

Vermont Agency of Natural Resources

Pesticide Use Impact Assessment for Demonstration Treatment of Hemlock Woolly Adelgid in Jamaica State Park

I. Purpose and Need for Action

- a. **Purpose:** To maintain tree health for public safety and to preserve the hemlock canopy for shade, aesthetics and ecological functions. To demonstrate the suitability of basal spray application of dinotefuran for protecting groves of hemlocks, particularly large diameter trees near the river.
- b. **Need for Action:** Hemlocks in the park have been known to be infested since 2008. The first discovery in the park was in trees adjacent to the beach and playground. A mild winter in 2011-2012 allowed high HWA survival rates. Trees near the beach and playground were surveyed in 2013 and found to be moderately infested. Some trees are beginning to exhibit crown thinning and discoloration.

A wide variety of measures, including chemical and biological controls, regulations and silvicultural treatments, in conjunction with winter temperatures, will be needed to manage HWA in VT. This proposal is for a basal trunk spray of dinotefuran, a first in Vermont. The proposal broadens the Department's experience with chemical treatments and is in keeping with the VT Invasive Forest Pest Action Plan, which was developed to: "protect native hemlocks by implementing an integrated Slow-The-Spread program: exclusion from uninfested areas, eradication of outlying populations, suppression activities at the leading edge, and integrated management in the infested area." Jamaica State Park is along the leading edge of the known infestation.

II. Management Strategy and Objectives

	Strategy	Objective
1.	Delineate treatment area	Designate treatment and control trees
2.	Conduct pre-treatment analysis of HWA	Establish % alive in control and treated
3.	Apply dinotefuran to bark	Quickly reduce HWA population
4.	Conduct post-treatment analysis of HWA	Assess knockdown of HWA
5.	Monitor crown condition	Determine success in preserving crown
6.	Record number of trees, application time, chemical expense	Quantify treatment costs

III. Affected Environment

- a. **Physical Setting:** Jamaica State Park is located in the town of Jamaica, Windham County, Vermont. Approximately 30 trees will be treated along the river bank near the beach, parking lot and play ground.
- b. **Biological Considerations:** The stand is primarily large pine and hemlock that provide shade and help to hold the river bank. The project has been reviewed by the Vermont Nongame and Natural Heritage Program of Vermont Fish and Wildlife Department. Two mussels in the West River are listed as threatened by Vermont, the brook floater and eastern pearlshell. There are two rare species of concern, both associated with the West River. One is the very rare boulder-beach tiger beetle (*Cicindela ancocisconensis*), which has been observed in the project area. The second is the rare plant species Canada burnet (*Sanguisorba canadensis*).
- c. **Social Considerations:** Hemlocks provide shade and aesthetics which enhance the recreational experience. The park will be open when the treatment is applied. There will be a need for access control; will work with the park ranger. Re-entry period is until the spray is dried. There will be an opportunity for public education; will work with park naturalist/interpreter.

IV. Alternatives

Proposed Action:

A basal bark spray of dinotefuran.

Other Alternatives Considered:

1. No action
2. Cultural Treatments
3. Soil injection with imidacloprid
4. Trunk injection of imidacloprid
5. Foliar spray of horticultural oil and bifenthrin

V. Evaluation of Alternatives

- a. **Pest Profile:** Hemlock Woolly Adelgid is an invasive insect that feeds at the base of hemlock needles. Hemlock woolly adelgid can cause significant hemlock decline and tree mortality. In northern New England, it is not known if it will cause hemlock mortality or at what pace hemlocks may decline, but it can kill trees within four years in southeastern US. Trees are likely to decline more rapidly if other stressors are also present; many of the trees to be protected are already stressed by compaction from high visitor use. Trees generally lose foliage, reducing their value in the landscape and for fish and wildlife habitat, and increasing their risk of mortality in the future. Other known impacts of this insect on the forest ecosystem include a shift in the forest species composition and disruption of nitrogen cycling. Hemlock Woolly Adelgid has been known to be in Jamaica State Park since 2008. Monitoring indicates that the size and severity of the infestation in the park is increasing.
- b. **Pest Management Strategies**

Proposed Action:

