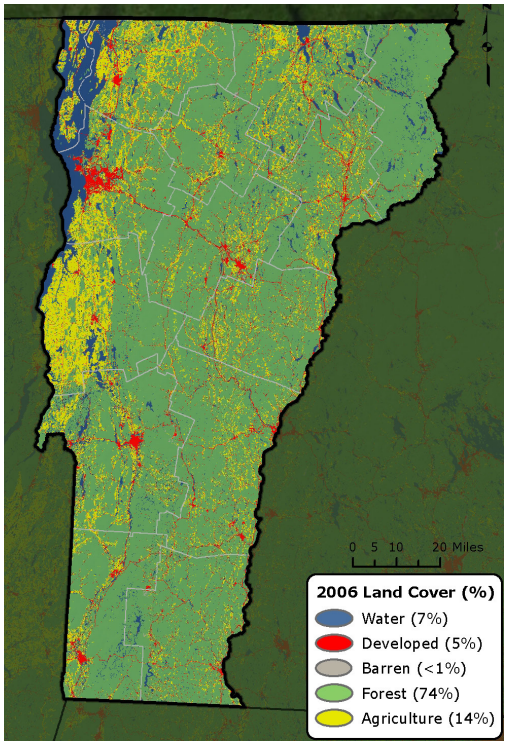
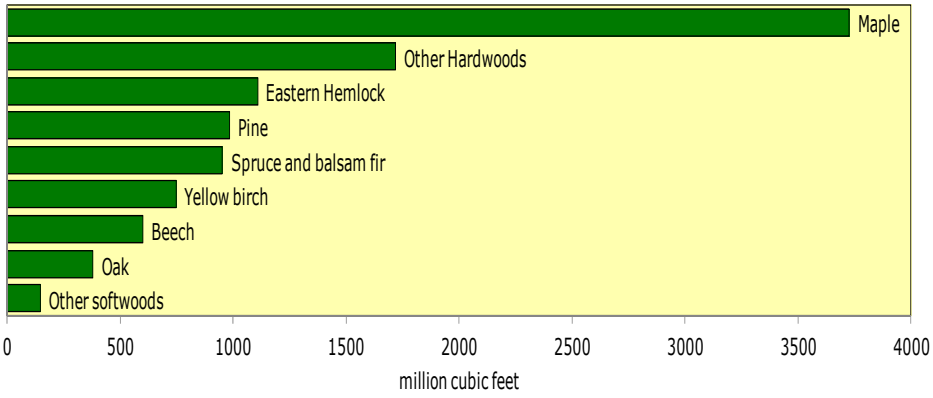
Forest Health VERMONT *highlights* 2013

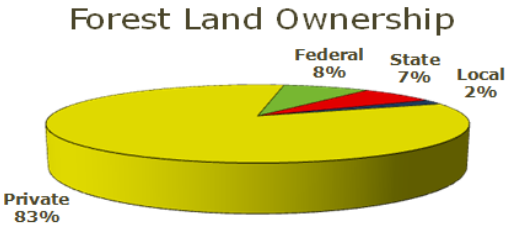
These highlights summarize information from the annual report on Forest Insect and Disease Conditions in Vermont. The complete annual report, as well as other Vermont forest health information, is posted online at www.vtfpr.org/protection/idfrontpage.cfm. To receive a copy by mail, for assistance in identifying pests, diagnosing forest health problems, on-site evaluations, and insect population sampling, to obtain defoliation maps, management recommendations, and other literature, or to participate in invasive pest citizen monitoring, contact Forest Resource Protection Personnel or your County Forester.



Forest Resource Summary

Forests cover 78% of Vermont. Over 83% of the state's forest land is privately owned with eight percent under federal management in the Green Mountain National Forest and 7% managed by the State of Vermont. Sugar and red maple, eastern hemlock, and white pine are the most common species by number and volume. More information on Vermont's forest inventory is at Vermont's Forest Resources, 2012.





