those known for their old-growth hemlock stands—Cook Forest State Park, Tionesta Scenic and Research Natural Areas, Hearts Content National Scenic Area, and Allegheny State Park.

"These four areas of old-growth are our most highly prioritized areas in the entire [Allegheny Plateau]," said Johnson. "The whole area around Cook Forest State Park, as well, regardless of ownership—[its] very high-quality streams, recreation, good contiguous hemlock in the bottoms, and core biodiversity areas—this whole area fell out as being very important."

Just about Everywhere

Unfortunately, the hemlock woolly adelgid has little regard for the hemlocks in and around the Cook Forest State Park, or anywhere else. An import from Asia, the pest landed on US shores in 1924 and spent the next several decades establishing itself in the East's hemlock forests. According to the Forest Service, the HWA can now be found from northeastern Georgia to southeastern Maine and as far west as eastern Kentucky and Tennessee.

In Pennsylvania, the earliest record of the bug dates back to 1967. Since then, it has moved from east to west and, so far, little seems to be slowing its spread.

"It's just about everywhere in the state," said Donald Eggen, chief of the Forest Pest Management Division at the Pennsylvania Department of Conservation and Natural Resources (DCNR). "We've probably got about 10 counties left out of 67. The only counties not infested are in the very northwest and very southwest part of the state" (see map on this page).

According to Hille, there are three known infestations on the Allegheny National Forest (ANF).

"Two of them are considered to be relatively small. Unfortunately, they're dispersed across the forest. One is on the northern edge, on the New York state line (at Webbs Ferry Boat Launch), one is along the southern edge of the forest along the Clarion River near Cook Forest State Park, and one was just found along the western portion of the forest (below the Kinzua Dam), along the Allegheny River," she said. "I don't know what the extent of it is, but there were two spots that were roughly two miles apart, so I suspect it's probably a pretty good-sized infestation."

On its own, the HWA travels at an estimated rate of 15.6 kilometers per year south of Pennsylvania and 8.13 (or less) in the northern section of its range. However, experts agree that birds probably aid in moving the pest around.

The continued march of the HWA is bad news not only for the eastern hemlock (*Tsuga Canadensis*)—Pennsylvania's "state tree"—it's also a threat to the myriad life forms that depend on the ecological services the tree provides. According to the Forest Service's Southern Research Station, hemlock forests provide critical habitat for birds and other animals and their shade helps maintain the cool water temperatures required by trout and other aquatic organisms in mountain streams.

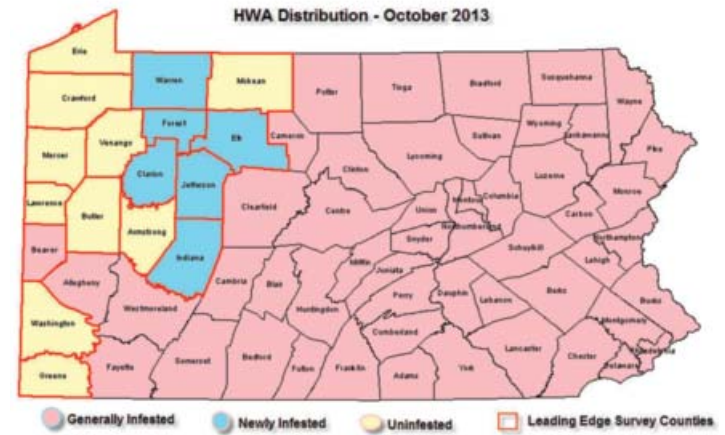
Forest Service data also indicate that hemlock once made up about 20 percent of the trees found on the Allegheny Plateau (circa 1800–1815). Today, the species makes up about 6–7 percent, and as the HWA moves its way through the region, that percentage is likely to drop even lower.

Not Admitting Defeat

Yet, despite the severity of the threat posed by the HWA, partnership members are optimistic that they'll be able to save at least some of the hemlock component in the areas they've identified as priorities.

