



**USDA FOREST SERVICE
NORTHERN RESEARCH STATION,
NORTHEASTERN AREA, REGION 8**



**2007 REQUEST FOR RESEARCH AND TECHNOLOGY DEVELOPMENT PROPOSALS
TO IMPROVE MANAGEMENT OF HEMLOCK WOOLLY ADELGID**

The hemlock woolly adelgid (*Adelges tsugae*) is a non-native insect that is a threat to hemlocks (*Tsuga canadensis* and *T. caroliniana*) in the eastern United States. First observed in 1951 in Virginia, hemlock woolly adelgid (HWA) is now present in 17 states (from southern Maine to Georgia) and continues to spread, causing decline and mortality of hemlocks. Without effective controls, HWA may threaten the survival and sustainability of hemlock as a forest resource throughout eastern North America.

The native range of the hemlock woolly adelgid includes Japan, China, India, and western North America. In these areas, hemlocks and the adelgid likely share an evolutionary history, and because of this, adelgid populations rarely cause damage, probably because of co-evolved host resistance and a complex of natural enemies. Using this paradigm as an initial approach to the development of HWA control measures, a request for proposals for research and development focused on host plant resistance was issued in 2005 and seven proposals (totaling \$375,000) were funded (see Appendix I). In 2006, a second request for proposals for research and development was issued, focusing on biological control of HWA and six proposals (totaling \$413,000) were funded (Appendix II). Additional information on HWA can be found at the website <http://na.fs.fed.us/fhp/hwa/>.

As the loss of hemlocks from eastern forests threatens to produce cascading ecological effects (for example, changes in riparian structure, with impacts on both vertebrate and invertebrate aquatic fauna), federal, state, and university researchers, along with forest health specialists continue working to identify and evaluate methods for managing HWA. Current efforts center on the use of biological control, silviculture, host resistance, chemical control, regulatory efforts, and public awareness as tools to mitigate HWA impact.

Biological Control: A concerted effort to identify, evaluate, and introduce a complex of non-native natural enemies in the eastern United States has been initiated, but demonstrated effective biological control of HWA has not yet been accomplished. To date, three imported natural enemies have been released. *Sasajiscymnus tsugae*, a lady beetle from Japan, has been released in high numbers across the eastern United States since 1999 and in Connecticut as early as 1995. *Laricobius nigrinus*, a derodontid beetle from western North America, was first released in multiple locations in 2003, albeit at much lower release densities. Release of the third HWA predator *Scymnus sinuanodulus*, a lady beetle from China, began in 2004 at multiple release

sites throughout the infested region. Foreign exploration efforts to identify other potential natural enemies are underway and have generated some promising new leads including several new candidates from Japan and China that are currently in quarantine for further evaluation. Further research is needed on the efficacy and impact of already released species, as well as the new biological control candidates.

Silviculture and Host Resistance: Eastern North American hemlock species (*T. canadensis* and *T. caroliniana*) are highly susceptible to injury from HWA, while Asian and western North American species show more tolerance. The U.S. National Arboretum has initiated a breeding program to assess the potential for controlled hybridization among hemlock species utilizing *T. caroliniana* and *T. chinensis*. Several studies to evaluate potential factors involved in host resistance and to identify eastern hemlock trees with putative resistance are underway. Further work is needed to identify resistant hemlocks that can be used in restoration and conservation efforts.

Chemical Control: Recent studies have demonstrated that treatment of infested hemlock trees with imidacloprid can provide several years control of HWA. Resource managers from 6 states and numerous National Parks and National Forests are now protecting high value hemlock resources using single tree treatment methods. While treatments of hemlocks with systemic insecticides can be effective, more information is needed on optimal dosage, timing, application technology, environmental safety, and non-target impacts. Additionally, alternative insecticides and procedures for treatment in environmentally sensitive areas (e. g. near water) and eradication of isolated HWA populations are needed.

The USDA Forest Service Northern Research Station and Northeastern Area State and Private Forestry are jointly requesting proposals for innovative projects to advance the management of the hemlock woolly adelgid in the eastern United States. Projects can relate directly to biological control, chemical control, host resistance, or address aspects of HWA biology and ecology that influence the successful application of these management tactics. Priority will be given to HWA management solutions that have application potential. Examples of potential research and technology development topics include but are not limited to:

- Improving the establishment and survival of HWA natural enemies
- Assessing field efficacy of biocontrol agents in reducing HWA populations
- Improving methods to accelerate screening for host plant resistance to HWA
- Elucidating the role of environmental (i.e., site factors) and biological (i.e., host plant chemistry, genetics, physiology, morphology) factors in host plant resistance
- Improving dosage, timing, and methodology for use of systemic insecticides to control HWA
- Evaluation of innovative insecticide and application methods suitable for forest applications to control HWA
- Procedures for treatment in environmentally sensitive areas (e. g., near water) and eradication of isolated HWA populations
- Linking pesticide residue analysis to effectiveness against HWA and safe pesticide application

- Evaluating HWA treatment options versus no treatment on HWA control, ecosystem response, public acceptance, and economic cost/benefit

Proposals Due: **April 30, 2007**



Proposals will be reviewed for scientific merit, relevance to the USDA Forest Service's Hemlock Woolly Adelgid Management Initiative goals (see <http://na.fs.fed.us/fhp/hwa/>), and probability of timely success. Original innovative pilot studies, as well as proposals to support the expansion of existing research and technology development programs, are strongly encouraged.