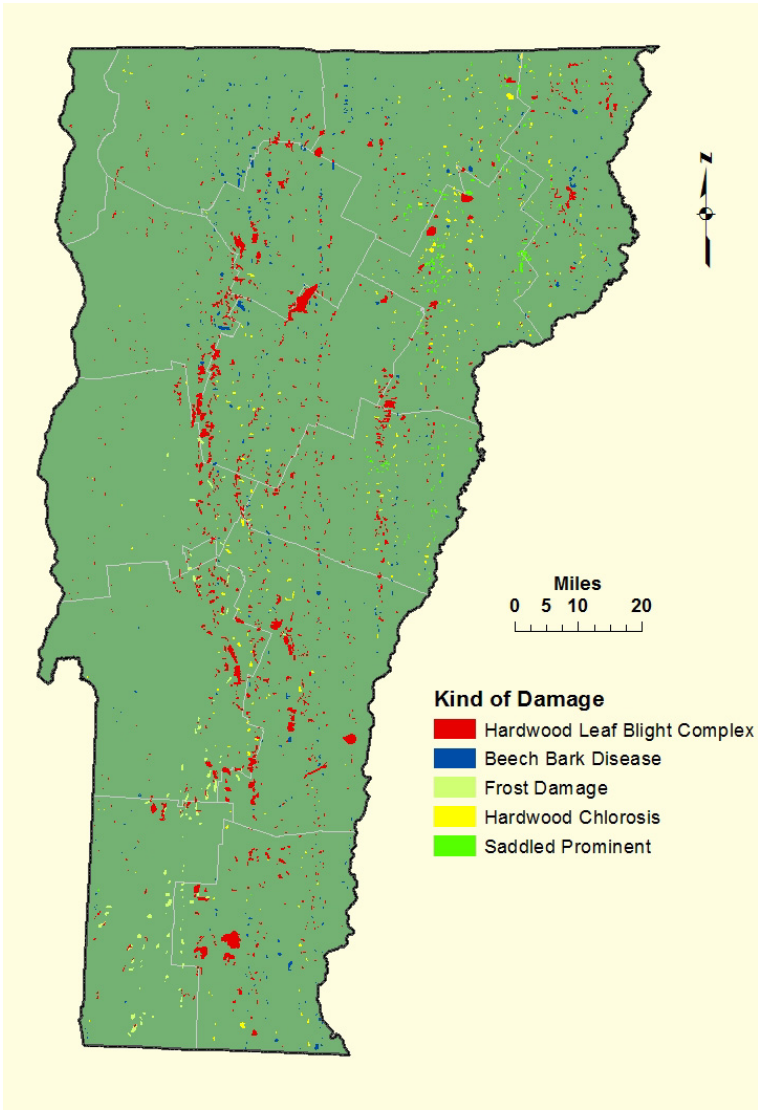
Forest Resource summary from US Forest Service Forest Inventory and Analysis.

Forest Health Programs in the Northeast

Vermont Department of Forests, Parks and Recreation (FPR) works in partnership with the U.S. Forest Service to monitor forest conditions and trends in Vermont and respond to pest outbreaks to protect the forest resource.

Aerial Surveys

In 2013, 226,229 acres of forest damage were mapped statewide. This represents less than 5% of Vermont's forestland. Most of the acreage mapped was hardwood defoliation by leaf fungi, insect defoliators and/or frost. Beech bark disease, a non-native pest complex, accounted for 10% of the area mapped.



The vtinvasives website provides information on reporting invasive pest suspects, and getting involved as a volunteer.

Plan is updated every year. The website dedicated to invasives, vtinvasives.org, covers non-native plants and tree pests, and provides information on reporting suspects, spreading the word, and getting involved as a volunteer. In 2013, Vermont's Forest Pest First Detector Program trained 25 new volunteers. Currently, there is a statewide network of 118 volunteers representing 109 communities. The program also provided an advanced workshop and a field trip for veteran volunteers to a New York EAB infestation.

A network of 118 Forest Pest First Detectors, serving 109 communities, has conducted training, screening, outreach, surveys, and community preparedness activities.

Forest Health Program Highlights

The Vermont Department of Forests, Parks and Recreation conducts aerial and ground surveys to detect forest damage. In addition, long-term monitoring plots are visited to evaluate forest health.

