

**Southern Appalachian Man and the Biosphere Program (SAMAB)
Environmental Coordination Committee**

**Template and Guidance
ENVIRONMENTAL ASSESSMENT OF
HEMLOCK WOOLLY ADELGID (HWA) CONTROL STRATEGIES
March 2005**

Several agencies are facing the need to take quick action to implement strategies to control hemlock woolly adelgid in the Southern Appalachians. SAMAB wishes to facilitate the needed environmental compliance documentation by providing a template that agencies can use. Items in small print represent guidance while items in large print indicate actual text that may be useful in a NEPA compliance document addressing HWA issues. If your office has a proposed action related to HWA control, first consider whether the proposal could qualify for a categorical exclusion. For example, some Forest Service actions may fall under the categorical exclusion for Applied Silvicultural Assessments provided in Section 403 of the Healthy Forests Restoration Act of 2003. This categorical exclusion applies to agencies under the Secretary of Agriculture and limits the area involved to 1,000 acres per assessment. Your agency may have another categorical exclusion that can be used for qualified HWA control projects.

If the project does not meet the conditions of a categorical exclusion and you determine that an EA is needed, the following general guidance is provided. The EA will conclude either that the impacts are insignificant or that an EIS should be prepared. All information should be reviewed for consistency with the site-specific conditions of each geographic area.

GENERAL GUIDANCE FOR EAs

- Concise public document of 10-15 pages
- Reference any supporting data, inventories, and other documents
- Provide public notice of availability of the EA
- Provide public notice of availability of the FONSI

I. Purpose and Need for Action

The purpose of this initiative is to slow or stop the spread of hemlock woolly adelgid (HWA) on lands managed by _____. This would be accomplished by the release of laboratory-reared predator beetles. In addition, the insecticide imidacloprid would be used to keep accessible groups of trees alive in some areas. The action is needed because HWA has been found infesting hemlocks in the area. HWA kills eastern and Carolina hemlock within a few years (4-7 years) of infesting them. HWA is steadily spreading south into the oldest and largest hemlock forests of the Southern Appalachians, threatening a unique forest ecosystem and the aquatic communities it shelters. Foresters warn of a potential disaster comparable to the chestnut blight, which radically changed the composition of Southern forests. HWA is a difficult pest to manage. No natural enemies keep HWA

in balance. HWA is a serious pest of eastern hemlock and a threat to Carolina hemlock, which is found only in the Southern Appalachians.

A. *Geographic Distribution*. Southern Appalachian ecosystems/ecoregions where eastern hemlock and Carolina hemlock are found include the Blue Ridge, Ridge and Valley and Cumberland Mountains and Plateau of Virginia, North Carolina, Georgia, Tennessee, Kentucky, and Alabama.

B. *Vulnerability*. Little is known about the susceptibility of Carolina hemlock to HWA but they are known to be susceptible. All eastern hemlock are likely to be vulnerable. Because hemlock in the southern Appalachians tend to be mature, they are especially vulnerable to heavy infestations of HWA. Impacts in Virginia, New Jersey and Connecticut have been severe, with mortality from 42 to 90 percent among stands.

C. *Ecology*. Eastern hemlock stands occur in a variety of sites, soil types, and climatic conditions. It is long-lived and extremely tolerant of shade. Hemlock forests are common in riparian areas such as coves and along escarpments in the Southern Appalachians, especially north- and east-facing slopes. The tree's dense canopy provides food, shelter and breeding sites for many species of wildlife. The dense canopy also maintains cool stream water temperatures and moderates temperatures in cold winter months and during hot summer days.

Carolina hemlock grows as a canopy dominant on rock outcrops, talus slopes, and dry rock ridges in Virginia, West Virginia, North Carolina, Tennessee, South Carolina, and Georgia. It can rarely occur as a minor component in other landscapes.

Species associated with hemlock and hemlock-dominated communities include birds, mammals, and arthropods.