"There are probably a lot of places where it hasn't been detected, but we're way early on and we're able to capitalize on the experience of other regions that didn't have that head start," said Stout. "So, we're trying to be both really smart in terms of prioritizing treatment areas without regard to ownership and incorporating information from other areas that have been through this already."

The primary method of protecting infested hemlocks in the priority areas is through the use of the insecticides, primarily Imidacloprid



This map shows Pennsylvania's infested, uninfested, and newly infested counties as of October 2013.

and Dinotefuran (aka: Safari).

"If HWA hit all areas of the park [Cook Forest State Park] at once, [the Forest Cathedral area] is our highest priority. Our second priority stand—the stand that it's in right now—is along the Seneca Trail. We have 11 old-growth forest areas, and nine of those are probably dominated by eastern hemlock," said Dale J. Luthringer, environmental education specialist with the Pennsylvania DCNR stationed at Cook Forest State Park. "We've got certain areas blocked off, and we're pretty confident we can take care of the smaller areas and jump ahead and pretreat some of these significant trees that are large by dimension, age, or height class."

According to Eggen, which insecticide is used depends on site condition, the condition of the tree, and the level of infestation. Both can be applied in three ways: soil injection at the base of the tree, soil drench, and a bole spray.

"Imidacloprid in some of those really big trees can take anywhere up to a year or more to get up into the tree, so it's a little slower moving, but it also lasts longer. Once you treat with [it], the trees are protected for five, six, seven years," he said. "Safari is principally an annual. [It's] good to knock back a heavy infestation because it's quick acting, so if we have a tree that's heavily infested or a really large tree (greater than 24 inches in diameter) that's infested, we like to hit it with Safari. You can also double treat it— you knock back the population [with Safari] and then the Imidacloprid can then go up."

Both of these insecticides have limits on how much can be applied per acre, so Eggen and his colleagues have to plan their treatments carefully.

"When we have an area that we're working on, we kind of divide it into thirds. We try to knock back the heavy infestations with the Safari, and over a three-year period try to get as many of the trees that need protecting protected," he said.

In addition to chemicals, the Pennsylvania DCNR has been using biocontrol organisms—predatory beetles—to slow the HWA's spread since 1999.

"The one that we're using principally right now is the *Laricobius nigrinus* (LN) from the Pacific Northwest. The good news about that insect is that all the life stages of that beetle feed on all the life stages of HWA. That [beetle] is established in the state, and we're going to continue to do that," Eggen said. "The problem is we're north of the Mason-Dixon Line, and we get cold winters. They establish pretty well in very sunny areas, such as in the rural urban interface, where

you might have a hedgerow of hemlock where it's bright and sunny. If we get really cold winters, the populations of the HWA get knocked back, and since this beetle has to feed on HWA, if you get rid of HWA you get rid of the beetle."

As a result, Eggen plans to enlist a more cold-hardy strain of the LN beetle from Idaho in the near future. Until then, the agency will continue working to establish populations of the Pacific Northwest strain of LN beetles.

"In some of these areas, what you do is release multiple years in a row in a good location, and they eventually become established. Sometimes it takes upwards of six to seven years to get a good population going, and that's what we've noticed in PA. That's what they've noticed in Maryland and other locations," he said. "In certain areas down south, the beetles have become very abundant, and they actually do help control HWA. I think that as you get climate change and things start to warm up, HWA will do better, but so will our predators."

Beyond insecticides and biocontrols, the partnership is also researching silvicultural options.

According to Ned Karger, CF, land manager with The Collins Companies, the ANF, the Pennsylvania Game Commission, and his company are experimenting with silvicultural guidelines for hemlock stands developed by Forest Service Research Silviculturist Mary Ann Fajvan.

"Andrea [Hille] used them on some Forest Service property, state gamelands have put a prescription on their property, and so I was talking to my team and they identified a couple stands here that were predominantly hemlock, and we thought maybe we could try the same thing," he said.

The silvicultural prescription used on the ANF was designed to reduce stress and enhance vigor in advance of the HWA, Hille said.