Invasive Pests and Plants are a key threat to forest health in the region. The Department of Forests, Parks and Recreation and the Agency of Agriculture, Food and Markets collaborate with USDA agencies to survey and manage non-native forest pests, and with UVM Extension on education and outreach. An interagency Invasive Forest Pest Action

Don't Move Firewood outreach continued. In 2013, the State of Vermont policy was adjusted to exclude all untreated firewood, originating from out-of state, from entry into all State Parks and State Forests. State Park campgrounds continued to exchange out-of-state firewood with local wood. The amount of firewood needing to be exchanged continues to decline.

Climate Change adaptation remained a focus in 2013. The Agency of Natural Resources completed a vulnerability assessment and a Climate Change Adaptation Framework Report. Climate change impacts and projections for forest health are part of a new collaboration with University of Vermont and the University Corporation for Atmospheric Research.

Scientists from the US Forest Service Northern Institute of Applied Climate Science led forest adaptation workshops for natural resource managers. A subset of the management plans developed in these workshops will be implemented as demonstration areas. A plan is near completion for one of these at The Narrows Wildlife Management Area in West Haven. The publication, "Creating and Maintaining Resilient Forests in Vermont: Adapting forests to climate change" will be distributed in early 2014.

Other Forest Health Initiatives which continued in 2013 include a multi-state project to slow the spread of hemlock woolly adelgid, a project to conserve germplasm of disease-resistant butternut, an investigation into causes for tree mortality in Vermont and adjacent states, and, with the University of Vermont, a study of forest carbon at sites affected by non-native earthworms.

We also provide diagnostic services, assist the VT Department of Health in monitoring tick populations, and participate in programs with the VT Invasive Exotic Plant Committee and the Endangered Species Subcommittee.

2013 Weather Influences on Forest Health

In general, the winter of 2013 was mild. Below zero temperatures were recorded on only twelve days. Snow was minimal for much of the winter. Sugaring season was long and sap was sweet, with many producers reporting their best season in a long time.

Spring was dry well into May. Spring buds on sugar maples got off to a slow start, then developed rapidly. Leaf buds at Proctor Maple Research Lab in Underhill did not break out of their scales until May 3rd, with full leaf expansion by May 7th.

In mid-May, the weather pattern made a dramatic flip-flop, turning cold and wet. In late May snow broke branches in the Northeast Kingdom, and cold temperatures led to widespread frost damage to fir Christmas trees, and to hardwoods at mid-high elevations. On June 2nd, strong winds and hail the size of ping pong balls knocked down trees in the St. Johnsbury area and between Rutland and Chelsea. The weather service used the term "train effect" to describe storms which lined up one after the other.

Frost damage to fir Christmas trees (right), and to hardwoods at mid-high elevations (below), was widespread.

"Train effect" described storms which lined up one after the other, often knocking down trees in their path.

After a soggy June, July was off to a similar start. The prolonged wet period set the table for a variety of leaf diseases on hardwoods and conifers alike. In Burlington, May was the wettest ever, and June just missed the record. Some farm fields were never planted all summer because water was everywhere. High winds associated with a fierce thunderstorm on July 19th damaged trees in a swath across the northern counties of New York and Vermont.

In August, trees responding to the stress of the summer's excessive soil moisture were easy to pick out: red maples flagging red in low lying areas and more than normal yellow on sugar maples statewide. Mid-September brought on the foliage season in earnest. Every year it seems that when any particular species doesn't contribute much to the fall foliage event, others shine brighter to compensate. Although ash and birch trees lost their leaves sooner than usual, sugar maples and red maples once again stole the show with spectacular splashes of color. Killing frosts came late (on October 29th in the Champlain Valley).

An ice storm in late December travelled across northern Vermont, with the most significant damage to trees in the northern towns of Franklin and Orleans Counties.

Many plants had very heavy flowering in 2013, including red maple, black locust, ash, basswood, cherry, and apple. Thin foliage was associated with heavy seed production on red maple and ash.

Heavy seed production led to thin foliage on red maple.

