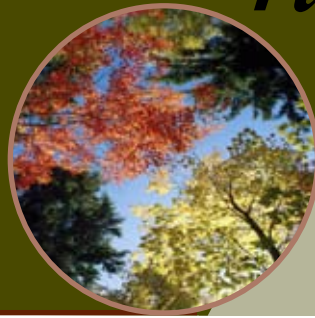


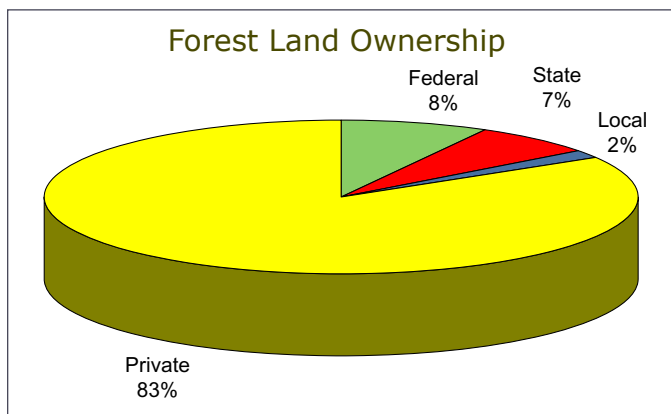
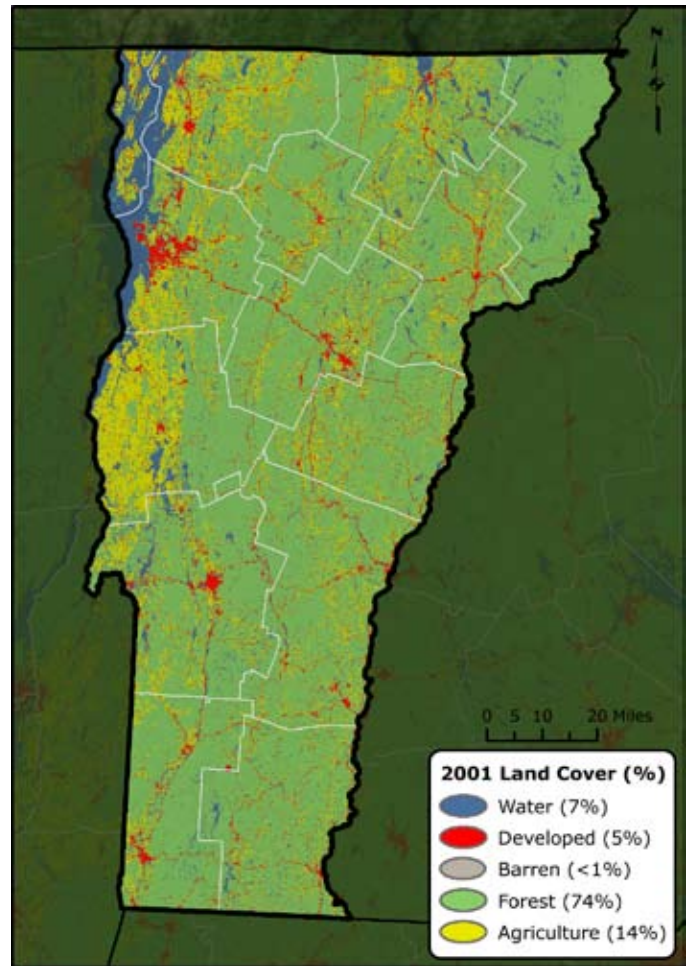


# Forest Health VERMONT *highlights*



## Forest Resource Summary

Vermont's forests, which encompass 4.6 million acres, offer valuable ecological, economic, and social benefits. Healthy forests are resilient forest ecosystems that possess the long-term capacity for self-renewal of their ecological productivity, diversity, and complexity. Forests cover 74 percent of the State and provide jobs, landscape stability, wildlife habitat, biological diversity, clear water, scenic vistas, and diverse recreational opportunities. Over 83 percent of the State's forest land is privately owned with 8 percent under Federal management in the Green Mountain National Forest. The major forest types are comprised of maples and other hardwoods, along with spruce, balsam fir, pine, and hemlock. With growing public concern about climate change and greenhouse gas reductions, Vermont forests are recognized as playing a major role in reducing carbon dioxide and mitigating changes in our climate.



## Forest Health Programs in the Northeast

State forestry agencies work in partnership with the U.S. Forest Service to monitor forest conditions and trends in their State and respond to pest outbreaks to protect the forest resource.

The Forestry Division's new 2009 Web site being released for its centennial celebration ([www.vtforest.com](http://www.vtforest.com)) will include a carbon calculator tailored for Vermont that was initiated by the U.S. Forest Service. Individuals and businesses can calculate their carbon footprint, estimate their contribution to carbon reductions from existing or planted trees or forests, and provide donations to benefit Vermont forests.

