

# Hemlock FAQs

## **Q: What's happening to our hemlocks?**

**A:** They are being attacked and killed by the hemlock woolly adelgid, a tiny aphid-like insect that has no natural predator here. These invasive insects are incredibly prolific and threaten the very survival of the eastern and Carolina hemlocks. With a life cycle that produces two generations a year, the offspring of a single adelgid can multiply into as many as 90,000, so in just a few years, even large hemlocks can be overwhelmed and die.

## **Q: When and where did the problem start?**

**A:** Native to Asia, the hemlock woolly adelgid was first reported in the eastern United States in 1951 near Richmond, Virginia, where it was accidentally imported. It remained confined to Virginia in the 1950s but then began spreading north along the Appalachian Mountains chain into Pennsylvania in the 1960s, New Jersey in the late 1970s, Connecticut and Massachusetts by the 1980s, and in the 1990s up into Maine. More recently it has traveled south along the Appalachians and now infests almost the entire eastern and Carolina hemlock range, killing forests and landscapes as it goes.

## **Q: What is the extent of the infestation in Georgia?**

**A:** According to an Environmental Assessment performed by the U. S. Forest Service, the adelgid arrived in Georgia in the Chattooga River gorge along the South Carolina-Georgia border in 2002. Since then, it has been making a devastating march westward and southward across the Blue Ridge Divide crest into the Little Tennessee, Hiwassee, and Chattahoochee River drainages. By the end of 2012, infestations had been officially confirmed in 19 counties -- Rabun, Habersham, Stephens, Banks, Towns, White, Hall, Union, Lumpkin, Fannin, Gilmer, Pickens, Dawson, Murray, Whitfield, Cherokee, Gordon, Walker, and Dade -- which means HWA has spread through the entire native hemlock range in Georgia. HWA reports have also been received from other counties where hemlocks have been planted in landscapes, reaching as far south as Atlanta.

Tree mortality is already occurring in the northeast part of the state where the infestation has been the longest, and great swaths of dead or dying hemlocks can now be seen in those areas. The degree of infestation in the north central counties continues to worsen, and many trees there are in decline.

## **Q: What age or size of hemlock is attacked?**

**A:** Hemlock trees of all sizes and ages are attacked. Trees in close proximity to each other and those growing along waterways may experience a severe infestation more quickly than stand-alone trees.

## **Q: How does the HWA kill the tree?**

**A:** An adelgid begins its journey as a tiny reddish-brown egg protected inside a white cottony egg sac that may contain 30 to 300 siblings. Upon hatching, the crawler travels a short distance along the branch, selects a home site at the base of a needle, inserts its long slender mouth-part called a stylet into the tissue, and begins consuming the starches in the tree's branches and twigs that are essential to new growth and, it is thought, injecting a coagulant that prevents sap from reaching the needles. Unlike the indigenous insects of the eastern U.S., the HWA is active all through the winter. Deprived of nutrition, the needles desiccate (dry up) and fall off; new growth diminishes and then ceases; branch die-back follows, and ultimately the tree dies.

## **Q: How long does it take an infested tree to die?**

**A:** It depends on the original health and growing conditions of the tree. On average, it takes a healthy hemlock in the north 5-10 years to die after becoming infested. In the south, scientists are finding that decline and mortality occur more quickly, and trees living in stressful environments (e.g. rocky soils, compacted soils, drought prone, poor drainage) succumb easily to the HWA and can die in as few as 3-6 years.

## **Q: Why should anyone care about the hemlocks?**

**A: Aesthetically –**

\*Hemlocks are one of our most beautiful trees.

\*They contribute greatly to the enjoyment of those who live, work, and play among them, as well as the many people who come to north Georgia for tourism and outdoor recreation.

**Environmentally –**

\*Hemlocks provide food and habitat for about 120 species of vertebrates and 90+ kinds of birds.

\*They help maintain necessary temperatures in streams for trout and other native fish.

\*Hemlocks provide abundant shade necessary to numerous species of rare and endangered native plants.

