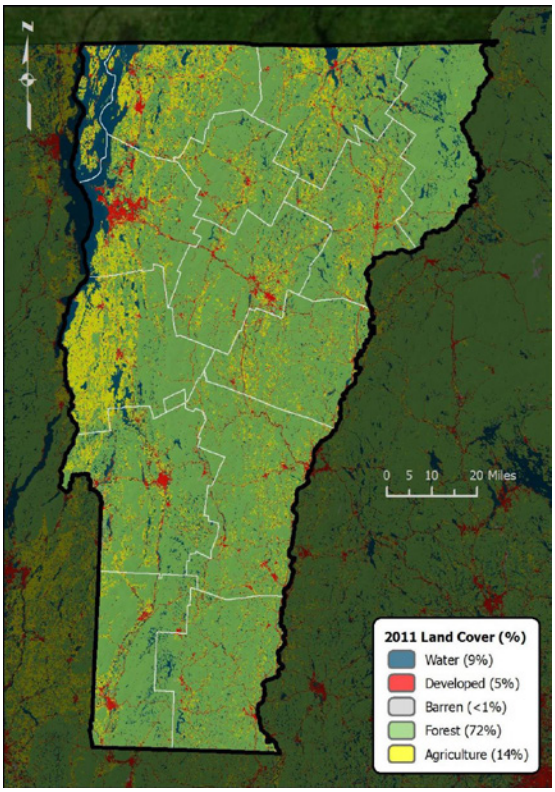
USDA United States Department of Agriculture

2016 Forest Health highlights

VERMONT

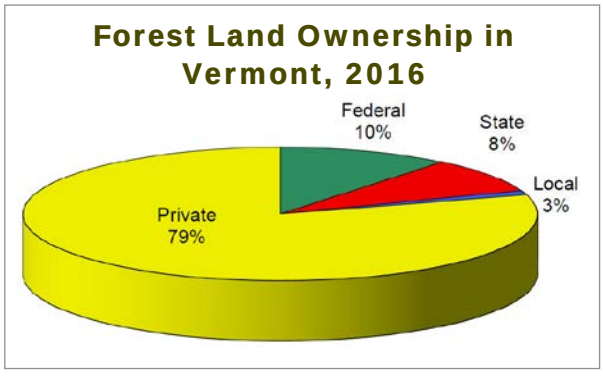
These highlights summarize information from the 2016 annual report on Forest Insect and Disease Conditions in Vermont. In addition to an overview of the forest resource in Vermont, this summary provides forest health program highlights, separate sections on hardwood and softwood insects and diseases that are native or well established in the State, a section on exotic forest pests that are not known to occur in the State or that are recent invaders, a summary of activities related to nonnative invasive plants, and our results from monitoring forest health.

The complete annual report, as well as other Vermont forest health information, is posted online at the Forest Health page of the Vermont Forests, Parks and Recreation Web site. Please contact the Vermont Department of Forests, Parks and Recreation to receive a copy of this report by mail or to request assistance in identifying pests or diagnosing forest health problems; request on-site evaluations or insect population sampling; obtain defoliation maps, management recommendations, and other literature; or participate in invasive pest citizen monitoring.



Forest Resource Summary

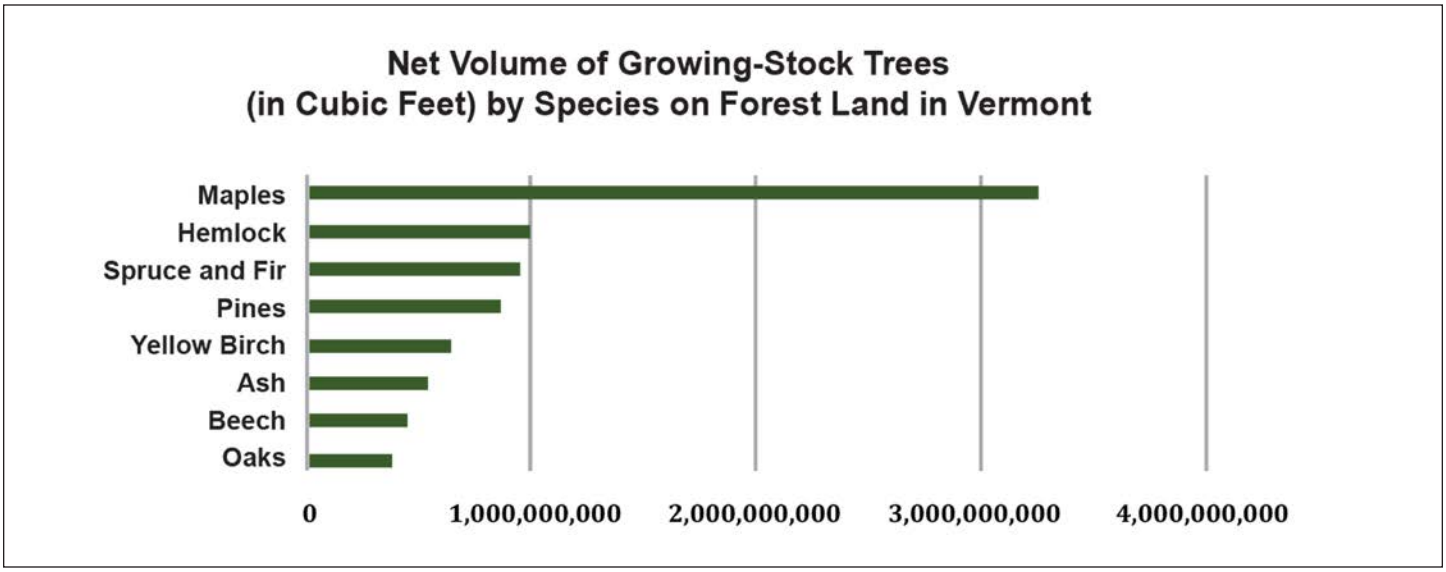
Forests cover 73 percent of Vermont. Seventy-nine percent of the State's forest land is privately owned with 10 percent under Federal management in the Green Mountain National Forest and 8 percent managed by the State of Vermont. Sugar and red maple, eastern hemlock, and white pine are the most common species by volume. Access more information about Vermont's forest inventory online.



Forest Service
Northeastern Area
State and Private Forestry

Vermont Department of Forests, Parks and Recreation

June 2017



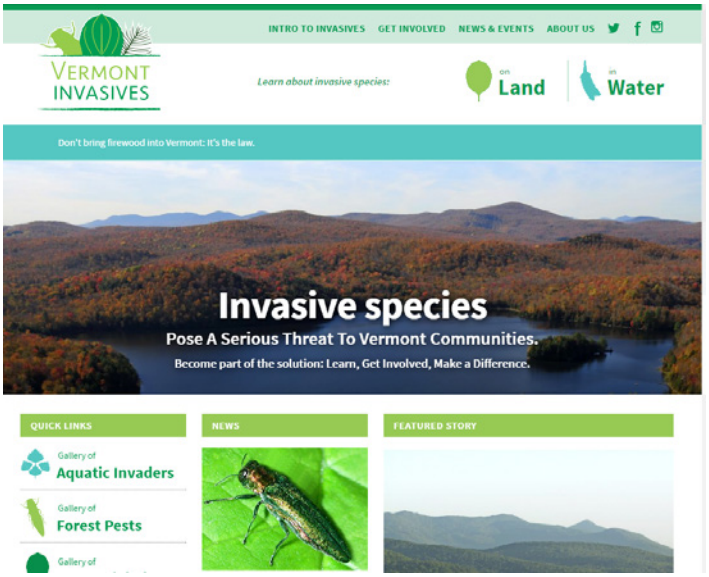
Data presented are from Forest Inventory and Analysis (FIA) plots established by the USDA Forest Service. Estimates for Vermont totals were calculated using EVALIDator (v. 1.6.0.03) software, December 2016.

Forest Health Program Highlights

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

The Vermont FPR and the Vermont Agency of Agriculture, Food and Markets (AAFM) collaborate with USDA agencies to survey and manage **nonnative forest pests** and with University of Vermont (UVM) Extension on education and outreach.