It is anticipated that up to \$250,000 will be available to fund selected projects though actual funding available is still uncertain. Duration of projects may extend more than 1 year, but total funds requested should not exceed \$75,000 per proposal. Yearly progress reports will be required for multi-year projects.

Projects will be funded as Research Joint Venture Agreements or Cooperative Agreements. In accordance with USDA Forest Service guidelines, indirect charges will not be provided for state cooperative institutions. Indirect charges for all other institutions will be limited to 10%. A minimum contribution equaling at least 20% of total project costs (that is, a contribution equaling at least 25% of the Forest Service contribution) must be provided by the institution.

You are encouraged to include Forest Health Protection staff on technology development proposals and scientists in NRS-4503 in the research proposals as cooperating scientists. Current NRS-4503 scientists include: Dr. Melody Keena, Acting Project Leader and Research Entomologist; Dr. Michael Montgomery, Research Entomologist; Dr. Talbot Trotter, Research Ecologist.

Proposals should be submitted electronically in Microsoft Word or PDF format to **by 5:00 pm EST on Monday, April 30, 2007 and should be submitted via email to mkeena@fs.fed.us – late submissions will not be accepted.** Receipt of all submittals will be acknowledged as quickly as possible.

Notification of acceptance or rejection of proposals will be made by May 15, 2007. Proposals will be submitted for processing by the Forest Service by May 30, 2007 with funding availability dependent upon Cooperator and Forest Service processing time (probably 1-3 months).

For additional information, contact:

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Proposal Format

Proposals can be of any length up to a maximum of 5 pages, 8½ x 11 inch format with 1 inch margins, typed on one side only, using 12-point font with no more than 6 lines per inch – standard spacing for 12-point font – and must include:

1. **PROJECT TITLE**
2. **PRINCIPAL INVESTIGATOR** (name, institution, address, phone, FAX, email)
3. **COOPERATORS AND OTHER PARTICIPATING INSTITUTIONS**
4. **AMOUNT REQUESTED** (yearly and total)
5. **PROJECT GOALS AND SUPPORTING OBJECTIVES**
6. **PROJECT JUSTIFICATION** (relevance and significance)
7. **RESEARCH APPROACH** (description of activities, methods, length of project, analyses)
8. **EXPECTED PRODUCTS AND OUTCOMES** (products and how they will be used)

Additional items requested but not included in the 5-page limit:

1. **A SHORT (NO MORE THAN ONE-PAGE) CURRICULUM VITAE** for each principal investigator
2. **BUDGET** using the Agreements Financial Plan formatted Excel file titled '[Agreements Financial Worksheet.xls](#)'. The file is available for downloading by clicking on the file name. The budget should show both requested and matching (at least 20% of total project costs) funds for the following expense categories:
 - SALARIES** (principal investigator, post-doctoral fellows, students, and technicians)
 - BENEFITS** (tuition costs are not allowable)
 - SUPPLIES**
 - EQUIPMENT** (all items; non-expendable equipment costs above \$5,000 are strongly discouraged)
 - TRAVEL**

Budgets should include **all year costs, as agreements will be funded in their entirety**. Please have your budgets checked by your grants and agreements office before submission, as the proposal and financial plan will be used directly when Research Joint Venture Agreements are set up. A minimum 20 percent cost sharing is required. Indirect charges can be used to meet the cost sharing requirement but one recent change requires some in-kind funding other than indirect charges – this can be PI salary, travel, supplies, etc.

The spreadsheet has been changed from previous years and includes several new items. First, the budget narrative (justification/explanation of budget items) is entered directly on the spreadsheet in the color coded remarks area (the color-coding relates to the column of budget data). Secondly, there are 3 columns of budget data that need to be completed for a Research Joint Venture Agreement: columns (a), (c), and (d). Column (a) is where the non-cash expenses of the FS cooperator are entered and include any FS Co-PI salary, technical support salary, FS travel, supplies, etc. that we

spend as part of our joint research. Column (c) is where the expenses that will be reimbursed to your organization by the FS are entered (e.g., the budget for the proposal). Column (d) is where your organization's non-cash expenses to obtain the 20% minimum match are entered and **must include more than just indirect charges to qualify as joint research**. Thirdly, the new column on FS non-cash expenses are required in order to classify the agreement as a Research Joint Venture Agreement; they are included in the calculations of the agreement's total expenses and increases the 20% level of cost sharing accordingly. If you have any questions about these new requirements, please feel free to contact us.

3. TIMETABLE

4. LITERATURE CITED