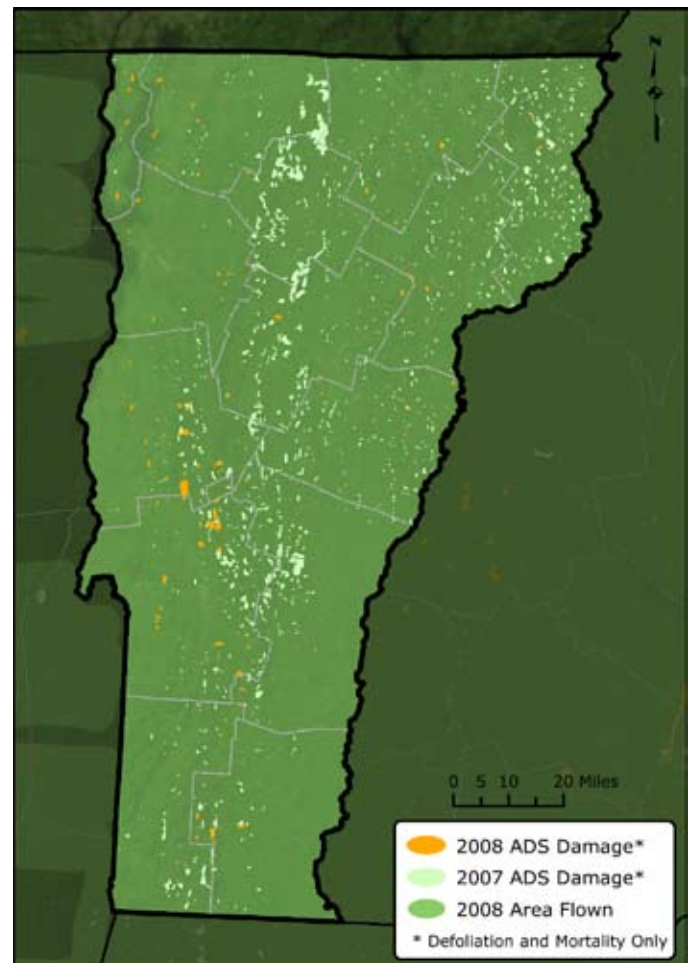
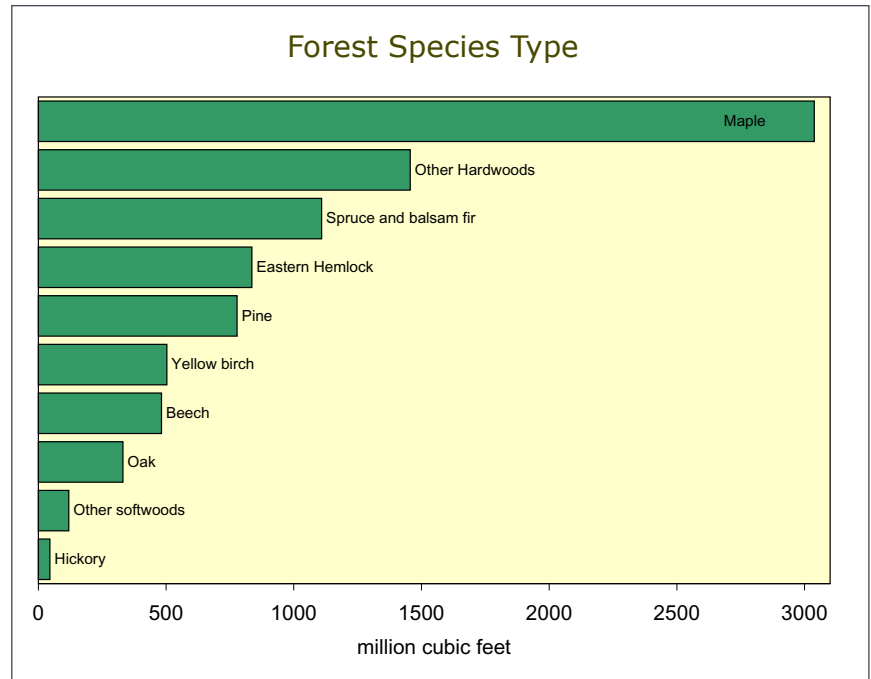
A Forest Resource Plan was developed to sustain the many values provided by Vermont's forests and meet a variety of demands on the forest resource. The vision states:

*In the future, the forests of Vermont will consist of healthy and sustainable ecosystems, with a prosperous and sustainable forest products industry, abundant recreational opportunities, and a combination of ownership patterns supporting a working forest landscape and undeveloped forest land.*

An updated forest resource plan is underway to set priorities for the next decade.