The Web site vtinvasives.org is getting a new look. The new site design will offer information on terrestrial plants, forest pests, and aquatics. Navigation will be easier, resources will be stored in a searchable hub, and news articles will be added weekly. You can also follow vtinvasives on Twitter and Facebook.



An updated version of vtinvasives.org is coming soon.

In 2016, 36 new volunteers, including tree wardens, conservation commission members, arborists, and concerned citizens, attended Vermont's **Forest Pest First Detector** program training and received a new pocket-sized field guide to invasive pests developed by UVM Extension. Volunteers assisted in survey and outreach. In Lamoille County, volunteers formed a Regional Invasive Insect Preparedness Team and spent over 500 hours creating educational PSAs, newspaper ads, and ash tree inventories.

The Forest Pest First Detector program gained 36 new volunteers. (Photo: G. Kozlowski)

A new pocket-sized field guide was developed for Forest Pest First Detectors in Vermont.

The PSAs developed by Lamoille County volunteers are worth watching and sharing.

Vermont's **Firewood Rule** went into effect on May 1, 2016. Basic elements are these:

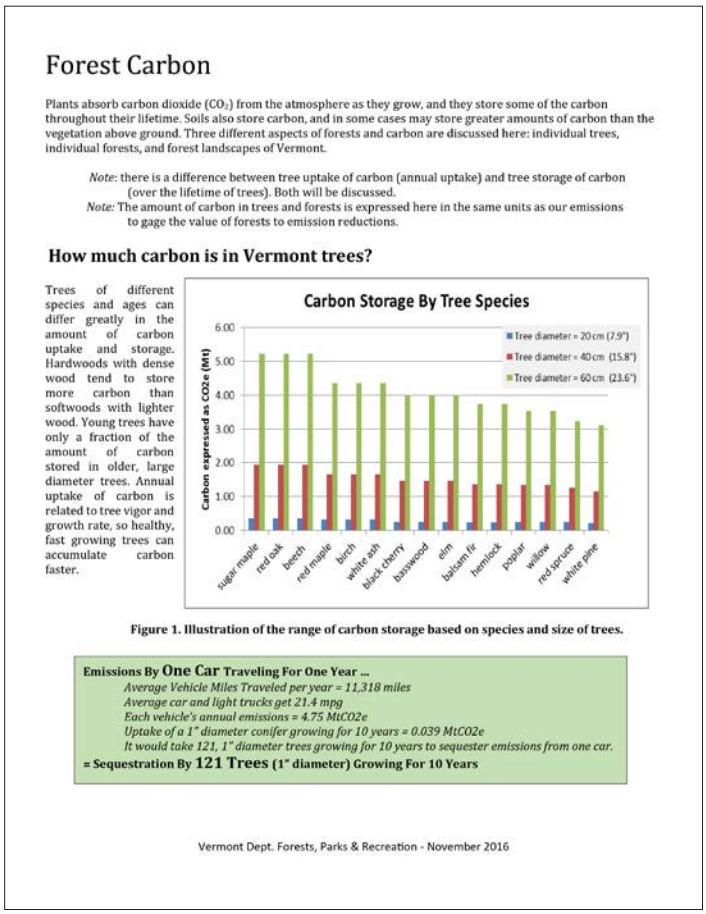
Vermont's firewood rule went into effect in May 2016.

- Firewood is defined as wood processed for burning and less than 48 inches in length. It does not include wood chips, pellets, pulpwood, or wood for manufacturing purposes.
- Untreated firewood cannot be brought into Vermont.
- Treated firewood must be treated to the highest USDA standard (160° F/71.1° C for at least 75 minutes), which kills Asian longhorned beetle, among other pests.
- Treated firewood must be accompanied by certification of treatment, such as a phytosanitary certificate, invoice, bill of lading, or label stating that the firewood has been heat treated to the 160° F/75 minute standard.
- By written request, Vermont FPR can grant a waiver allowing untreated firewood to be moved into Vermont, but only if there is minimal threat to forest health and [the firewood is] not restricted by existing State or Federal pest quarantines. Currently, waivers are being granted to import firewood from counties adjacent to Vermont, as long as the material complies with other quarantines, including EAB quarantine restrictions.
- Enforcement is through the Agency of Natural Resources' Enforcement Division. Firewood imported in violation of the rule may be confiscated or destroyed.

Don't Move Firewood outreach efforts are conducted in collaboration with the U.S. Forest Service, USDA Plant Protection and Quarantine, Vermont AAFM, and UVM Extension. Letters were sent to private campgrounds and firewood producers, and posters were distributed to each of the 17 Vermont welcome centers and to 700 convenience stores.

A new leaflet, Earthworms in Forests, was produced jointly with the University of Vermont and provides information on nonnative worm identification and impacts.

Climate change remained a focus in 2016. Two new online resources are the Vermont Agency of Natural Resources' Climate Change Dashboard and a factsheet on forest carbon, including estimates of the amount of carbon stored in Vermont's forest land.



Forest Carbon

Plants absorb carbon dioxide (CO_2) from the atmosphere as they grow, and they store some of the carbon throughout their lifetime. Soils also store carbon, and in some cases may store greater amounts of carbon than the vegetation above ground. Three different aspects of forests and carbon are discussed here: individual trees, individual forests, and forest landscapes of Vermont.

Note: there is a difference between tree uptake of carbon (annual uptake) and tree storage of carbon (over the lifetime of trees). Both will be discussed.
Note: The amount of carbon in trees and forests is expressed here in the same units as our emissions to gage the value of forests to emission reductions.

How much carbon is in Vermont trees?

Trees of different species and ages can differ greatly in the amount of carbon uptake and storage. Hardwoods with dense wood tend to store more carbon than softwoods with lighter wood. Young trees have only a fraction of the amount of carbon stored in older, large diameter trees. Annual uptake of carbon is related to tree vigor and growth rate, so healthy, fast growing trees can accumulate carbon faster.

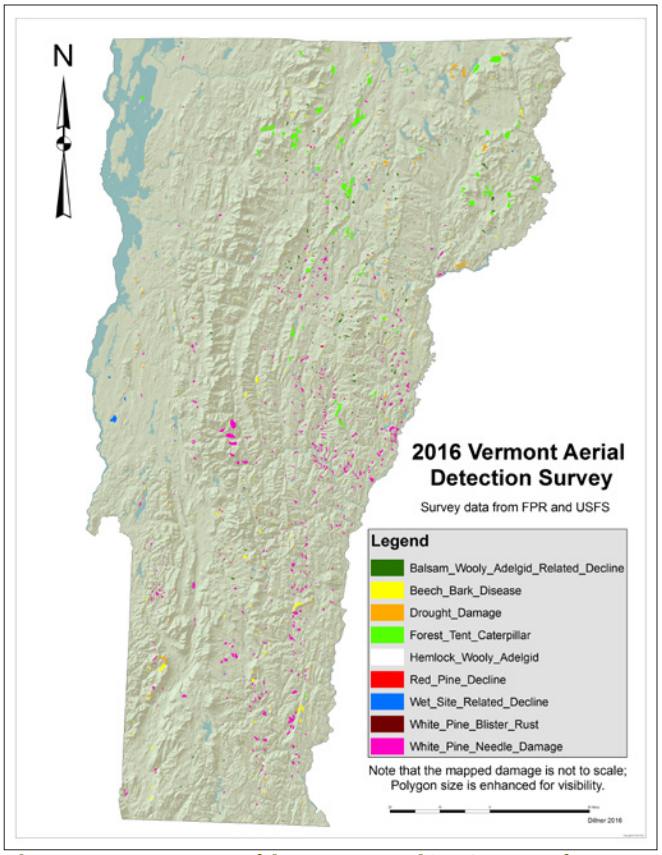
Figure 1. Illustration of the range of carbon storage based on species and size of trees.

Emissions By One Car Traveling For One Year ...
Average Vehicle Miles Traveled per year = 11,318 miles
Average car and light trucks get 21.4 mpg
Each vehicle's annual emissions = 4.75 MtCO2e
Uptake of a 1" diameter conifer growing for 10 years = 0.039 MtCO2e
It would take 121, 1" diameter trees growing for 10 years to sequester emissions from one car.
= Sequestration By 121 Trees (1" diameter) Growing For 10 Years

Vermont Dept. Forests, Parks & Recreation - November 2016

A factsheet on forest carbon estimates the amount of carbon stored in Vermont's forest land.