Defoliation of white birch by **Septoria Leaf Spot** was widespread with 98,329 acres mapped. This included damage in birch-dominated montane forests, but also at lower elevations. **Poplar Leaf Blight**, also attributed to a *Septoria* fungus, was common statewide on balsam poplar.

Oak skeletonizer damage (arrows) and refoliation contributed to the ragged appearance of defoliated oaks.

Oak Defoliation and Browning continued to draw attention. Leafrollers, oak skeletonizer, anthracnose, and frost damage were observed in association with the damage. Refoliation that resulted in a variation of leaf sizes and colors contributed to the ragged appearance.

Hardwood Insects and Diseases

Hardwood Browning was mapped on 29,299 acres. The primary cause was anthracnose and other fungal diseases, although insect defoliators and frost contributed to the damage. Anthracnose was particularly heavy on ash and hophornbeam. Pear thrips damage was much reduced from 2012.

Dieback from **Beech Bark Disease** was mapped on 25,150 acres. Levels were similar to 2012.

In August, 29,299 acres of brown hardwood were mapped during aerial surveys. Anthracnose was particularly heavy on ash, and on hophornbeam (right).

Saddled Prominent populations increased statewide. During aerial surveys, 12,924 acres were mapped, mostly in northeastern Vermont. Noticeable defoliation occurred in scattered locations statewide.

Sugarbushes and northern hardwood stands should be monitored for saddled prominent (left). Following the last outbreak, hardwood decline was significant on some sites (above).

Sugarbushes and important northern hardwood stands should be monitored for this insect. Following the last outbreak (1979-81) hardwood decline was significant on some sites. Defoliation tends to start at upper elevations. If a ridge-top is infested, anticipate defoliation downslope in subsequent years. Outbreaks are unstable. Areas often sustain complete defoliation where no damage was observed the previous year. Infestations often collapse suddenly, as well.

Softwood Insects and Diseases

Consecutive wet springs also continue to leave behind a legacy of conifer diseases, most notably **Needle Damage to White Pine**. During the aerial survey conducted over the Green Mountain National Forest in June, the US Forest Service mapped 2,662 acres of white pine needle damage.

The US Forest Service, in cooperation with UNH and affected states, continues to investigate this malady, including studies to clarify the roles of needlecast fungi and weather. Plots have been established to monitor impacts on tree growth.

Studies are being conducted to clarify the roles of fungi and weather in causing needle damage to white pine. Plots have been established to monitor the impact of this damage on tree growth.

Other **Shoot and Needle Diseases** that remain common are Sirococcus tip blight on hemlock, Diplodia shoot blight on red pine and Rhizosphaera needlecast on spruce. Fungal diseases are more severe on lower branches, and in stand openings or other protected pockets where moist air accumulates.

Phytophthora Root Rot and other root diseases were unusually common in Christmas tree plantations. Consecutive years of heavy rain have led to the saturated soil conditions that allow these diseases to spread. Infestations of **Balsam Twig Aphid** were also unusually severe in scattered plantations.

Phytophthora root rot increased in Christmas tree plantations due to saturated soil. Balsam twig aphid symptoms (below) were also common.

Exotic Forest Pests

We continue to address the invasion of **Non-Native Plants** into forest ecosystems. A new invasive plant category will be available for pesticide applicator certification in the coming months, and we are working with the Agency of Agriculture to finalize a training manual.

Vermont State Parks have initiated an extensive invasive plant management effort focusing on southwestern Vermont.

The Nature Conservancy (TNC) has supported iMapInvasives, a web based system used to report sightings and map infestations of invasive plants in Vermont. Trainings can be done online at: http://vtinvasives.org/plants/report-it/volunteer. TNC is also working on a project to conduct invasive plant management on three nature reserves.