## Aerial Surveys

The Vermont Department of Forests, Parks, and Recreation conducts ground and aerial surveys annually to evaluate tree health and identify stress problems across the State. In addition, long-term monitoring plots are visited to provide data on trends in forest health. In 2008, the State's forest land was again evaluated during aerial surveys to map forest health conditions. More than 50,000 acres of damage were reported. The major causes of tree damage in areas observed from the air in 2007 and 2008 were insect defoliators and various hardwood declines. In 2008, the oak leaf-tier affected over 4,500 acres, and a fall hardwood defoliator complex caused damage on 2,600 acres. About 4,300 acres of birch were damaged by Septoria leaf spot, and birch dieback was observed on 1,700 acres. Continued decline and mortality of American beech were noted on 2,500 acres due to beech bark disease. Areas of hardwood tree yellowing were recorded on over 15,000 acres, mostly late in the summer. The cause is unknown, but may be related to excessive soil moisture following heavy summer rains.



This map delineates aerial detection (ADS) survey results for Vermont in 2007 and 2008.

## Forest Damage

Current tree health was generally good in 2008, following a year of plentiful moisture and low pest activity. Most of the common defoliating insects, including **gypsy moth**, **pear thrips**, **saddled prominent**, **maple leaf cutter**, **forest tent caterpillar**, **spruce budworm**, **eastern tent caterpillar**, and **birch defoliators**, were at low population levels this year.

**Sugar maple** in particular had dense, lush foliage. Trees on plots monitored for over 20 years as part of the North American Maple Project (NAMP) showed the best tree condition ever observed. Scattered patches of tree decline following defoliation in 2003 to 2006 from the forest tent caterpillar were mapped on 3,000 acres in southern Vermont during aerial surveys.

**Birch decline** from previous stress events occurred mostly at high elevations in areas where mortality has been observed over the past few years. This wave of paper birch decline followed recent drought from 1999 to 2001, successive years of birch defoliation, and, in some locations, damage from the 1998 ice storm.



This tree exhibits symptoms of birch decline.

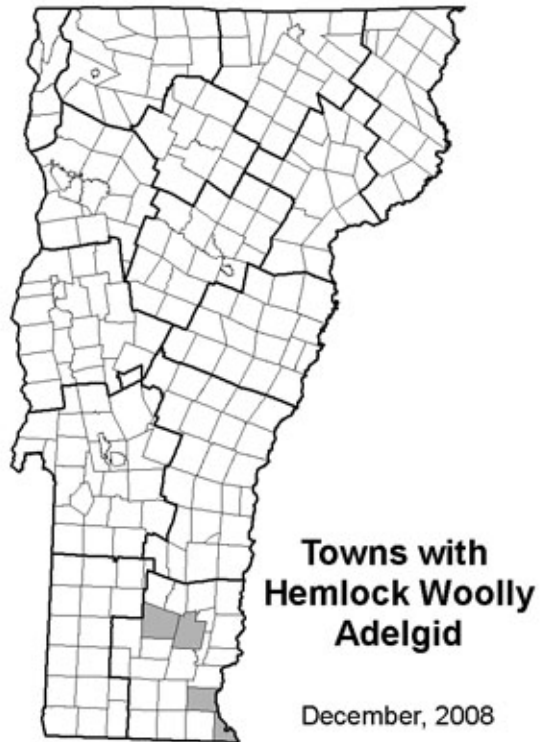
Intense **winds** in the Champlain Valley and central and northern Vermont reached 100 mph during a July 18 storm. A localized tornado touched down in Cambridge and Waterville, and leveled trees in its path on about 108 acres.

Small or localized areas were affected by various pests of interest. Red oak defoliation was noted in seven counties, believed to be caused by an **oak leaftier/leaf roller complex**. More surveys in these areas will be conducted in 2009. The **elm leaf beetle** caused heavy damage to scattered trees. This insect was last observed causing damage in 1977. **Brown spot needle blight** caused heavy and widespread damage on white pine, red pine, and Scots pine. The **fall webworm** caused heavy but scattered defoliation on hardwoods. Damage from the **maple trumpet skeletonizer**, whose impact was widespread last year, decreased in most locations.

## Exotic Pests

A major thrust of maintaining forest health in Vermont is detecting, eliminating, or managing newly introduced pests. The introduction of non-native insects, diseases, and forest plants can lead to significant changes in Vermont forests. The natural controls that keep species in balance are not present, so these organisms may outcompete native species for resources and space. Some potentially damaging exotics have not reached Vermont and are the subject of detection surveys. Other species already in Vermont are being monitored for population changes and tree damage.