\*They help prevent the spread of invasive plant species. Hemlocks' extensive root systems prevent stream bank erosion.



- \*They protect watershed and water quality, preventing build-up of harmful bacteria.
- \*Streams lined with hemlocks almost never dry up in summer or freeze in winter.

### **Economically –**

- \*Healthy mature trees can add 7-10% to private property values.
- \*Hemlocks provide the net cooling effect of 10 room-sized air conditioners running 20 hours a day.
- \*They save billions of dollars a year by filtering CO<sub>2</sub> and other pollutants from the air as they produce oxygen for us to breathe.
- \*A hemlock tree 1' in diameter performs thousands of dollars worth of water purification.
- \*North Georgia counties with hemlocks enjoy over \$1 billion of tourist spending annually.
- \*Outdoor enthusiasts account for a quarter of this revenue.
- \*The 90,000 fishermen who enjoy the Chattahoochee National Forest contribute more than \$43 million in annual revenues.
- \*Each \$1.25 million generated by tourism activities funds one job in the tourism industry.

### **Q: What will happen if appropriate action isn't taken in time?**

**A:** Infested hemlocks that are not treated will die. Widespread hemlock death could result in an environmental and economic disaster in north Georgia.

It is estimated that within the next 10 years, 80-90% of the hemlocks in Georgia will be dead, resulting in:

- \*decline or loss of certain plant and animal species that depend on hemlock habitat for food, shelter, and shade and an increase of invasive plant species
- \*increase of soil erosion, increase of forest fire risk, and decrease of water retention in the land
- \*degradation of air quality, water quality, watersheds, and trout streams
- \*degradation of some of our most beautiful and scenic areas in the state
- \*closure of affected recreation areas, trails, campgrounds, and fishing and paddling streams
- \*loss of recreational and tourism revenue (and associated jobs)
- \*decrease in private property values

### **Q: Are there any options for preventing this disaster?**

**A: On public lands –** The U.S. Forest Service has identified approximately 144 Hemlock Conservation Areas in the national forests. They are treating these with chemicals that are injected into the soil around the trees, with predatory beetles that prey only on the adelgids, and in some cases a combination of approaches. The Georgia Department of Natural Resources is also treating specific areas in state parks, recreation areas, historic sites, and wildlife management areas. The efforts of both these agencies are targeted at saving the trees in high-value areas and preserving a genetic population for the future. However, given the thousands of acres of hemlock forest in Georgia with millions of hemlocks and the limited funds and manpower available to these agencies, most of the hemlocks on public land will die.

**On private land –** There is cause for great opportunity here. In most cases, infested hemlocks can be treated and saved, and property owners can choose to save as many trees as they want. The control methods include cultural controls and chemical treatments that are both easy and inexpensive to do.

### **Q: How can one tell if a hemlock has the woolly adelgid?**

**A:** The insects themselves are almost too tiny to see with the naked eye, but the telltale sign – most visible in the spring – is white woolly egg sacs about the size of a peppercorn on the underside of the branches. These egg sacs look similar to the end of a Q-tip and are found where the needles attach to the branch. Even if a tree is too tall to inspect a branch, there are other clues to an infestation such as infested branchlets that have fallen to the ground, infestation on neighboring trees, or looking up through the tree's canopy and seeing lots of blue sky.

For a while, an infested tree may continue to look basically healthy. However, as the infestation worsens, it becomes easier to see the white wool without even turning the branches over, and it covers more of the tree. Infested trees show an increasingly grayish tint to the foliage, a decline in needle density, cessation of new tip growth, branch die-back, and finally, if left untreated, complete defoliation and death.

### **Q: How can one tell if a hemlock has already been treated?**

**A:** In the national forest and on some state properties, you will find a numbered metal tag affixed to the trunk of the tree. In other cases, you may see a dot of spray paint (about the size of a lemon) on the trunk of the tree. Both of these are indicators that the tree has been treated. Even if you don't see a tag or dot of paint, you can sometimes tell that a tree has been treated if it looks healthy while the others around it look sick.

