

Hemlocks under threat

Invasive insect could lay waste to Nova Scotia's remaining old-growth forest



Defoliation caused by the Hemlock woolly adelgid in Graham County, North Carolina, in 2006. The exotic insect has caused extensive forest losses in the eastern U.S., and now it has gained a foothold in Nova Scotia.

(William Ciesla, Forest Health Management International photo)

by Zack Metcalfe

About 60 years ago, the Hemlock woolly adelgid, an aphid-like insect named for the hemlocks of its Asian homeland, made unintended landfall in Virginia. Asian hemlocks possess a natural resistance to this insect, maintaining an ecological balance between host and parasite, but the Eastern hemlocks of North America have no such defence. The adelgid

extracts water and nutrients from the base of their needles until the tree is dead, a process taking between four and 10 years. Thus, an invasive species is born.

In the intervening decades, the Hemlock woolly adelgid (HWA) has ravaged state after state, spreading north and east across New England to fatally infect hemlocks of every age class. Losses have been significant,

in some cases affecting entire forests.

Twice already the HWA has attempted an invasion of Canada, infesting just a couple trees in southern Ontario in 2011, and again in 2013. Both attempts were turned back with the application of pesticides, but a third invasion is well underway, this one in the Atlantic region.

In mid-July of 2017, the Canadian Food Inspection Agency (CFIA) re-

ceived a report of HWA on trees near Weymouth, N.S., in Digby County. Exactly how it arrived is difficult to say until genetic analysis is complete, but these insects can be moved by wind, by birds or other animals, or in wood products and nursery stock. Regardless, follow-up surveys showed this new infestation to be much larger than the previous two.

“Since that time we’ve been doing quite a bit of surveillance,” says Ron Neville, a CFIA survey biologist active in the Atlantic region. “We’ve confirmed it in five counties: Digby, Yarmouth, and Shelburne, but also into Queens and Annapolis.”

He describes these first three counties as “generally” infested, meaning HWA is widespread, while Queens and Annapolis only host small pockets. The CFIA’s priority, he says, has been to determine the extent of the infestation, and to formulate a response in coordination with relevant federal and provincial departments. As of yet, no major actions have been taken. Control measures used extensively in the United States over the last several decades are being considered for their feasibility in Nova Scotia, including bio-controls, pesticides, and harvesting strategies.

The adelgid is a prolific creature, a species consisting entirely of asexual females born pregnant, capable of laying 200 eggs twice a year. This means a single insect could become 40,000 in a year’s time, under ideal conditions – and with little natural predation on the East Coast, its population could track pretty close to this alarming arithmetic.

“It’s a highly mobile pest,” says Neville, “so Eastern hemlock across Nova Scotia and really the rest of Canada is at risk. HWA and the loss of hemlock trees has the potential to cause major ecological impacts in Canada. In many forests, hemlock serves as a foundation species, which means that many species rely on hemlock for their existence. The loss of Eastern hemlock could negatively impact the health of other plants, birds, aquatic organisms, mammals, etc.”



The Hemlock woolly adelgid is very small, but its egg sacs – which resemble small, white cotton balls covering the underside of the needles – are much easier to spot. (Lorraine Graney, Bartlett Tree Experts photo)



Anyone in Nova Scotia who sees signs of Hemlock woolly adelgid infestation is encouraged to take a photograph, note the location of the affected tree, and contact the CFIA at 1-800-442-2342. (Michael Montgomery, USDA Forest Service photo)

SENIORITY

The infestation could have far-reaching implications for Nova Scotia’s forest ecology, above and beyond the intrinsic importance of hemlocks. Because this tree has proven less economically valuable for lumber or pulp than its pine, spruce, birch, oak, and beech counterparts – historically and today – hemlocks make up the vast majority of Nova Scotia’s remaining old-growth forests.

Colin Gray, of the Mersey To-beatic Research Institute, has spent

the last two years tracking down and documenting Nova Scotia’s surviving climax forests, and he can attest to this. A considerable number of species depend on the ecological services of mature forests, says Gray. The prospect of a severe adelgid infestation is alarming to him.

“We won’t be able to take our grandchildren or great-grandchildren into an old-growth forest, because none will be left,” he says.

“We’re definitely concerned,” says Mary Jane Rodger, general manager of

(MCFC), “because there’s little question at this point that HWA will spread.”

She says while hemlock is far more valuable ecologically than commercially, an infestation could affect forest management practices and wood markets on the South Shore. Rodger says restrictions will likely be placed on the movement of round wood and firewood from the five infected counties to the rest of Nova Scotia, with permits granted only where reasonable precautions are taken to prevent the spread of HWA. She uses the examples of kiln-drying, or letting the wood sit for six months after processing.

To prevent the insect’s spread from one hemlock stand to another on their

special silviculture treatments, and will be making forest blocks available to local and government scientists testing biological or chemical control methods. As yet, HWA hasn’t been found on MCFC lands or in nearby Kejimikujik National Park.