In 2016, 80,233 acres of forest damage were sketchmapped during statewide **aerial detection surveys**. This represents less than 2 percent of Vermont's forest land and a decrease from 2015, when 128,391 acres were mapped. White pine needle damage and hardwood defoliation by forest tent caterpillar accounted for 34 percent and 32 percent, respectively, of the area mapped.

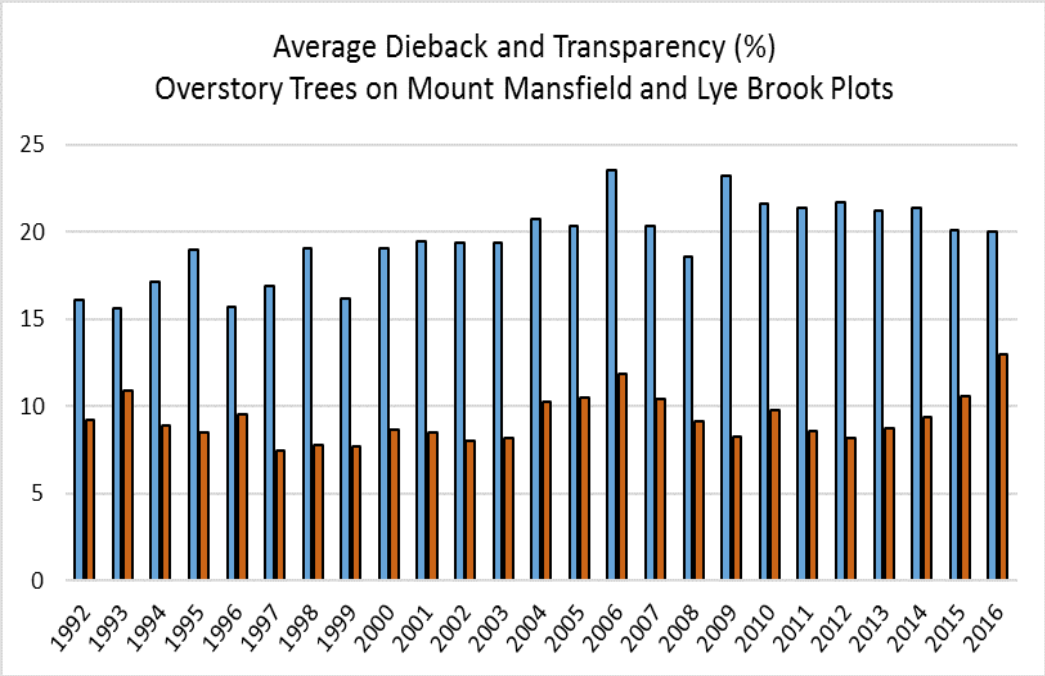


The most common types of damage mapped in 2016 were forest tent caterpillar defoliation and white pine needle damage.

At the **Forest Biology Laboratory**, we continue to provide invertebrate identifications, tree disease diagnoses, and pest management recommendations, and support environmental education and outreach. The lab retains a rich source of records on forest insect and disease incidence and distribution. Some of this information is shared through our yearly Conditions Reports, Forest Health Updates, and Web site postings.

We are also striving to make our records more widely accessible to improve documentation of Vermont species. Over the past year, we have shared data on Vermont sphinx moths with NatureServe's pollinating hawk moth project, metallic wood borers with a regional project through the U.S. Forest Service, and data on bees, butterflies, beetles, and flies with Vermont's Pollinator Protection Committee and the Vermont Atlas of Life through the Vermont Center for Ecostudies.

Planning efforts continue for eventual relocation of the Vermont Agriculture and Environmental Laboratory to a new facility in Randolph.

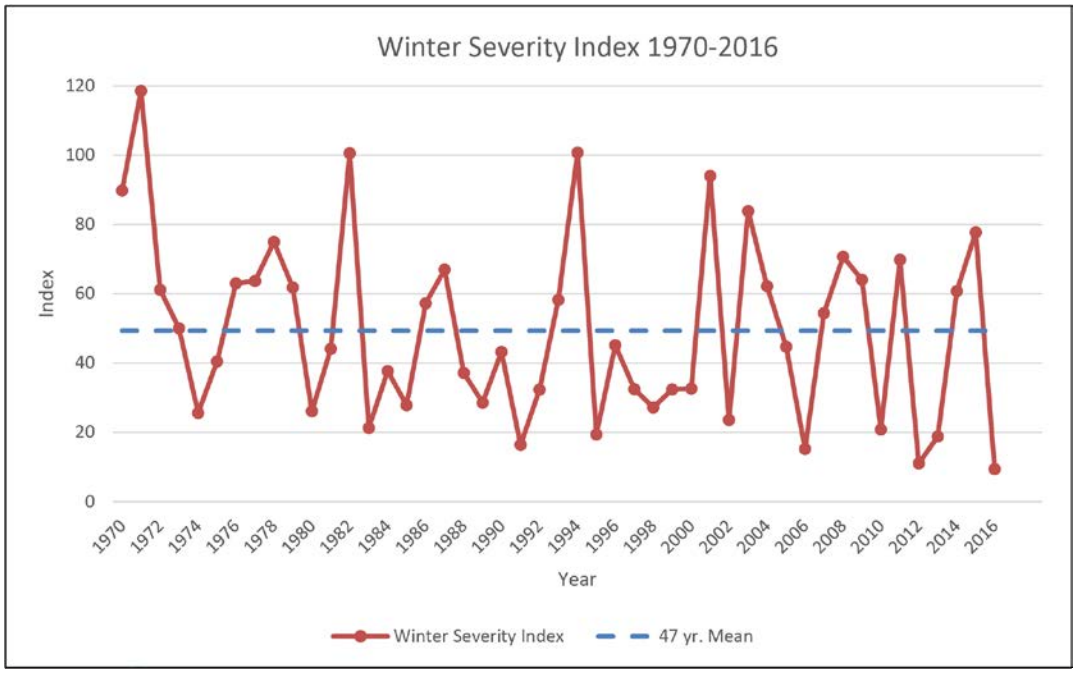


Data have been collected on VMC forest health monitoring plots since 1992.

The **Vermont Monitoring Cooperative** (VMC) completed its 26th year of monitoring forest ecosystem health. In 2016, 42 forest health monitoring plots were sampled across Vermont as a collaborative effort between the State, UVM, and the U.S. Forest Service. Additional monitoring of air, streams, wildlife, soils, and flora by a variety of partners added to the archived database maintained at UVM. Results are maintained on the VMC Web site as Long-Term Monitoring Updates.

2016 Weather Influences on Forest Health

Following multiple years during which tree health was shaped by wet springs and stormy summers, the primary influences in 2016 were the abnormally mild winter interrupted by a cold snap in mid-February and dry weather starting in mid-May and continuing through the end of the growing season.