"The stands on the ANF that we selected for treatment were overstocked, so the objective was to reduce some of the stress of that overstocking in advance of the adelgid far enough that the trees will recover from the stress of the harvest operation and, hopefully, have more improved vigor and could withstand an adelgid infestation longer," she said.

Still, it's a bit of a catch-22, said Hille.

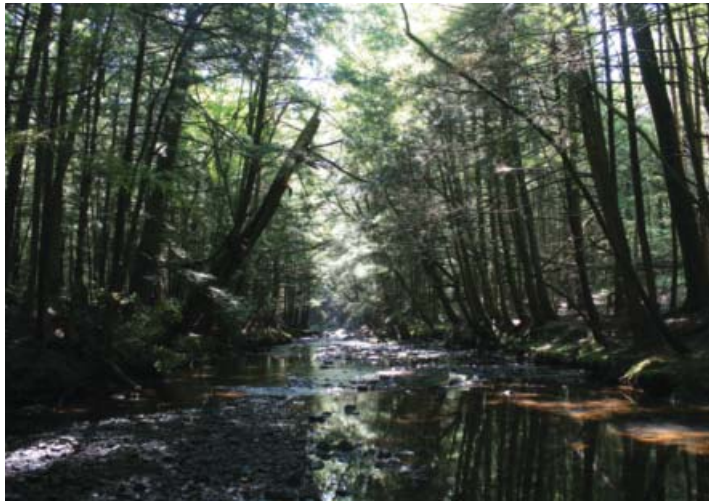
"The adelgid feeds on the new growth of hemlock, so if you have an area with healthy, rapidly growing trees, it could actually make it more attractive. That's really where the uncertainty comes into this," she said.

Silvicultural uncertainty aside, collaborators are hopeful that whatever they learn about responding to HWA infestations will be of use to others down the road.

"It's sexy to say, 'We're going to save the hemlocks,' but the options for treatments are so limited, I think we know that prioritized areas are all you can do and, sometimes, prioritized individual trees is all you can do," said Karger. "Thinking ahead, we're looking at some monitoring and some studies to say how can we make stands more resilient, what's happening as these changes are going to take place. Looking 15 to 20 years out into the future, that might be really valuable for Michigan and Wisconsin and Ontario and places like that."

What Would Success Look Like?

Given this kind of long-range thinking, not to mention the long-term challenges posed by the HWA, how will the partnership know its efforts have succeeded?



Hemlock shade helps maintain the cool water temperatures required by trout and other aquatic organisms.

"To me, success would be that we have identified hemlock conservation areas for various resource values across the plateau and sustained them long enough for the research to catch up," said Hille. "We cannot save every hemlock, we realize that, so we're trying to be strategic in where do we spend our time and energy and money in trying to sustain a good representation geographically, and I think genetically, across the plateau."

The TNC's Sarah Johnson agreed and added that she'd like to see the development of a cooperative forest pest management area sometime in the future.

"I would like to get as many private landowners as possible signed on to this cooperative management area, and to become aware of the situation, aware of their options, and basically educated about what they have to lose with the impacts of hemlock woolly adelgid."

That awareness has already started to spread. When asked what he hopes to get out of his involvement in the partnership, landowner and McKean County commissioner Cliff Lane said knowledge and the ability to share it.

"The first thing is better knowledge. The second thing is the ability to communicate to other people that knowledge in such a way that it is easy to understand why it's important to be aware of the HWA."

Having citizens engaged and participating in the effort is boon to her agency, said Hille.

"We held a training down at the state park for volunteers and for ourselves on identifying populations of the HWA, and there are a number of areas on the national forest that they have basically adopted for monitoring and conducting surveys for us. Having citizens out looking is a huge help."

Among those providing that help are Johnson, who first discovered the HWA in Warren County, and the members of the Friends of the Allegheny Wilderness. Johnson found a second infestation on September 8.

"So far, we've been active in getting out and looking at hemlock sites throughout the ANF just to survey for the HWA, so I think we've been able to contribute that way—with boots on the ground," he said. "We have a lot of people who are passionate about wild areas of the forest. They've been out and about, and they know where the hemlocks are."