Vertebrates. The black-throated green warbler, the solitary vireo, and the northern goshawk are exclusively associated with hemlock stands. These and other species might decline as hemlock forests decline. Brook trout are found more commonly in streams associated with hemlock ecosystems because of the shaded cooling effect of the hemlock canopy. A total of 36 mammal species occur in hemlocks within Connecticut. In the Unicoi Mountains of western North Carolina and Tennessee, the endangered northern flying squirrel (*Glaucomys sabrinus coloratus*) is found in northern hardwood and northern hardwood/hemlock stands. The importance of hemlock to this species is not known, although elsewhere in this species'

range, it is associated with spruce/fir and northern hardwood, indicating that there may be some importance to the conifer component.

Terrestrial arthropods. In an arthropod diversity study using pitfall traps in two hemlock ravines at the Delaware Water Gap National Recreation Area, beetles represented the largest group of terrestrial arthropods associated with hemlock stands, followed by ants and harvestmen. Spiders are found in larger numbers on hemlocks and other conifers than on hardwoods. The hemlock angle, *Semiothisa fassinotata*, is an obligate of eastern and Carolina hemlock. Pests of hemlock include two scale insects (elongate and hemlock scale), several mites, needleminers, hemlock borer, and the hemlock looper.

D. Economics. Eastern hemlock is used by the forest industry for structural lumber, but is not a highly valued timber species. Lumber production may average about 100 million board feet annually, and an equivalent amount is used for pulpwood, but the species is more important ecologically than commercially. As a large, shade-providing species, established eastern hemlock can contribute directly to the property values of private lands either containing these trees or adjacent to lands containing these trees. In the southern Appalachians there is a high demand from both locals and tourists for outdoor recreation, including fishing, camping, hiking, and wildlife viewing, in and near hemlock forests. High tree mortality in these areas can reduce the quality of recreational experiences, therefore reducing recreational use and the associated economic benefits of recreation. Because eastern hemlock helps maintain cool temperatures at the headwaters of streams that support trout populations, loss of hemlock in certain locations could adversely impact trout and as a result, adversely impact recreation in the form of trout angling.

E. Aesthetics. Eastern hemlock is a valuable component of mountain and gorge forests in the Southern Appalachians. It is widely used as an ornamental in urban landscapes and highly valued for its dense foliage and persistent lower branches. There are 274 cultivars of eastern hemlock. It is the state tree of Pennsylvania.

F. Fuel loading. If dense stands of hemlock experience substantial mortality, additional fuel loading will be likely in these areas, making it more likely that fires will start and burn longer.

G. Safety. Hemlocks in developed areas, if weakened or killed by HWA, will create a safety hazard.

H. Authorities. Executive Order 13112, Invasive Species, dated February 3, 1999, directs each federal agency to prevent the introduction of invasive species, to detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner, to monitor invasive species populations accurately and reliably, and to provide for restoration of native species and habitat conditions in ecosystems that have been invaded. [National Parks and National Forests will also have specific statutory guidance to include here].

I. Scoping Activities. Describe any public involvement and notification process, as well as any interagency notifications that have taken place.

J. Issues Not Considered in Detail.

Impact to native predators. There are no other arthropod species federally or state-listed as endangered or threatened that utilize HWA as a food source. Of the native or introduced beetles found in natural hemlock habitat, none appear to be dependent on HWA and all have an alternate host preference.

Nuisance to human residences. *Pseudoscymnus tsugae* does not aggregate in large numbers prior to overwintering as was the case with another nonindigenous beetle, *Harmonia axyridis*, that was introduced into the U.S. for biological control of aphids. *P. tsugae* does not leave the forest to overwinter and observations suggest that this species hibernates in the leaf litter. *P. tsugae* is incapable of transferring to non-adelgid prey and populations are expected to decrease as HWA densities decline. In contrast, *H. axyridis*, a generalist predator, maintains high densities by switching over to other more abundant prey.

II. Alternatives

Include No Action and the Proposed Action. When there is consensus about the proposed action based on input from interested parties in the scoping process, you can consider the proposed action and proceed without consideration of additional alternatives. Otherwise, you need to develop reasonable alternatives to meet project needs (NEPA Section 102(2)(E)).

A. No Action. The agencies would take no action to release predators of HWA. However, individual trees in landscape settings would likely be protected through insecticidal soap applications or pesticide root injections.