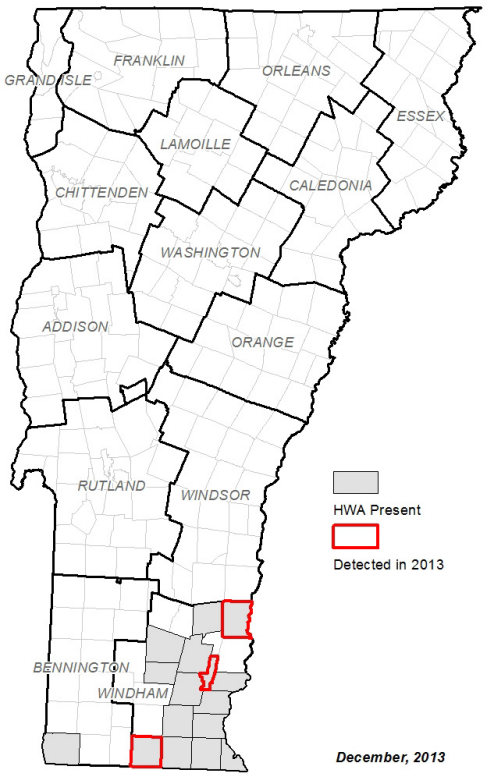
The increase in fungal foliage diseases in 2013 did not spare exotic plants. Defoliation and foliage distortion of glossy buckthorn caused by crown rust of oat, was observed in several locations. The impact on buckthorn is expected to be minimal.

The impact of defoliation by crown rust of oat on buckthorn health is expected to be minimal.

Hemlock Woolly Adelgid was not detected in any new counties. It is known to occur in 15 towns in Windham County, and only in Pownal in Bennington County.

Winter mortality averaged 46% at the five monitoring sites. Populations grew following the mild winter. Adelgids seemed more prevalent in areas already known to be infested and many new areas were reported.

During the 2012-2013 reporting period, a total of 88 surveys were done in 22 towns, including 5 surveys in each of the 13 towns adjoining known infested towns. Volunteers were involved in 9 of the 13 towns, accounted for 55% of the border town surveys, and made the first discoveries in Rockingham and Grafton. A logger reported the first occurrence known in Brookline. Training of volunteer surveyors for the 2014 season has begun.

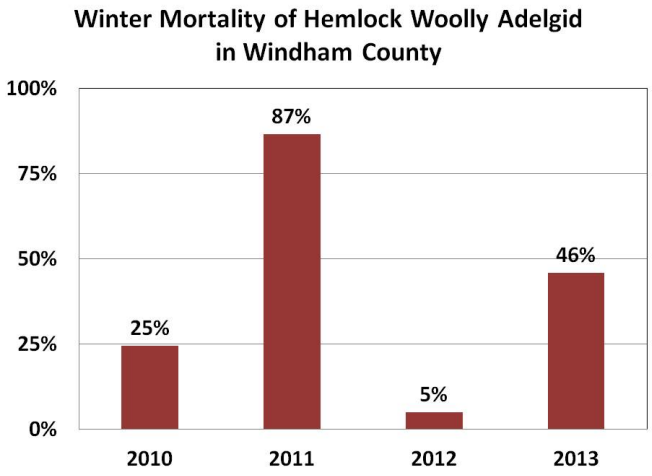


Hemlock woolly adelgid (HWA) winter mortality averaged 46% at monitoring sites, after a mild winter. HWA was detected in three new towns in 2013. Sixteen towns are now known to have active infestations.

Hemlock woolly adelgid impact plots have been installed at five locations on state or Nature Conservancy land. All measurements and crown assessments are scheduled to be completed this winter.

In December 2012, predatory beetles had been released for the first time in Pownal and to augment a previous release in Windham County. Monitoring of these sites is ongoing. The UVM Entomology Research Lab continued to work with native insect-killing fungi as a potential biocontrol.