Basal bark spray with dinotefuran, a neonicotinoid that disrupts the insects' nervous system. Dinotefuran is highly soluble, soaking through the bark and distributing through the tree quickly. The material will be applied with a low-pressure, backpack sprayer (max. 20 psi). A band from the root flair to approximately 4.5 feet will be sprayed, just to the point of saturation. The maximum application rate will not exceed labeled per acre rate. Basal bark spraying is considered a more appropriate application technique for this riverside site than the alternatives. There should be much less drift, with proper nozzle size and low pressure compared to hydraulic spraying. Soil injections in this area are not indicated because of the risk of water contamination. The target date for application is September; while the trees are actively transpiring and prior to the HWA breaking aestivation. This treatment is expected to give the trees a quick respite from HWA feeding. The expected residual effect is one year. Results of subsequent monitoring will guide future management actions that may include the use of predatory beetles or entomopathogenic fungi. This demonstration will give FPR experience with a product and an application technique that has not been used in VT yet. It is hoped that this technique will be quicker and cheaper than the alternatives and provide an interim solution for strategic hemlock areas while waiting for funding or development of longer term biocontrols.

Other alternatives considered:

1. **No action:** In this scenario, HWA could continue to spread and hemlocks would continue to decline. If mortality or dieback occurs, trees would need to be removed as they became hazardous to park visitors. The quality of the recreational experience and ecological functions would diminish as trees decline.
2. **Cultural treatments.** Cultural treatments will be very labor intensive and expensive. Cutting and disposing of infested material will change the look of the park. Replacement plantings might be considered, but will be expensive and take years to fill in the canopy. Given the extent of the infestation in the park and the size of the trees involved, cultural treatments are not likely to be effective in preserving the recreational experience or furthering HWA management.
3. **Soil injection with imidacloprid:** Soil injections so close to the river are contraindicated because of the risk of water contamination.
4. **Trunk injection with imidacloprid:** This treatment would give the longer lasting effect of imidacloprid and avoid the risk of water contamination. There are some concerns, however. This technique wounds the tree and the trees in the demonstration area are already exposed to extra stressors associated with being in a park. Imidacloprid is not as effective for larger diameter trees.
5. **Foliar spray of horticultural oil or oil mixed with bifenthrin:** This option has the benefit of a quick knock down, but has several problems. Spray drift is a large risk because the park will be open and the site is adjacent to the river. Oil alone has no residual activity.

VI. Environmental Consequences

Impact on Botanical Resources:

There is no basis for asserting that dinotefuran is phytotoxic (Durkin, 2009). Durkin referred to a study by Porch saying, "No adverse effects were observed in either of the tests, each of which involved the exposure of six species of monocots and four species of dicots. (Durkin, 2009 Page 61). Without treatment, the hemlocks will continue to decline.

Impact on Terrestrial Resources:

The environmental fate (half-lives) of dinotefuran is described (Durkin, 2009) as:

- Hydrolysis stable
- Photolysis on soil 46 days
- Aerobic soil metabolism 52 days
- Field Dissipation 22-68 days

Toxicity against mammals and most birds is very low.

Risks to non-target species appear to be minimal, except for terrestrial insects, which appear to be at substantial risk. Dinotefuran will kill most insects that are sprayed directly. Given the limited number of trees and the small area of the boles that will be treated, this risk will be limited and temporary.

Dinotefuran is highly toxic to honeybees and silkworms. In addressing honey bees, Durkin said, "The risk to foraging honeybees is less certain, and data to support a risk analysis are scant. For certain types of dinotefuran applications (e.g., tree injections to wind-pollinated trees), exposure may be minimal for foraging bees" (Page 89). "The major planned uses of dinotefuran by the Forest Service are for the control of pest species on hemlocks (hemlock wooly adelgid) and on ash trees (emerald ash borer). The potential exposure of bees is greatly reduced in bark application or tree injections of these species of trees because these trees are wind pollinated" (Page 98). Durkin also points out that dinotefuran is more toxic by the oral route than by the contact route of exposure (to bees).

Impact on Aquatic Resources:

Although information on the toxicity of dinotefuran to aquatic species is limited, mysid shrimp appear to be very sensitive to the effects of dinotefuran as well as other neonicotinoids. As for other aquatic species, the available data indicate that dinotefuran is not highly toxic to fish, aquatic invertebrates (other than mysids) or aquatic plants (Durkin, 2009).

Durkin's report says, "While the available studies on dinotefuran are limited, they consistently fail to provide a basis for asserting that dinotefuran is likely to pose a hazard to fish, even at concentrations that are far in excess of expected environmental concentrations" (Page 62).

Impact on Threatened and Endangered Species

The two mussels in the West River listed as threatened by Vermont will not be impacted by this treatment. Proper application technique will keep the dinotefuran out of the river. Being an herbicide, dinotefuran is not expected to injure Canada burnet. Since the pesticide will be applied to the hemlock bark and boulder-beach tiger beetle doesn't feed on hemlock foliage, the beetles' exposure will be extremely limited.