B. Proposed action (Alternative 1). Release of laboratory-reared predator beetles (including *P. tsugae*, *Scymnus sinuanodulus*, *S. ningshanensis*, and *Laricobius nigrinus*) or their eggs in hemlock woolly adelgid (*Adelges tsugae*) infested hemlock stands in the Southern Appalachians. Release

would be by manual methods. [add other beetles as needed] These release strategies would be accompanied by an aggressive public education campaign to encourage the public to report infestations, thus allowing agencies to more effectively respond to isolated infestations.

C. Alternative 2 (if needed-see guidance note above. A “no chemical treatment” alternative could be added)

D. Alternatives Not Considered in Detail. (1) Control with traditional insecticides is not feasible because hemlock stands vulnerable to HWA are spread across remote landscapes. Individual hemlock trees may be treated by individual homeowners or landowners with insecticides. (2) Plant breeding for resistance. Asian hemlock trees and western North American hemlock species are more tolerant of HWA. In the longer term, plant breeding strategies could identify host resistance and more resistant cultivars could be developed. However, this could not be accomplished fast enough to save native hemlock stands.

E. Comparison of Alternatives.

Without a viable method for long-term control of HWA there may be devastating impacts to Southern Appalachian ecosystems as eastern and Carolina hemlocks are lost throughout their range. Under the proposed action, biological control agents would be released. If they eventually establish a reproducing population, hemlock mortality would likely be reduced.

III. Environmental Consequences

- Describe the environmental impacts of your proposed action and each alternative. Each alternative must meet the purpose and need of the HWA project.
- Provide enough information to support a determination of no significant impact
- Use CEQ’s definition of “significantly” (40 CFR 1508.27) as a guide on significance
- Tailor the length of the discussion to the complexity of the impacts
- Discuss the direct, indirect, and cumulative effects of each alternative under each resource area below.
- Contrast the impacts of the proposed action and alternatives with the current condition and expected future condition in the absence of the project (no action)

Recommended Impact Assessment Sections to Include in a HWA EA

A. Non-target organisms and host specificity. The predatory beetle *P. tsugae* is from Japan as is HWA. It is a tiny black ladybird beetle about the size of a poppy seed. It specifically attacks adelgids and both the larvae and adult beetles feed voraciously on all life stages of HWA. Its life cycle is well-synchronized with that of the adelgid, and it completes at least two

generations each year in the field. The beetle shows no undesirable traits that would cause it to be a nuisance or otherwise poor candidate for release. *P. tsugae* is expected to attack only HWA and other adelgids such as the balsam wooly adelgid, pine bark adelgid, and Cooley spruce gall adelgid. *P. tsugae* does not feed upon or attack other arthropod fauna known to be associated with hemlock. Based on these considerations, in the event that *P. tsugae* attacks other adelgids, any indirect or cumulative effects are likely to be beneficial.

B. Ecosystem Effects. Under the action alternative, any effects to the stands at the release site would be minimal. This is due to the small size of the stands and the non-invasive nature of the activity. If release is successful, hemlock mortality would be reduced. Hemlock stands occur on both private and public lands in the Southern Appalachians. Thus, if predatory beetles become established, they would likely attack HWA infestations on other public and private lands. If this occurred, no adverse impacts to hemlock-dominated stands are expected. Even though HWA has been reported from Virginia since the 1950s, no effective native or naturalized predators have emerged that are abundant enough to control HWA or prevent tree mortality.

Under No action, eastern hemlock forests in the entire Southern Appalachians will decline, with resulting ecological changes to the forests. Cumulatively, these impacts would likely be far-reaching. Hardwoods and invasive species would likely colonize habitats now dominated by hemlock forests. The distribution and abundance of bird species would likely decline. Temperature and hydrologic regimes of streams will become more variable and less stable. This would result in a decline in brook trout. Rates of nitrogen mineralization and nitrification will increase, with some depletion of soil nutrients.