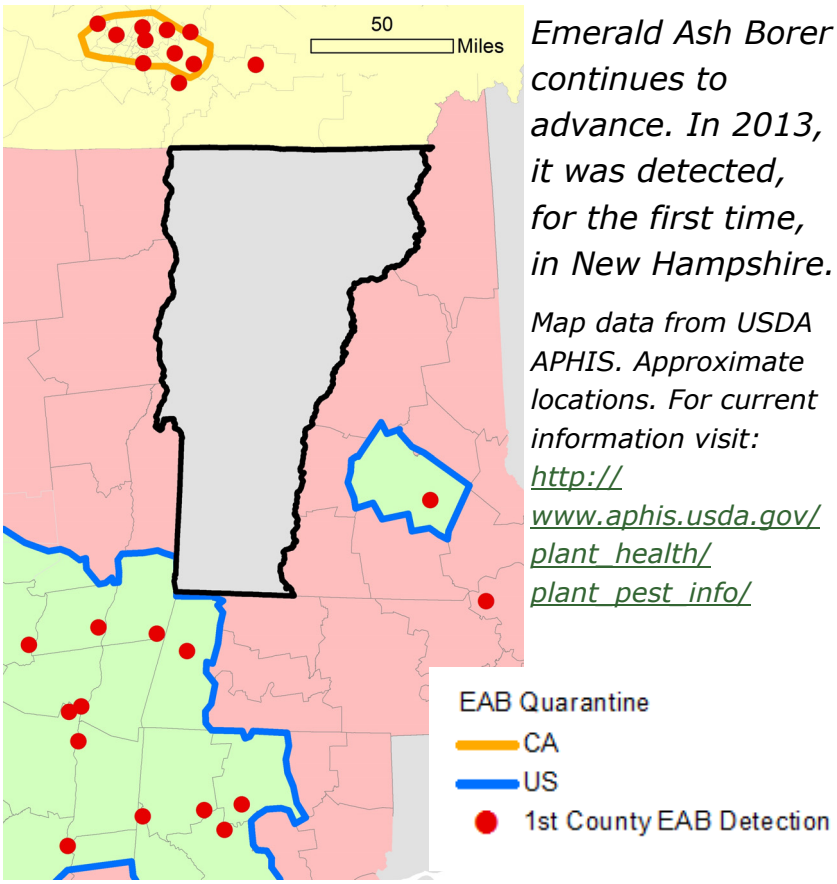
A *Best Management Practices Guide for Hemlock Resource Managers in Northern New England States*, addressing the threats of hemlock woolly adelgid and elongate hemlock scale, will be available in 2014.



Emerald Ash Borer (EAB) is not known to occur in Vermont and was not detected by public outreach or survey. However, it continues to advance. In 2013, there were several New County Detections nearby. A well-established infestation was discovered in Concord NH, and new counties were found to be infested in eastern New York, Connecticut, and Massachusetts. There were also new detections around Montreal, including some locations south of the area that was already regulated for EAB.

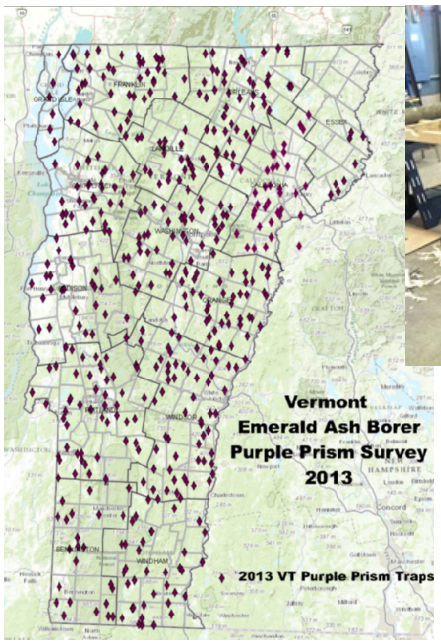
Anyone using firewood, ash sawlogs, or other ash products from infested states should be aware of the USDA quarantine regulations and compliance agreement conditions. You can start by contacting USDA APHIS, the VT Agency of Agriculture, Food, & Markets, or an FPR office below.

An aggressive emerald ash borer detection effort continues in Vermont. Purple panel traps were deployed at 438 sites in an effort led by USDA-APHIS. About 45 wasp watchers searched for and monitored nest sites of the predatory wasp *Cerceris fumipennis* in biosurveillance surveys. Although no emerald ash borer beetles were found, 1,074 buprestids were collected at 23 *Cerceris* nest sites in seven Vermont counties. We are also using girdled trap trees as a detection tool. In 2013, trap trees were girdled in nine counties in the spring, then harvested in December and peeled to look for EAB.