VII. Risk Analysis

- a. **Human Health Risk Assessment:** The warning label for dinotefuran products, such as Transect 75WSP is CAUTION. Dinotefuran is not a mutagen, neurotoxin or reproductive toxin. It is slightly irritating to skin (mitsuichemicals.com).
- b. **Voluntary Exposures:** The potential for risks to humans in the normal use of dinotefuran appear to be low. Based on a generally conservative and protective set of assumptions regarding both the toxicity of dinotefuran and potential exposures to dinotefuran, there is no basis for suggesting that adverse effects are likely in workers (Durkin, exec. summary). All label instructions for application will be adhered to, limiting exposure.
- c. **Involuntary Exposure:** Public exposure will be limited by following label instructions. The treatment area will be cordoned off. Park staff can assist to keep visitors away from treated trees. The re-entry period will be enforced. There will be very little movement of product off-target once it has dried. Any residue that leaches from the bark would be expected to bind with organic matter in the soil or degrade with exposure to sunlight (Cowles et al., 2009).
- d. **Other Animal Risk Analysis:** There are no residences in the immediate vicinity of the treatment area, reducing the likelihood of a pet being exposed. Some park users may have pets. Signs and verbal warnings to park users will manage this risk. There is no livestock in the area. Toxicity to mammals and most birds is very low.
- e. **Plan for Risk Reduction:** Label requirements will be followed. Individuals other than the applicator will be adequately protected or excluded from the area during application, until the reentry time has lapsed. Signs will be posted to keep people away from the treatment area.

VIII. Pesticide Profiles

See attachments for labels and MSDS.

IX. Schedule of Implementation

	Action	Planned Implementation Schedule
1.	Delineated treatment area	by July 14, 2013
2.	Conduct pre-treatment HWA analysis	by September 1, 2013
3.	Apply treatment	by September 30, 2013
4.	Conduct post-treatment HWA analysis	by October 30, 2013
5.	Monitor crown conditions	ongoing
6.	Report results	by December 31, 2013

X. Contingency Plans

See attached 2013 Hemlock Woolly Adelgid Suppression Program Safety Plan.

XI. Schedule for Minimization of Reliance on Chemicals

Trees in the demonstration area will receive a temporary reprieve from the feeding damage done by HWA. Nearby untreated trees will not and will be a source for reinfestation. Chemical protection of hemlock trees is not normally a viable, long term solution. A long term goal for Jamaica State Park should be implementation of an Integrated Pest Management Plan that includes the use of biocontrols. Predatory beetles have been used at several other sites in Vermont.

XII. List of Certified Applicators and Certified Supervisors

The demonstration project will be supervised by Barbara Schultz, Forest Health Program Manager. Spray application will be done by Jim Esden, Forester II.

XIII. Schedule of Applicators Recertification and Other Training

Applicator		Certification Expiration Date		
Last name	First name	Category 2	Category 3A	Category 10
Esden	James	2016		2016
Schultz	Barbara	2014	2014	2014

XIV. Administrative Requirements and Constraints

Administrative requirements will be met in accordance with Agency of Natural Resources policy adopted in 2005. After approval by the agency, this assessment will be reviewed by the Agency of Agriculture, Food and Markets.

XV. Others Consulted

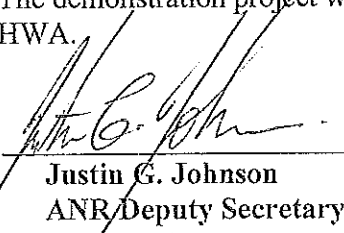
VT Agency of Agriculture, Food and Markets
VT Nongame and Natural Heritage Program
NH Division of Forests and Lands

XVI. List of Preparers

Jim Esden, Forester II, Forest Health program, Springfield Regional Office

XVII. Summary and Conclusions

- Environmental impacts, if any, of the proposed demonstration project would be limited spatially and temporary. The trunk spray option was chosen over others because it is least likely to cause environmental impacts.
- Successful treatment will prolong the health of trees; providing continued ecological, recreational, aesthetic and safety values.
- The demonstration project will expand FPR staff's experience with chemical control of HWA.