Firewood is MCFC’s primary product, and precautions will be taken to ensure none of it comes in contact with HWA. “This includes only selling firewood* from stands that are predominately spruce-pine or mixed hardwood, rather than stands which have a spruce-hemlock structure,” says Rodger. “Forest companies will no doubt be concerned regarding restrictions on moving wood.”

The adelgid is an incredibly small

“millimetre-sized blob with six legs and a feeding tube.” Its egg sacs, however, are much easier to spot. They look like small, white cotton balls covering the underside of hemlock needles. If you detect the insect or its eggs, you’re encouraged to take a photograph, mark the tree’s location, and contact the CFIA at 1-800-442-2342. The CFIA is also asking industry players and all members of the public to avoid moving potentially infested wood products into areas that are not infested.

(Zack Metcalfe is a freelance environmental journalist, author, and writer of the *Endangered Perspective*. He operates out of Halifax, Nova Scotia.)

Adelgid expert

Nova Scotia seeks advice from Cornell researcher

As the Hemlock woolly adelgid (HWA) threatens the integrity of Maritime forests, government departments, research organizations, and landowners are preparing their defences. A Nova Scotia HWA Working Group has been formed, with representation from the Canadian Food Inspection Agency (CFIA), the Canadian Forest Service, Parks Canada, the Mersey Tobetic Research Institute, Nova Scotia’s Department of Natural Resources, and researchers from various universities. In their search for expertise in combating this invasive insect, they’ve reached out to Dr. Mark Whitmore,

a forest entomologist with Cornell University, in New York State, who has been studying the pest for 40 years now, throughout its conquest of the eastern United States.

When Dr. Whitmore visited Nova Scotia in mid-December to share his experience and to help formulate a local response, he was asked how many hemlocks have already fallen to HWA in the U.S. “I have no idea, but countless trees... billions,” he replied. “You just need to look throughout Pennsylvania and south to Georgia; the devastation is mind-boggling.”

A millimetre-sized insect native to Asia,

HWA is also present in the Pacific Northwest, where it’s adapted to North America’s Western hemlock. In both regions, it is held in check by predatory

insects, while on the Eastern Seaboard its devastation goes entirely unchallenged by native predators. Its offspring are so small as to be carried off by the wind, spreading like dandelions across ecosystems unprepared for its insatiable appetite.

Whitmore talked about Eastern hemlock’s ecological importance as a “foundation species,” meaning it is “basically responsible for forming the habitat on which myriad other species depend.” In much of the eastern U.S., where hemlock is the most common conifer, and in Nova Scotia, where it’s invariably the oldest, this tree is especially important to wildlife, he said. Rivers and watersheds dominated by hemlocks, for example, are shaded from the sun, ensuring aquatic temperatures cool enough for the spawning of Brook trout. And during winter, these trees intercept enough snowfall to maintain shallow walkways in the understory – an important service for species such as deer.

“Foundation species are generally so common that they’re taken for

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granted," he said. "If you take them out of the system, the system collapses."

CONTROLS

Whitmore said the careful application of insecticides can be an affordable and safe measure against HWA, providing protection for five to seven years. There are too many trees, and too many adelgids, for this to be a long-term fix, but he considers it a way of buying time.

"Our whole strategy is to use insecticides to preserve valuable hemlock resources across the landscape, be them scenic, genetic, or ecological," he said. "The long-term plan, in my mind, is the implementation of biological controls, which could take years."

HWA co-exists sustainably with the Western hemlocks of B.C. because of the aforementioned predators specialized to eating adelgids. With extensive lab work, Whitmore and his colleagues have demonstrated that two of these predators – a beetle known as Little Larry (*Laricobius nigrinus*), and a species of Silver fly (*Leucopis argenticollis*) – would rather starve than change their diet. "They only eat adelgids," he said, with scientific certainty, "and as far as I'm concerned, that's a good thing."

With no demonstrated harm to the ecosystems of the Eastern Seaboard, these two predators have been introduced so they might devour HWA, creating what's called a biological control. Both are slowly establishing themselves in selected states.

Once the introduced predators have achieved a population size sufficient to control HWA, Whitmore expects the ecosystems in question will find balance. Because this will take time, however, every year counts, especially in the early stages of an infestation, such as the one in Nova Scotia.

Currently there are no insecticides registered and available for use against HWA in Canada. And while Little Larry and the Silver fly are native to B.C., neither has been brought to Nova Scotia. Whitmore's opinion is that these obstacles should be overcome quickly, so the Maritimes can follow the example of eastern states.

"Assume the worst, and hope that you're wrong," he said. "I'm working on the assumption that all Eastern hemlocks will disappear, because I don't want them to. I'm going to fight as hard as I can to keep them on the landscape. If it were me, that's what I'd do here, because I've seen important stands deteriorate while waiting for biological controls."

On Dec. 12 a public meeting was held at the Mersey Tobetic Research Institute headquarters in Kempt, N.S., and members of the provincial working group fielded questions from woodlot owners. Government representatives said there has been talk of testing registered Canadian pesticides for their effectiveness against HWA, as well as other studies aimed at introducing the proven predator insects to Nova Scotia.

"The working group is discussing biological pest control seriously," said Ron Neville, of the CFIA. "It may be what we need to have happen here." 



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