Emerald Ash Borer continues to advance. In 2013, it was detected, for the first time, in New Hampshire.

Map data from USDA APHIS. Approximate locations. For current information visit: http://www.aphis.usda.gov/plant_health/plant_pest_info/



Emerald Ash Borer has not been detected in Vermont in spite of intensive survey efforts. In 2013, USDA APHIS led the deployment of 438 purple traps. Volunteers assisted with monitoring 23 Cerceris wasp colony survey sites, and with peeling ash trap trees from nine counties.

In cooperation with UVM Extension, we continue to work with Vermont towns in developing Community Preparedness Plans. In 2013, 13 communities were awarded incentive grants. They have organized public meetings, inventoried roadside ash trees, and briefed decision-makers. Several towns are collaborating to share resources and coordinate outreach and fundraising efforts. Students have been important partners in pest planning, with 34 students from Middlebury College, UVM, Antioch University and the Community College of Vermont assisting with ash inventories and research.

The **European Wood Wasp** (*Sirex noctilio*) was collected in three traps deployed as part of the Exotic Wood Borer/Bark Beetle National Survey. Collection sites included East Burke (Caledonia County), Island Pond (Essex County), and Swanton (Franklin County). Former *Sirex noctilio* finds in Vermont were in Stowe 2007 (Lamoille County), Burlington 2010 (Chittenden County), and Brattleboro 2012 (Windham County). No infested trees have been seen in Vermont.

Elongate Hemlock Scale was detected in a planted landscape in Charlotte. Infested trees are being treated. No scale infestations were found in a survey of conifer hosts in the surrounding area. This insect is not known to be established in Vermont. It is a pest of concern since it infests fir and spruce as well as hemlock, and is reported to worsen the impact of hemlock woolly adelgid.

Elongate hemlock scale infests fir and spruce as well as hemlock. It has been detected on landscape trees in 2013, but is not known to be established in Vermont.

The **Common Pine Shoot Beetle** has been found in many Vermont counties since it was detected in 1999. By federal quarantine, pine material is free to move within Vermont and through most of the region. See Pine Shoot Beetle Quarantine Considerations for more information.

Butternuts grafted from Vermont trees which seem to have resistance to butternut canker have been outplanted in two seed orchards.

Asian longhorned beetle is not known to occur in Vermont, and was not found in any of the 18 traps deployed in 2013.

Butternut Canker levels remain stable, with most butternuts showing symptoms of the disease. A project to conserve butternut germplasm moved forward when trees grafted from 30 different Vermont butternuts which seemed to have some disease resistance were planted in Vermont. Thirty-eight trees were planted in a seed orchard established by Middlebury College, and 29 trees were planted in Brandon to enhance a parallel effort on the Green Mountain National Forest.

Asian Longhorned Beetle (ALB) is not known to occur in Vermont. None were collected in the 18 panel traps deployed and checked bi-weekly in Vermont this year**.** However, ALB was found in a new location on Long Island, which is east of the previously known infested area. In addition, ALB was found in Mississauga, Ontario, just west of Toronto where ALB was recently declared eradicated.

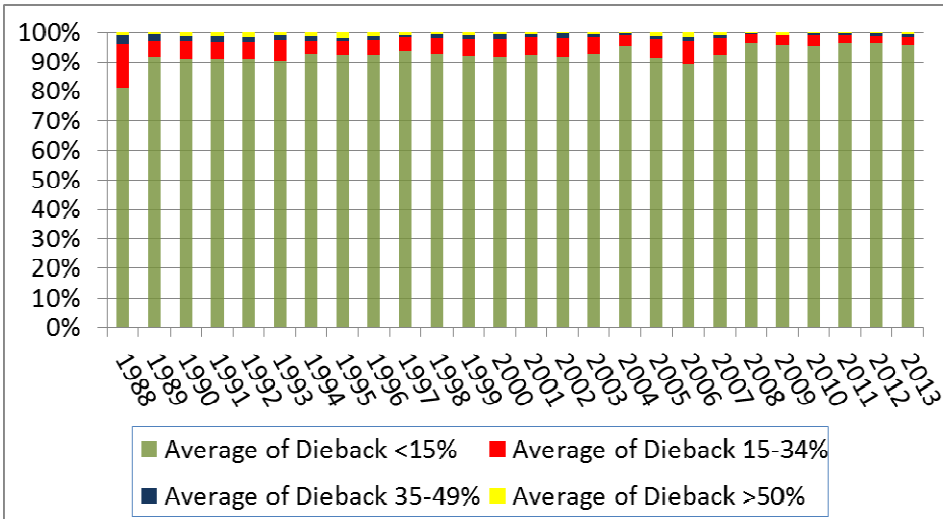
We don't recommend any management adjustments in anticipation of this insect. However, early detection is especially important for Asian longhorned beetle; small populations in other states have been successfully eradicated.