### **Q: What specific actions can individuals take to help save the hemlocks?**

**A: On public lands –** Save Georgia's Hemlocks and the U. S. Forest Service have established an agreement under which SGH Facilitators and other trained volunteers can chemically treat hemlocks in designated Hemlock Conservation Areas (HCAs) of the Chattahoochee-Oconee National Forest. We have a similar agreement with the Georgia Department of Natural Resources to

treat hemlocks in state parks and wildlife management areas. Anyone interested in helping to treat hemlocks on public lands should call the Hemlock Help Line 706-429-8010.

In addition, there are other ways for volunteers to help hemlocks on public lands through the Georgia Forestry Commission, Georgia Department of Natural Resources, and the Friends of Georgia State Parks organizations. Please see “Helping Hemlocks on Georgia’s Public Lands” on the Resources page of our web site for a link to the list of contact persons with whom you can register for future volunteer opportunities.

**On private land** – Property owners should inspect their hemlocks frequently and take action at the first sign of an adelgid infestation. Once the adelgid is found, property owners basically have 3 choices. (1) Do nothing and the trees will die. (2) If property owners are willing and able, the least expensive solution is for them to treat their own trees. (3) Another option is to hire a qualified professional who specializes in treating hemlocks for the woolly adelgid. Neighbors should join together to help each other take care of their trees, establish the widest area of suppression possible, and share the cost.

And good news – the Hemlock Help Program provided by Save Georgia’s Hemlocks has been implemented to help north Georgia property owners save as many of their trees as they desire for the lowest cost. It offers assistance both to property owners or groups who want to do the work themselves and to those who prefer to hire a professional.

**Q: What methods of adelgid control can be used on private property?**

**A:** The key word is “control.” It is unlikely that we will be able to completely eradicate the woolly adelgid. Rather, the goal is to implement a combination of control measures that will reduce the adelgids’ numbers to a level that doesn’t damage the hemlock and allows the tree (and the species) to survive.

**Cultural controls:** These involve physical or mechanical actions. Maintain tree health; keep trees watered and mulched; don’t fertilize infested trees until the infestation is under control; don’t put bird feeders or deer feeders in or near your hemlocks. Trying to remove adelgids mechanically by pruning or spraying with a high-powered water hose isn’t easy or very effective. Unwanted or untreated trees should be removed. Cultural controls can be used year-round and should be done in combination with chemical controls.

**Chemical controls:** Systemic chemicals can be applied by soil injection, soil drench, foliar spray, or basal trunk spray. They are absorbed through the roots, trunk, and/or leaves and distributed throughout the entire tree for overall protection. Insects that bite or suck on the tree following treatment will die.

Topical non-systemic treatments are normally applied by spraying. They are not absorbed by the tree but kill insects on contact, generally by smothering them. For this approach insecticidal soap, horticultural oil, or any product labeled to kill aphids can be used but must be done when the insects are out of their protective egg sacs (normally April through mid-May or mid-June through September).

While chemicals are not the ultimate long-term solution, they can serve as a serious band-aid, buying time for the trees while effective long-term solutions are being developed. Systemic chemical treatments can provide residual protection for anywhere from one to five years before treatment needs to be repeated, depending on the chemical used.

**Biological controls:** Research is ongoing with predatory beetles and/or other biological controls for a sustainable long-term solution that will establish a balance between predator and prey. At present, biological controls are not a viable option for property owners and are available only for public lands, but we hope that will change at some point in the near future.

Five southeastern colleges/universities – Young Harris College, the University of Georgia, North Georgia College and State University, Clemson University, and University of Tennessee at Knoxville – are rearing several different kinds of predatory beetles that feed only on the woolly adelgid. Experiments are also being conducted on insect-killing fungi to identify those that will be most effective against the woolly adelgid, genetic modification in favor of any resistance factors that may exist, and seed and sapling conservation for future reforestation.