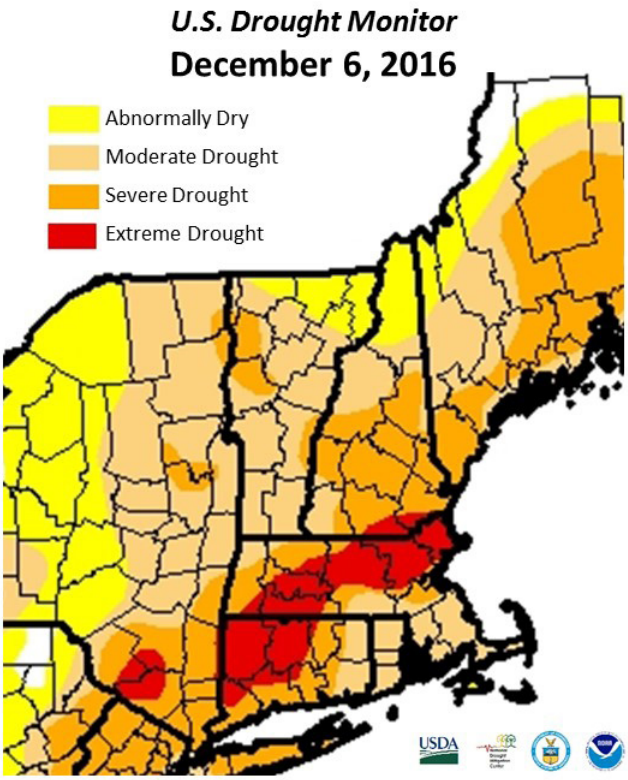


2016 started with an abnormally mild winter, the mildest recorded since the inception of the Winter Severity Index in 1970. (Data analysis and graph: Tim Appleton)

The cold snap in late February increased winter injury to conifers. It was so warm early in the month that needles were beginning the process of de-acclimation, exchanging their cold hardiness for a chance to get a jump on spring. Then the cold weather came and killed those no-longer-cold-hardy tissues. The fact that parts of Vermont were dry towards the end of 2015 may have played a role in this phenomenon.

In the spring of 2016, winter injury was common on ornamental conifers.

In the spring of 2016, winter injury was common on Christmas trees. (Photo: J. Horst)



By late fall, the entire State was abnormally dry or in drought. (Map author: Anthony Artusa, NOAA/NWS/NCEP/CPC)

By midsummer, symptoms of drought became noticeable. These included early color on sugar and red maple, early symptom development on trees affected by beech bark disease, and poor refoliation of defoliated trees. Later in the summer, brown margins developed on a variety of hardwoods, especially those growing on shallow sites. There was also an increase in interior needle drop of conifers and premature leaf drop of ash and other hardwoods. Midseason browning or offcolor foliage on hardwoods, attributed to drought, was mapped on 7,924 acres.

Left: Dry conditions resulted in early color on maples.

Below: Dry conditions resulted in interior needle drop of conifers.

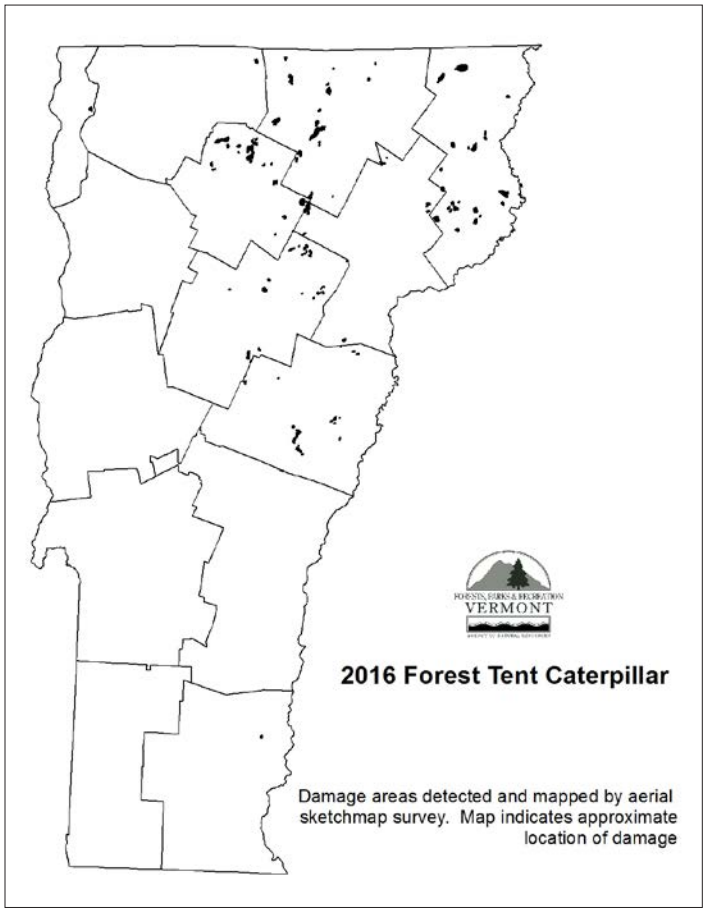
By late fall, the entire State was abnormally dry or worse, although conditions were more severe in southern New England. Dry fall conditions led to a number of difficult-to-extinguish ground fires. Despite (or perhaps because of) drought conditions (see August Update), fall foliage was particularly stunning in some areas, with red maples and red oaks demonstrating how they got their names.

Hardwood Insects and Diseases

Populations of the native forest tent caterpillar (FTC) exploded, especially in north-central and northeastern Vermont; 24,278 acres of defoliation were mapped. The mapped area covers less than 1 percent of Vermont's northern hardwood forest type. By contrast, at the peak of the most recent outbreak in 2006, about 10 percent of the northern hardwood forest type was defoliated. These defoliated areas mapped during 2016 aerial surveys are available on the ANR Natural Resources Atlas. (The "Forest Tent Caterpillar (2016)" layer is available under the "Forests, Parks and Recreation" theme.) The Vermont FPR Forest Tent Caterpillar Update describes the current status of forest tent caterpillar and provides management information for sugar makers, forest land managers, and others concerned about protecting tree health.

Forest tent caterpillar populations exploded in 2016. (Photo: R. Kelley)

The defoliated area is likely to increase in 2017. Moth catches in all but one of our pheromone trap locations increased from 2015, with the statewide average trap catch in double digits for the first time since 2006. Overwintering egg mass surveys provide some indication of the risk of FTC defoliation for the following year. We are available to conduct these fall and winter surveys for maple sugar makers, by request. Sugar makers who may be interested in participating in a State-coordinated spray program should contact the Vermont Department of Forests, Parks and Recreation as soon as possible. The deadline to sign up is February 15th.



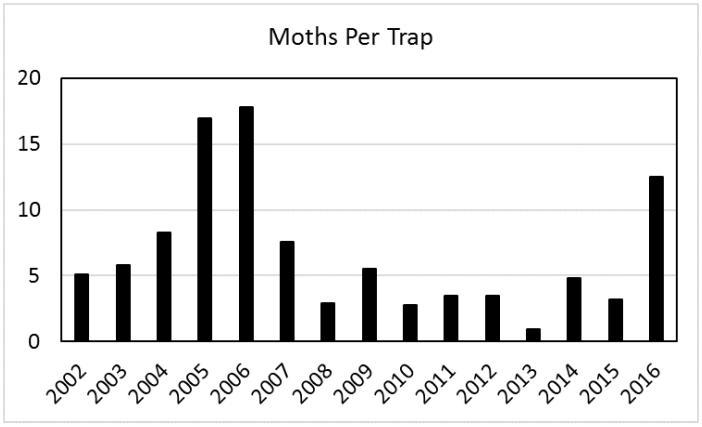
Forest tent caterpillar damage in 2016. (Map: Vermont FPR)

Most trees can survive several years of defoliation. However, dry conditions last summer will be an important factor. While trees typically respond to early-season defoliation by sending out a new flush of leaves, foliage this year remained thin because lack of water reduced refoliation success. Refoliated leaves were small, and sometimes, leaves were scorched or dropped to the ground, tender refoliated shoots wilted, and trees attempted a third flush of leaves. Even where refoliation was successful, dry conditions in 2016 have limited the new leaves' ability to replenish lost food. This will almost certainly affect wood production and the amount of foliage and shoot growth next year. Prevent avoidable stress in defoliated

stands by delaying thinning 1-3 years, using conservative tapping rates, and limiting vehicle use near crop trees.

Forest tent caterpillar defoliation was widespread in north-central and northeastern Vermont and was observed in scattered locations statewide.

Dry conditions reduced refoliation success. (Photo: M. Isselhardt)



The number of forest tent caterpillar moths trapped in 2016 increased from 2015, indicating that defoliation will be more widespread next year.

Maple webworm became surprisingly ubiquitous in some locations. Webworm moths lay their eggs in leaves that are rolled or tied by other insects such as FTC that feed earlier in the season. Increased numbers of maple webworm have coincided in past years with FTC outbreaks, and the insect was linked to an episode of "maple blight" in the 1950s. Maple webworm larvae can be found on trees from early July to October. At first, they feed where the eggs were laid, but later web leaves together and feed on surrounding leaves.