Other **Non-Native Species that Have Not Been Observed** in Vermont include winter moth, as well as the agents that cause oak wilt, thousand cankers disease, and sudden oak death.

Monitoring Forest Health

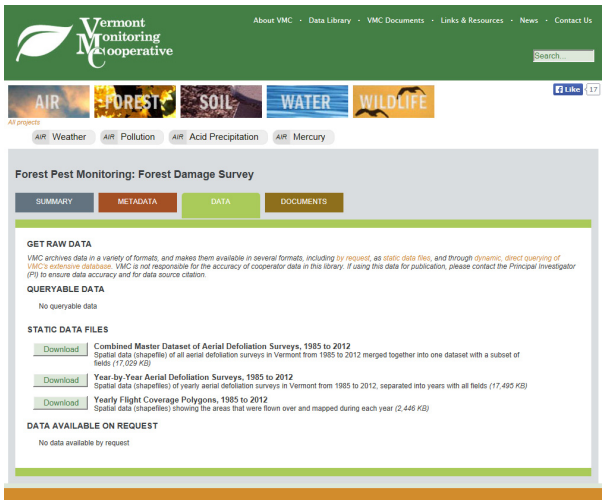
Over 90% of sugar maples were rated as having low dieback (<15%) in North American Maple Project plots.

In **North American Maple Project** (NAMP) plots, over 90% of sugar maples were rated as having low dieback (less than 15%). Foliage was particularly dense this year, except in areas experiencing light defoliation. Saddled prominent, a native defoliating insect, was present on 30% of plots but at most sites, only light defoliation resulted. Also of note were the 20% of plots with non-native invasive plants in the understory, 23% of plots with evidence of wind damage, and 10% of the plots with evidence of moderate levels of deer browse impacting regeneration.



The **Vermont Monitoring Cooperative** (VMC), Vermont's forest ecosystem monitoring and research collaborative, continued activities to collect and archive forest-related data and information. Dr. Jen Pontius took over as the new Principal Investigator on the retirement of Dr. Larry Forcier, one of VMC's founders. VMC continued a study of forest growth on Mount Mansfield, which will allow comparison with environmental trends, and completed the third year of a long-term urban tree health monitoring project, in collaboration with university staff.

Data storage and easy access, a major focus for the VMC, has become especially valuable with new access to current and historical spatial data from aerial surveys. Pest defoliators, tree declines, weather disturbances, and other forest health related observations have been mapped for decades and the 1985-2012 data are now accessible through the internet. http://www.uvm.edu/vmc/research/data.php.



Spatial data, acquired since 1985 from Vermont's forest damage aerial surveys, are now available through the VMC website.

Southern Vermont collaborators shared findings and opportunities for the future at a Lye Brook Wilderness Area Study Site Review. Air, water and land scientists and resource managers identified the need for long-term monitoring and data compilation at this VMC study site on the Green Mountain National Forest.

For more information, contact the Forest Biology Laboratory at 802-879-5687 or:	Windsor & Windham Counties..... Bennington & Rutland Counties..... Addison, Chittenden, Franklin & Grand Isle Counties..... Lamoille, Orange & Washington Counties ..... Caledonia, Orleans & Essex Counties.....	Springfield (802) 885-8845 Rutland (802) 786-0040 Essex Junction (802) 879-6565 Barre (802) 476-0170 St. Johnsbury (802) 751-0110

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