C. Economic. If predatory beetles become established, impacts to hemlock-dominated stands would be minimal. Under no action, forest industries would likely salvage hemlock on properties where this is allowed, though the amount salvaged would be limited by timber demands. Prices for hemlock lumber would be suppressed during periods of heavy salvage logging, making some stands economically inaccessible. Though difficult to measure, it is likely that anticipated mortality would lead to preemptive harvesting of live eastern hemlock in affected areas. Impacted areas would lose recreational values as people travel to other locations to recreate. Local

tourism industries that depend on these visitors to view or recreate in and near hemlock forests would suffer.

D. *Aesthetics*. If predatory beetles become established, impacts to aesthetics would be minimal. While individual trees would be lost, large stands would not. Under No action, an important element of the diversity of forest landscapes in the Southern Appalachian would be lost. Large blocks of dead and dying hemlocks would detract from the aesthetics of the area.

E. *Recreational Impacts*. If predatory beetles become established, impacts to recreational use of hemlock stands would be minimal. Under no action, outdoor recreation use that is linked to the ecologic, aesthetic, and/or wildlife habitat benefits of hemlock would be displaced to lower quality sites or lost altogether. Loss of hemlock in the headwaters of streams would reduce fish habitat and therefore reduce fish populations; angler success and satisfaction would therefore be reduced.

F. *Species associated with hemlock and hemlock-dominated communities*

Birds. Under no action, those neotropical birds which nest in hemlock stands would likely decline or continue their decline at a faster rate than under the action alternative. This includes blackburnian warbler and black-throated green warbler.

Terrestrial arthropods. Under no action, arthropod species which are dependent upon hemlocks would be lost or decline in numbers in comparison to the action alternative.

Mammals. Under no action, mammal species which utilize hemlocks for food and cover would likely find other food sources.

G. *Endangered and threatened species*. HWA control strategies are expected to have no effect on endangered or threatened species. With no control strategy (no action) there also would be no effect. However, treatment locations should be assessed for the presence of listed species, and findings coordinated with the U.S. Fish and Wildlife Service.

H. *Historic properties*. In some areas, hemlocks are important contributors to historic properties and cultural landscapes. HWA control strategies seek to preserve the cultural values inherent in these properties and landscapes. No historic properties would be adversely affected by HWA control strategies. However, under no action, the setting of historic properties would potentially be adversely affected by the loss of hemlocks.

I. *Wetlands and Aquatic Resources*. No wetlands would potentially be affected by HWA control strategies. Large woody debris transport to streams would be increased. Shading of water would decrease. Hemlock helps to maintain cool stream water temperatures, prevents stream bank erosion, and provides shelter to wildlife. Brook trout are more common in hemlock-bordered streams. Loss of this canopy would result in a loss of species diversity.

J. *Floodplains*. Under No action, hemlock mortality within riparian zones and floodplains may affect the potential for flooding in the short term, but over the longer term other forests would likely re-establish themselves. No long-term effects on floodplains are expected. Under the Action Alternative, floodplains would not be affected by HWA control strategies.

K. *Human Health and Safety*. Under no action, there would be some risk from dead hemlocks falling on visitors. The toxicity of imidacloprid is very low. It is not cancer causing, and is not expected to reach ground water. If not taken up by plant roots, the pesticide binds with soil particles. Under the action alternatives, the risk from pesticide use would be reduced through the use of certified pesticide applicators, following label directions, and development of a spill response plan.

L. *Other Actions Cumulatively Affecting Hemlock*. The health of hemlock forests and individual trees is potentially affected by ongoing forest management activities. Most timber harvest and prescribed burning activities do not take place in hemlock stands. These activities are unlikely to add to or combine measurably over time with the impact resulting from an expanding adelgid population. Streams shaded by hemlock are potentially affected by environmental stresses. Acid deposition has affected and continues to affect some high elevation streams. As a result of air quality legislation, the threat of cumulative impacts to streams shaded by hemlock groves actually lessens over time.

V. LIST OF PREPARERS

VI. LIST OF AGENCIES AND PERSONS CONSULTED

VII. BIBLIOGRAPHY

Proceedings: Hemlock Woolly Adelgid in the Eastern United States Symposium, February 5-7, 2002, East Brunswick, New Jersey. Available at www.fs.fed.us/na/morgantown/fhp/hwa/pub/proceedings/index.html

APPENDIX (Technical studies, response to comments, as needed)