Approved: 

Justin G. Johnson
ANR/Deputy Secretary

Date: 9/13/2013

Attachments:

References cited

Transtect label and MSDS

2013 Hemlock Woolly Adelgid Suppression Program Safety Plan

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References Cited

Cowles, R.S. and Lagalante, A.F. 2009. Activity and Persistence of Systemic Insecticides for Managing Hemlock Woolly Adelgid. USDA Research Forum on Invasive Species

Durkin, P.R. 2009. Dinotefuran -- Human Health and Ecological Risk Assessment -- Final Report. Syracuse Environmental Research Associates. Retrieved 7/8/13 from http://www.fs.fed.us/foresthealth/pesticide/pdfs/0521803b_Dinotefuran.pdf

<http://www.mitsuichemicals.com/dinotefuran.htm>

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2013 Hemlock Woolly Adelgid Suppression Program Safety Plan

Vermont Department of Forests, Parks and Recreation

FIRST AID for Transtect (dinotefuran):	
If swallowed	<ul style="list-style-type: none"> • Call poison control center or doctor immediately for treatment advice. • Do not induce vomiting unless told to do so by the poison control center or doctor. • Have person sip a glass of water if able to swallow. • Do not give anything by mouth to an unconscious person.
If on skin or clothing	<ul style="list-style-type: none"> • Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call poison control center or doctor immediately for treatment advice.
If in eyes	<ul style="list-style-type: none"> • Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing the eye. • Call a poison control center or doctor for further treatment advice.
If inhaled	<ul style="list-style-type: none"> • Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferable mouth-to-mouth if possible. • Call poison control center or doctor immediately for treatment advice.

**FOR LAW ENFORCEMENT, FIRE, AMBULANCE, EMERGENCY MEDICAL SERVICES,
AND RESCUE AGENCIES CALL 911**

Hospital: Grace Cottage Hospital 802-365-7357

Poison Control Center – Fletcher Allen Health Center 800-222-1222

Hazmat – Vermont Dept. of Public Safety 800-641-5005

Chemtrec 24 Hour Hazmat Communications Center 800-424-9300

Transtect information – Rainbow Treecare Scientific Advancements 877-272-6747

Vermont Plant Industry Division, Agency of Agriculture, Food and Markets 802-828-2431

Vermont Dept. of Forests, Parks and Recreation

	<i>Office</i>	<i>Cell</i>	<i>Home</i>
Barbara Schultz	802-885-8821	802-777-2082	802-885-4520
Jim Esden	802-885-8822	802-777-1591	802-885-1690
Steve Sinclair		802-233-7541	
Ethan Phelps	802-885-8827	802-777-0388	802-746-7987

Introduction

This plan is for basal bark spray application of dinotefuran for eradication of hemlock woolly adelgid. All personnel working on this project should become familiar and comply with these safety requirements as well as instructions on the label. The safety plan should be available to everyone working on the project.

Pesticide Handler Safety

Applicators and other handlers must wear long-sleeved shirt, long pants, shoes, socks and chemical-resistant gloves. Applicators and others in the treatment area should wash thoroughly with soap and water before eating, drinking, chewing gum, using tobacco or using the toilet. As soon as possible, contaminated clothing should be removed and it should be washed before reuse. The Vermont FPR supervisor will ensure that appropriate PPE is worn and that unauthorized people are kept out of the treatment area as prescribed on the label.

Pesticide Handling

The applicator will be responsible for applying, transporting, storing and disposing of the pesticide in accordance with label directions and all applicable state and federal safety requirements.

Pesticide Spill Containment

Spill containment is the responsibility of the applicator. Appropriate measures will be taken to avoid spills and to contain them if needed. Appropriate PPE will be used .

- Prevent further leakage by repositioning the container or by applying a seal to the leak.
- Separate leaking containers from other containers.
- Prevent unprotected persons from coming in contact with the spilled pesticide.
- Confine the spill. Cover the spill area with absorbent material and encircle the spill area with a dike of the material. If necessary, dig a ditch to direct the spill flow away from sensitive areas.
- If the spill cannot be contained, call Phil Benedict from the VT Plant Industry Division.
- *All spills must be reported to the Agency of Agriculture, Food and Markets during the next workday at 802-828-2431.*

Pesticide Application

The Department of Forests, Parks and Recreation supervisor will insure that abutting residents and landowners have been notified about the project. Appropriate signage and assistance from FPR staff will be used to be sure that there are no unauthorized people in the spray area at the time of application and that no one enters the area until the spray is dry. The applicator will use low pressure, appropriate nozzle size and adequate care to assure the pesticide is applied on target.

Accident or Injury

911 will be used for emergency response.