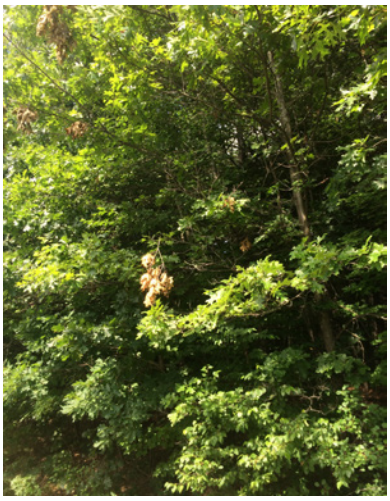
Maple webworm is common during forest tent caterpillar outbreaks.

Maple webworm is common during forest tent caterpillar outbreaks. (Photo: R. Kelly)

Other hardwood insects observed in 2016 included several that feed on sugar maple foliage. There were significant populations of maple leafcutter in some locations and lesser levels of injury by maple trumpet skeletonizer and pear thrips.

Nonnative satin moth caterpillars caused scattered heavy defoliation on poplar and willow. Light damage by the beech leaftier was observed statewide, with noticeable browning of lower foliage tied together by the feeding larva. Damage by oak twig pruner was also common. Its larvae burrow in twigs, leaving dead shoots hanging in the crown.

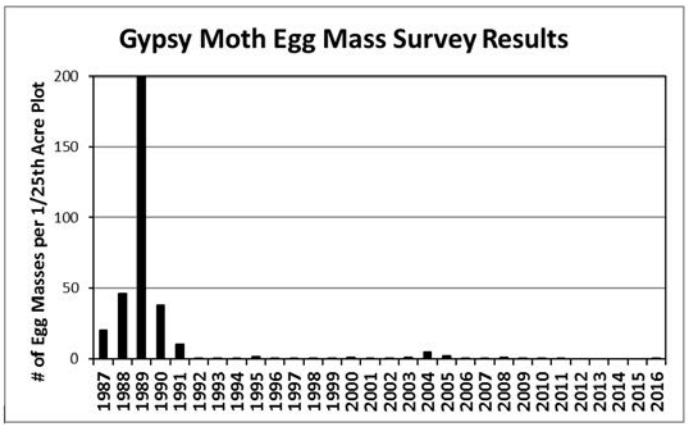
Beech leaftiers were noticeable on lower foliage throughout the State. (Photo: L. French)



The oak twig pruner leaves dead shoots hanging in the crown. (Photo: Jim Esden)

The oak twig pruner burrows in twigs.

Gypsy moth defoliation was not observed in Vermont this year, although it was extensive elsewhere in New England. Egg mass monitoring plots indicate our populations will remain low in 2017.



Egg mass monitoring plots indicate gypsy moth populations will remain low in 2017.

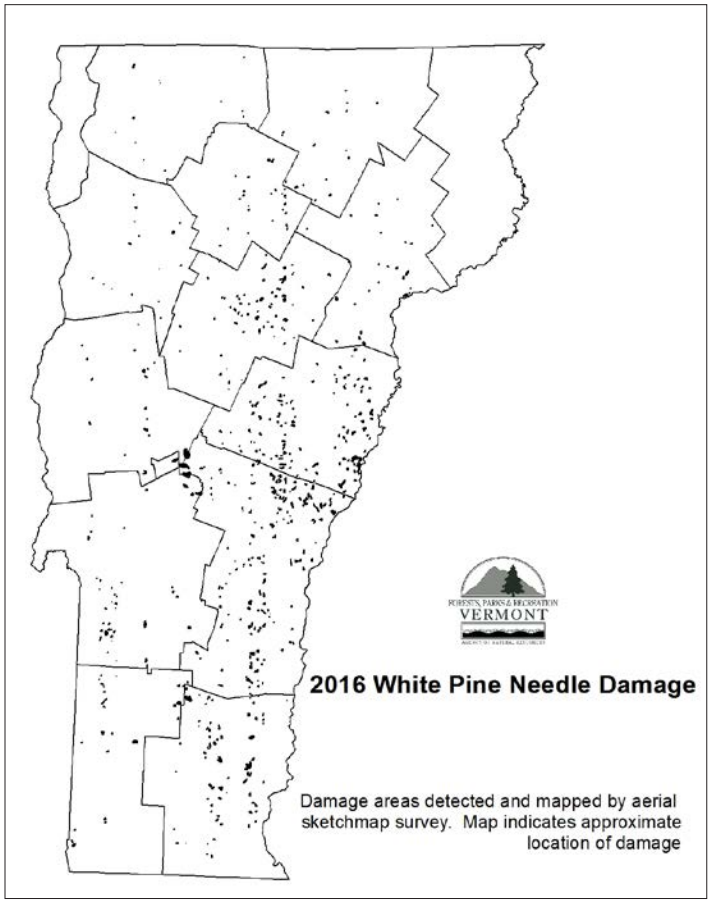
The browntail moth, currently a serious pest in Maine, is not known to occur in Vermont. This nonnative defoliator was here 100 years ago, with the last serious infestation in Vermont reported in 1917.

Thanks to dry conditions in spring 2016, there was very little anthracnose or other foliage diseases of hardwoods. An exception was **poplar leaf blight** on balsam poplar in riparian areas.

Beech bark disease remains a chronic cause of dieback and mortality with damage mapped on 7,278 acres.

Softwood Insects and Diseases

White pine needle damage continued, with the condition even more widespread and severe than it has been in recent years. Although damage peaks in the spring and is therefore less noticeable during midsummer aerial surveys, 30,666 acres of white pine needle damage were mapped. As summarized in a publication about dramatic needle browning and canopy dieback of eastern white pine produced by UMass, the cause is not fully understood.



White pine needle damage in 2016. (Map: Vermont FPR)

Similar symptoms have been observed throughout New England and in New York. The large footprint suggests that weather is an important factor. Several fungi have been associated with the disease. One of them, the brown spot needle blight, is more likely to spread when weather in June is wet, so that disease, at least, may be less severe in 2017. This recent episode of damage was first reported in 2005, with widespread symptoms occurring annually since 2010. Research is continuing at the University of New Hampshire and by the U.S. Forest Service. Since 2009, there has been a 10 to 60 percent decline in annual wood growth on affected pines.

White pine needle damage has been widespread since 2010. Damage was particularly severe in 2016. Although damage was less visible by midsummer when aerial surveys were completed, 30,666 acres of damage were mapped.

Browning and dieback on hard pines, particularly Scots pine, remained common, and 554 acres of damage were mapped. **Brown spot needle blight** has caused repeated defoliation of Scots pine wherever that species has been planted. Shoot blight diseases and other pests have also been associated with these symptoms.

Fir mortality caused by **balsam woolly adelgid** is continuing with acres mapped increasing to 5,616 compared to 2,263 acres in 2015. Currently active heavy populations are very widely scattered, and the infestation has already collapsed in many mortality areas. However, where fir mortality is occurring, especially on upland sites and where large-crowned trees are dying first, this insect could be considered the cause, even if it is inconspicuous. A Vermont Forest Health leaflet on this insect describes its symptoms, impact, and management considerations.

The white wool of balsam woolly adelgid may be hard to find even where the insect has caused mortality.

Balsam woolly adelgid is vulnerable to cold winters and doesn't survive on dead trees.

Six sites where the balsam woolly adelgid predator *Laricobius erichsonii* was released in the early 1960s were visited in late spring to see if that beetle could be recovered, but no evidence of the predator was found.

Reports of **red pine mortality** continued in 2016, with 743 acres mapped scattered in eight counties. A research project, led by a doctoral student at the University of New Hampshire with funding from the U.S. Forest Service, continues work to identify whether a primary pest or pathogen is responsible. The red pine scale, an exotic insect detected by this project in 2015 in Rutland and Orange Counties, continues to be a suspect.

Although it remains premature to say that red pine scale is the sole cause of this mortality, best practices would be to take precautions to reduce possible spread. Harvest declining red pine in winter when the insect is not capable of moving on its own, chip tops so twigs and branches dry out more quickly, and ensure equipment is free of plant material before leaving the site.