Individuals can donate money directly to support the efforts of the labs that are raising predatory beetles and experimenting with other biological controls to combat the HWA on our public lands. A list of contact names and mailing addresses can be found on the Biological Controls page of our web site. Be sure checks are marked “hemlock project” or “beetle lab.”

**Q: When treating with chemicals, how does one choose the best method and chemical?**

**A:** These choices should be made based primarily on the level of infestation and condition of the trees but also on number and size of trees to be treated, location of the trees, type of terrain and soil composition, equipment the property owner has (or has access to), and of course cost. In most cases, Imidacloprid is the treatment of choice for lightly to moderately infested hemlocks and provides residual protection for 5 – 6 years. Dinotefuran (a much faster-acting product) is recommended for heavily infested hemlocks and very large infested hemlocks (greater than 20 inches in trunk diameter). It gains control of the adelgids very quickly, usually within 2 – 6 weeks and gives about 2 years of residual protection, after which it is usually possible to switch over to an Imidacloprid cycle.

**Soil injection** – This is the most widely recommended method and involves using a soil injector to inject the treatment solution directly into the soil close to the base of the tree where a hemlock’s feeder roots are concentrated. It is highly effective and appropriate for almost all situations.

**Soil drench** – This method involves making small holes in the ground around the base of the tree and pouring the treatment solution in. It is appropriate for level to gently sloping ground with good organic content in the soil. Some people find this method easier than soil injection, and others think it is slower.

**Foliar spray** – This method is appropriate for hedges or trees that are small enough that the entire tree can be reached by the spray. It can also be used on the lower branches of larger trees that are also being treated by soil application to give them some relief while the chemical is attaining its full strength in the tree. However, it is important to avoid wind drift that may carry the treatment material to non-target plants or insects.

**Trunk spray** – One chemical product containing Dinotefuran (marketed as Safari) can be applied by spraying it directly on the trunk where it is absorbed through the bark and translocated upward throughout the tree.

**Q: How safe are the chemical treatments?**

**A:** Pesticides used improperly can be injurious to humans, animals, and plants. That said, when used according to the label instructions, HWA treatment products are quite safe. Be sure to follow the directions and heed all precautions on the labels. Never use a product in any manner that is inconsistent with the product label. Do not use more or less than is recommended. To protect the environment, keep pesticides out of waterways and drains. To protect human health, ordinary care should be taken when handling chemicals, including long pants, long sleeved shirt, and gloves; we also recommend protective eyewear and a mask for a spray application.

**Q: What are the costs of the various treatment options?**

**A:** Treatment cost depends on how badly infested the tree is, what chemical is used, how large the tree is, and who does the treatment. Here are some estimates based on the latest known pricing for the chemicals and the average pricing charged by professional pesticide applicators in north Georgia.

For do-it-yourselfers, the cost is for chemicals only and ranges from:

- \$0.05 to \$0.27 per diameter inches when using Imidacloprid 2F (based on a retail price \$97 per gallon);
- \$0.14 to \$0.41 per diameter inch when using Imidacloprid 75 WSP (based on a retail price \$140 per case);
- \$0.82 - \$3.26 per diameter inch when using Safari 20 SG (based on a retail price of \$370 per 3-lb container).

For a professional to do the work, the cost covers both chemicals and labor and averages from \$0.60 to \$4.00 per diameter inch for Imidacloprid treatment or \$1.50 to \$9.00 per diameter inch for Safari treatment.

A 16” hemlock can be treated for \$1.12 - \$34.88, with the lower figure representing do-it-yourself treatment using Imidacloprid 2F and the upper figure representing professional treatment with Safari.

**Q: What are the costs of NOT treating infested hemlocks on private property?**

**A:** The tangible costs relate to taking the tree down and loss of property value, and these are substantial. Taking down and hauling away a dead 16” hemlock could cost between \$300 and \$1500. Assuming a home value of \$200,000, the loss of healthy mature trees such as hemlocks could reduce the property value by as much as \$20,000. And the loss of such trees on one person’s property can cause a decrease of about half that size in his neighbor’s property.