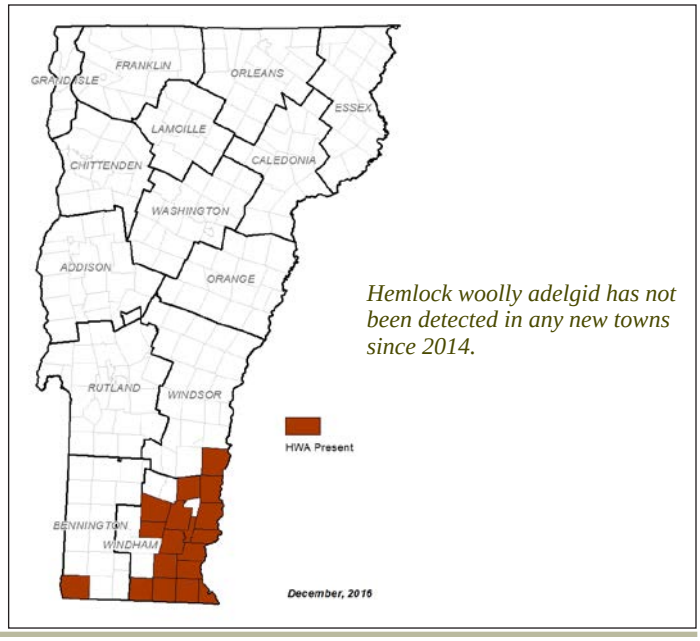
Research is underway to determine the cause of red pine mortality, which has been mapped in eight Vermont counties. (Photo: K. Beland)

While spruce budworm continues to cause widespread defoliation in Eastern Canada, the number of moths captured in our Vermont pheromone traps this summer remained low.

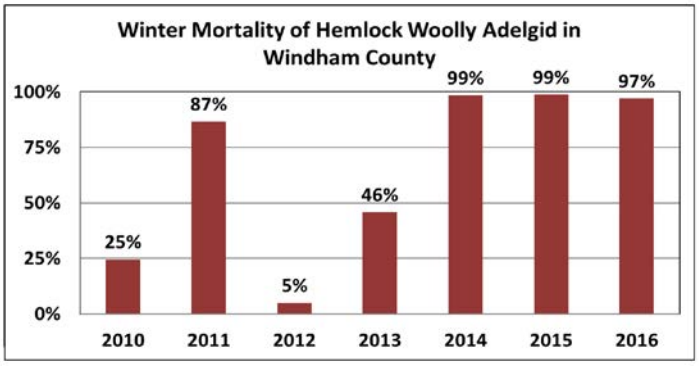
Drought effects were likely to have been the last straw leading to occasional mortality of blue spruce repeatedly defoliated by **Rhizosphaera needlecast**. The cause of thin crowns and occasional mortality in northeastern Vermont white spruce stands may be related to this disease, but as of now, the cause is undetermined.

Exotic Forest Pests

Vermont's **hemlock woolly adelgid** infestation remains centered primarily in Windham County with small spots in Springfield and Pownal. We continue to conduct intensive surveys to delineate this infestation. Fifty-five sites were surveyed in 2016 with volunteers completing nearly half of the survey work, but no newly infested towns were reported. This is due in large part to an unexpectedly high winter mortality rate, which averaged 97 percent in our monitoring sites. High overwintering mortality throughout the Northeast is attributed to the cold snap in late February. Earlier warm weather had prompted the insects to become less cold hardy, making them vulnerable to the sudden cold.



Hemlock woolly adelgid has not been detected in any new towns since 2014.



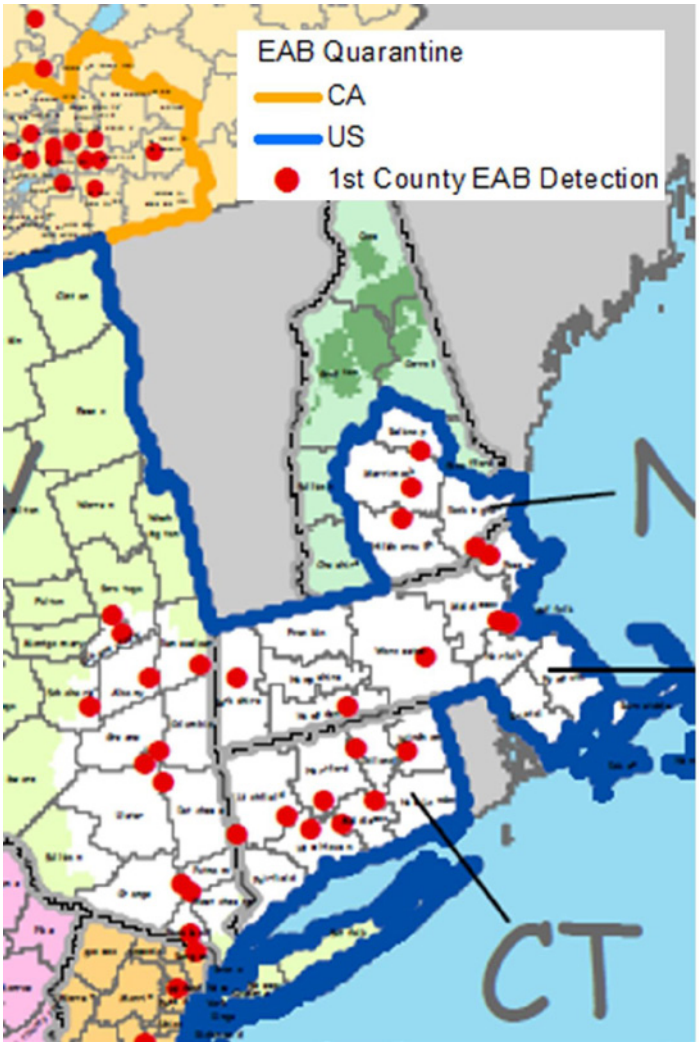
High overwintering mortality of the insect is attributed to the February cold snap following unusually warm weather earlier in the winter.

No predatory beetles, *Laricobius nigrinus*, were recovered during fall sampling of the three sites where they had been released, so the status of this introduction remains unknown.

While recent adelgid mortality rates have been high enough to slow its spread, trees are still threatened. Some stands of hemlock are in noticeable decline, with 322 acres mapped during aerial surveys, compared to 83 acres in 2015. Compounding the situation are the spread of **elongate hemlock scale** into southeastern Windham County and the dry summer that left the hemlock woolly adelgid-infested area in drought conditions for a substantial period.

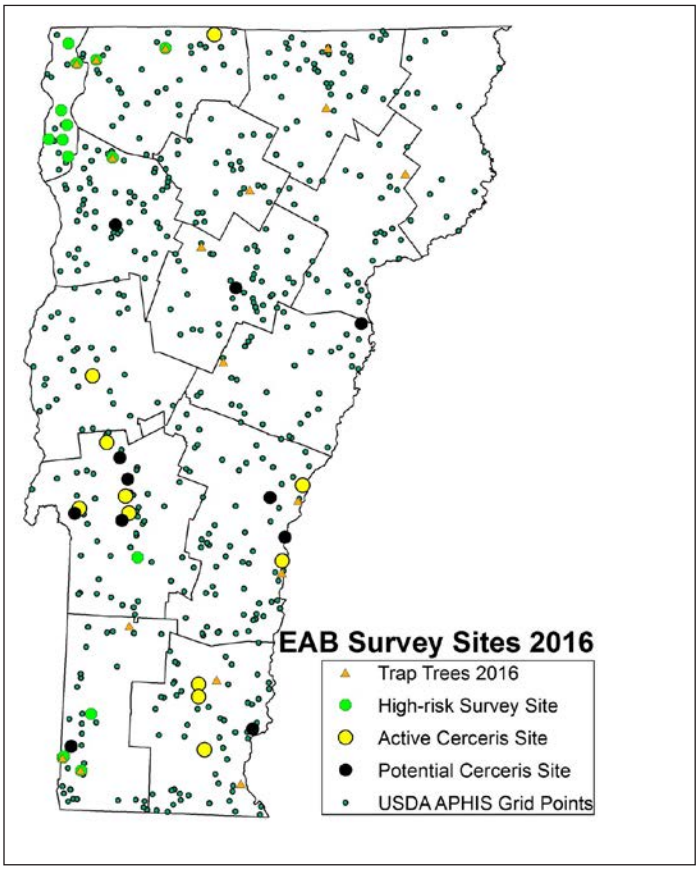
Some infested stands of hemlock are in noticeable decline (arrow).

Emerald ash borer (EAB) is not known to occur in Vermont and was not detected by survey. However, new counties were found to be infested in Massachusetts and Connecticut in 2016, and the insect is now reported from 30 States. Anyone using ash products from infested States should be aware of current regulations. Information is available by contacting the USDA Animal and Plant Health Inspection Service (APHIS), AAFM, or a Vermont FPR office.



As of December 2016, four counties in New Hampshire and all of New York, Connecticut, and Massachusetts are included in the emerald ash borer quarantine area. (Map data from USDA APHIS, 12/20/16. View current information.)

An aggressive emerald ash borer detection effort continues in Vermont. Building on the 2015 intensive trapping survey, with the assistance of volunteers we continued with 5 high-risk sites in southwestern Vermont and 10 new sites in the northwestern corner of the State. USDA APHIS continued its statewide survey by deploying an additional 515 purple traps throughout Vermont.

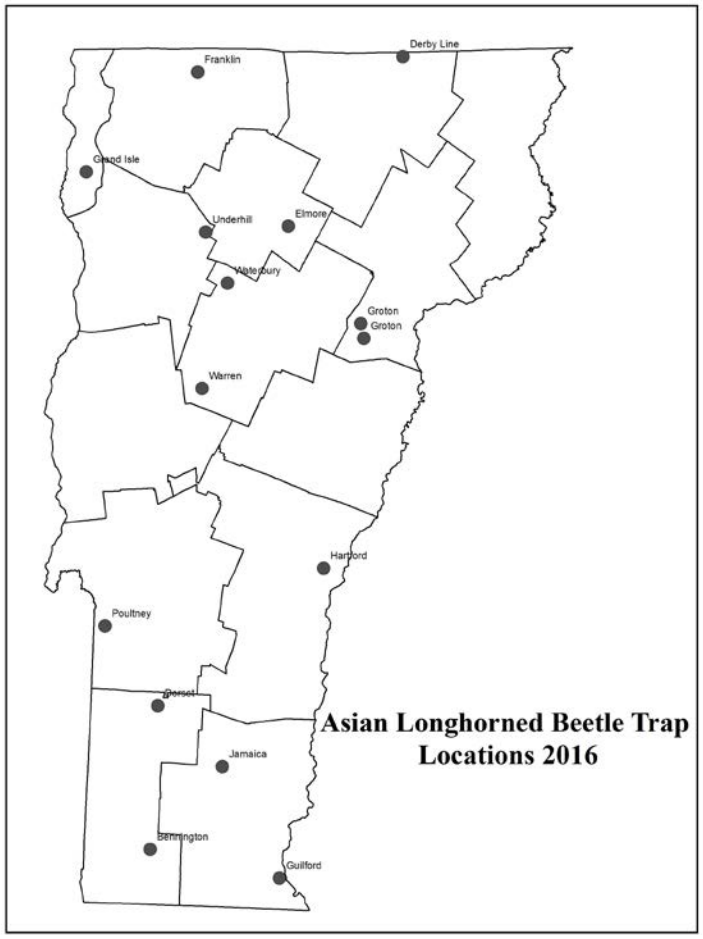


Emerald ash borer has not been detected in Vermont in spite of intensive surveys. In 2016, 15 high-risk sites in southwestern and northwestern Vermont were monitored with green and purple traps. USDA APHIS led the deployment of 515 additional traps statewide.

In 2016, wasp watchers made a total of 136 visits to 42 known and potential *Cerceris* nest sites. Twenty of the sites were active enough to warrant routine monitoring, but no emerald ash borers were found amongst 719 beetles that were collected. We are also using girdled trap trees as a detection tool. In 2016, 16 trap trees in high-risk areas in 10 counties were girdled in the spring, then harvested in November and peeled to look for signs of EAB.

Volunteers assisted with visiting 42 Cerceris *sites and peeling 16 trap trees.*

Asian longhorned beetle (ALB) is not known to occur in Vermont, and no forest management changes are recommended in anticipation of the insect. The natural spread of ALB is relatively slow when compared to some other invasive species such as the emerald ash borer. Nonetheless, education and outreach that can promote early detection remain a priority. Early detection is particularly important with Asian longhorned beetle, since small, newly discovered populations can be successfully eradicated. For the fourth year, we deployed panel traps in locations with a high risk that out-of-state firewood might have been in the area. Fifteen traps were checked biweekly between early July and late September, and no ALB were collected during the survey.



Asian longhorned beetle is not known to occur in Vermont and was not found in any of the 15 traps deployed in 2016.

AAFM and USDA APHIS continue efforts to trap the following nonnative forest insects:

- **Sirex woodwasp** has been trapped in six Vermont counties since 2007. In 2016, it was trapped again in Addison, Rutland, and Windham Counties. No new observations of Sirex infesting trees were reported.
- The **common pine shoot beetle**, which has been found in many Vermont counties since it was detected in 1999, was trapped this year in Chittenden County. 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.
- The **brown marmorated stinkbug** was also trapped in Chittenden County.

Dry conditions seem to have accelerated the symptoms of Dutch elm disease with widespread observations of brown, curled leaves on flagging branches. Researchers at the U.S. Forest Service Northern Research Station are working to identify American elms that are resistant; they are requesting samples of diseased elms from which they can isolate fungi. To participate, contact Jessie Glaeser.

Other **nonnative insects and diseases that have not been observed** in Vermont include winter moth, the agents that cause oak wilt, thousand cankers disease, and sudden oak death.

Nonnative Invasive Plants

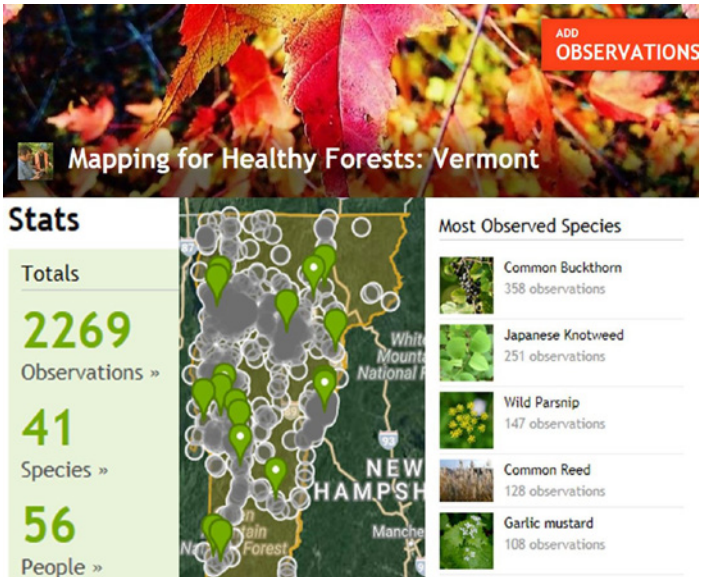
Nonnative invasive plant management (NNIPM) efforts grew in 2016 with progress on mapping, control, outreach, and education made possible through several grant-funded opportunities and varied strategies within local communities. The statewide invasive plant coordinator within Vermont FPR led over 28 workshops for a variety of stakeholders and worked with multiple State departments and agencies to unify Vermont's approach to NNIPM. Department staff continued to provide outreach and information about invasive plants to the public and professionals, building the capacity to continue to manage invasive terrestrial plants on State lands across Vermont.

In 2016, over 20 State-owned properties were managed to remove NNIP. Some sites involved large-scale treatments while others required more localized means.