The intangible costs – loss of beauty, loss of natural habitat, loss of privacy, and must more – are incalculable.

**Q: Is there anyone who can help property owners save their hemlocks?**

**A:** YES!!! Save Georgia’s Hemlocks has a Hemlock Help Program for property owners. We are now offering full services in all 19 HWA-infested counties: Banks, Cherokee, Dade, Dawson, Fannin, Gilmer, Gordon, Habersham, Hall, Lumpkin, Murray, Pickens, Rabun, Stephens, Towns, Union, Walker, White, and Whitfield. Our Hemlock Help Line<sup>SM</sup> serves the entire U. S. and Canada.

The goals of the program are:

**Educate** – Enhance public awareness of the hemlock woolly adelgid crisis, current treatment options, and emerging control technologies

**Enable** -- Ensure easy access to information, advice regarding economical solutions, and direct assistance for property owners

**Encourage** – Establish a clear understanding of the aesthetic, economic, and environmental reasons for property owners to take timely and effective action to save their hemlocks.

**Q: What does the Hemlock Help Program include?**

**A:** The key features of the program are:

**Raising awareness:**

- Free public Hemlock Help Clinics held in each county to introduce the program and share information about the hemlocks, the pest that is attacking them, and currently available solutions
- Customized presentations for property owner associations, community groups, schools, etc.
- Educational information disseminated via newspapers, radio stations, e-mail lists, newsletters, and direct mail
- Research-based web site that serves as a digest of the most accurate, up-to-date information from the educational, scientific, and professional communities as well as state and federal agencies, including hemlock-specific treatment instructions for a variety of treatment materials and application methods

**Direct assistance to property owners and property owner associations:**

- Hemlock Help Line<sup>SM</sup> (706-429-8010) to answer technical questions, give advice on the most appropriate control options, provide local contacts and sources, and help callers estimate treatment costs
- Information on where the public can borrow (rather than rent) soil injectors in each county to treat their own trees. Most injectors available for borrowing are located at local Forestry Commission Offices or UGA Extension Offices, but others may be available through local property owner associations.
- Information on where the treatment products may be purchased
- Information on finding qualified local companies that are properly licensed, insured, and experienced in treating hemlocks for property owners who prefer to hire a professional
- Healthy, locally raised hemlock saplings for planting or reforestation on private property
- Charitable assistance to financially challenged property owners to treat or plant hemlocks, as our resources permit

**Education and service to the community at large:**

- Facilitator training for volunteers who want in-depth hemlock instruction and service opportunities to help others in the community
- Mentoring support for groups undertaking hemlock awareness and treatment efforts
- Starter seedlings and training for groups establishing hemlock raising nurseries
- Assistance to local, state, and federal land managers and other nonprofits for hemlock treatment projects
- Repair/refurbishing service for Kioritz soil injectors
- Ongoing research and citizen science initiatives for hemlock preservation and restoration

**Q: What does the Hemlock Help Program cost?**

**A:** All services of the Hemlock Help Program are free. Save Georgia’s Hemlocks is a 100% volunteer, 501(c)(3) nonprofit organization. Our budget goals are to limit administrative expenses to 20% or less and use 80% or more of our available resources for program activities that directly benefit property owners and their hemlocks. Currently our spending ratio actually averages 90% for programs and only 10% for administrative expenses. There are no paid officers or staff.

**Q: Where is more information available?**

<b>Phone:</b>	<b>706-429-8010 Hemlock Help Line<sup>SM</sup></b>
<b>Web site</b>	<b><a href="http://www.savegeorgiashemlocks.org">www.savegeorgiashemlocks.org</a></b>
<b>E-mail</b>	<b><a href="mailto:donna@savegeorgiashemlocks.org">donna@savegeorgiashemlocks.org</a></b>

Note: The information provided in this document concerning chemical treatments is based on product labels and advice from experts, including various public land managers, product representatives, and the University of Georgia. It is the user's responsibility to read and follow the label instructions when using pesticide treatments.