In 2016, invasive plant removal activities were conducted on 20 State-owned properties. Nearly 600 volunteers were involved with invasive plant management or education. (Photo: H. Ewing)

Volunteer hours helped bolster these efforts in many cases – nearly 600 volunteers and over 2,000 volunteer hours were logged for either education or direct management of NNIP.

The *Mapping for Healthy Forests* project continued efforts to provide a resource for tracking NNIP across the landscape. This citizen science project trains volunteers to assess and prioritize treatment areas for NNIPM on town and private lands. All the information from this project is stored on the iNaturalist Web site.

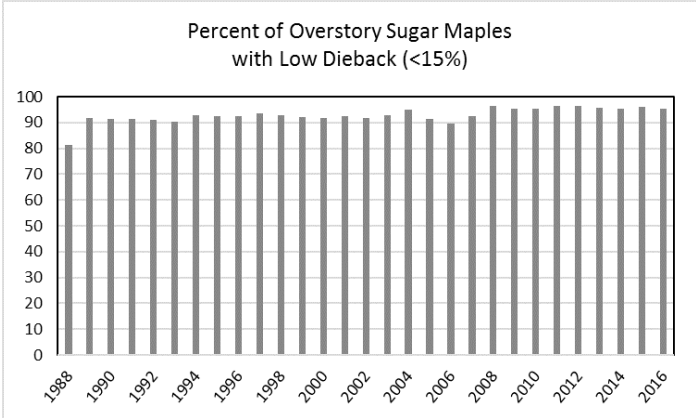


The Mapping for Healthy Forests Web site helps assess treatment areas for nonnative invasive plant management on town and private lands.

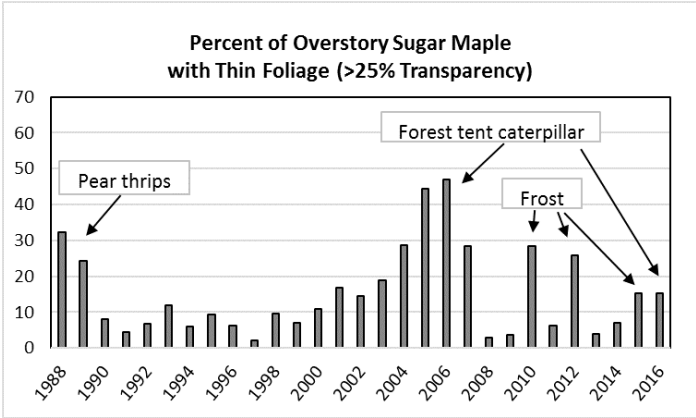
Monitoring Forest Health

Vermont has continued to monitor sugar maple health in sugar bushes and in maple stands since 1988. In these North American Maple Project (NAMP) plots, 95 percent of trees were rated as having low dieback (less than 15 percent). Of the 36 plots, 8 had moderate to heavy defoliation (22 percent) due to forest tent caterpillar and 20 had light defoliation (55 percent). The frequency of thin foliage was similar to last year when frost injury affected foliage density. Foliage transparency is sensitive to current stress factors. Other spikes in transparency have been due to frost injury (2010, 2012, 2015), forest tent caterpillar defoliation (2004–2007), and pear thrips (1988–1989).

In addition, 42 forest health monitoring plots were sampled across Vermont as part of the Vermont Monitoring Cooperative. Dieback increased in the original 23 sites on Mount Mansfield and Lye Brook Wilderness Area. Foliage transparency remained steady. Unusual lack of snow cover the previous winter, combined with dry summer conditions, were contributing factors to increased dieback.

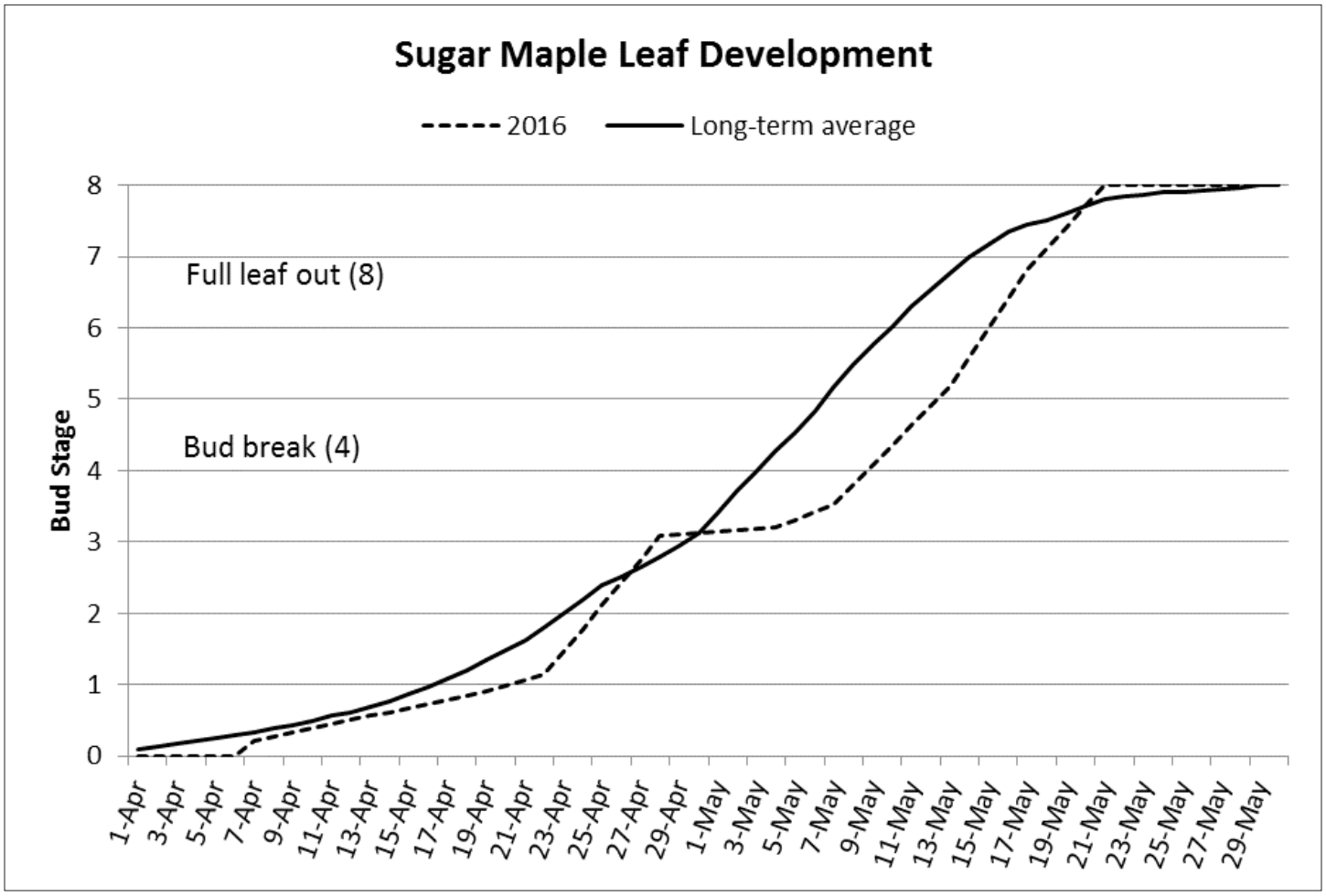


Over 95 percent of sugar maples were rated as having low dieback (<15 percent) in North American Maple Project plots.



Thin maple foliage was mostly due to forest tent caterpillar defoliation.

As part of ongoing phenology monitoring, sugar maple trees were monitored for the timing of budbreak and leaf out in the spring. Leaf bud expansion was later than normal; budbreak on May 9th was nearly 6 days later than the long-term average following a cool spell in early May. However, full leaf out was nearly indistinguishable from the long-term average.



In spring phenology monitoring plots, the timing of sugar maple bud break was normal.

For more information, contact the Forest Biology Laboratory at 802–879–5687.

To contact Forest Resource Protection or County Foresters:

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Lamoile, Orange & Washington Counties
Barre 802–476–0170

Caledonia, Orleans & Essex Counties
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Unless otherwise noted, photos are credited to Vermont Forests, Parks and Recreation.

Forest Health Programs

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