**Hemlock woolly adelgid** was found in four towns in Windham County on native hemlock trees. Bird transport of this insect from infested trees in neighboring States seems to be involved in moving the insect up the West River corridor in Vermont. Citizen volunteers are being trained to assist with detection surveys. Small areas with hemlock woolly adelgid found in 2007 were successfully treated to reduce or eliminate populations. The Vermont quarantine is being updated, and a three-state cooperative plan has been proposed to slow the spread of this pest.



Hemlock woolly adelgid was found in four towns in Windham County, Vermont, for the first time in 2008.



A Forest Health Specialist surveys hemlocks for the hemlock woolly adelgid.

Vermont is actively surveying high-risk forest areas for several new United States or North American introductions of serious forest pests. No evidence was found of the **Asian longhorned beetle** or the **emerald ash borer**. More information on exotic pests of interest to Vermont can be found at <http://www.vermontagriculture.com/ARMES/plantindustry/caps/forestPests/index.html>.

The **emerald ash borer** is considered a serious exotic pest threat as it is killing millions of ash trees in the Midwest and continues to be found further east from the original infestation in Michigan. This year a localized infestation was found in Quebec, just 30 miles from the Vermont border. Canadian officials are working to eradicate this infestation. A Federal quarantine on the movement of firewood across the U.S. border is now in effect. "Trap trees" were established in Vermont as part of the monitoring effort.



Survey trap trees are inspected for the possible presence of emerald ash borer.

A new infestation of the **Asian longhorned beetle** was found this year in Worcester, MA, and surveys are being conducted to determine just how far from this infestation the insect has traveled. Vermont has an active program to alert the public about transporting this and other wood-boring insects into Vermont when moving firewood (<http://www.anr.state.vt.us/fpr/vtfpr/firewood/index.cfm>).

The **European woodwasp**, *Sirex noctilio*, was detected for the first time in the State in 2007 at one location by the Vermont Agency of Agriculture. This insect can fly great distances and is detrimental to certain pine species, including Scots and red pines. Additional surveys were conducted in 2008 to determine if this insect is established in forests at the detected location, but no additional insects were found. Trapping elsewhere in the State did not capture any new woodwasp insects.



Funnel traps are set up in a pine stand during a survey for *Sirex* woodwasp.

**Beech bark disease** continues to cause tree decline on severely infested trees. Damage depends on attack by the beech scale, with subsequent infection with the *Nectria* disease. While disease incidence was lower this year, signs of a rising beech scale population in southern Vermont may indicate future disease increases.

**Balsam woolly adelgid** damage symptoms were visible in central and southern Vermont, with heavy mortality in some areas that have had high adelgid populations.

The **common pine shoot beetle** was first detected in northern Vermont in 1999. Since then surveys have found the beetles in many other counties in the State. Tree damage in Vermont is difficult to find and is limited to new shoot injury. A Federal quarantine is in place to limit the spread of this exotic insect into non-affected States, but pine material is free to move inside Vermont. Quarantine details can be found at <http://www.anr.state.vt.us/fpr/vtfpr/protection/quarantine.cfm>.

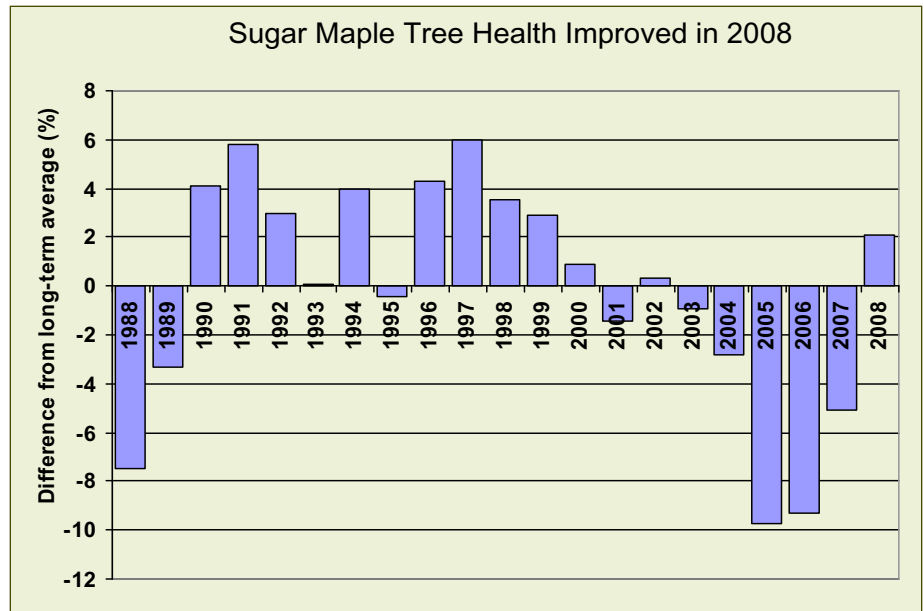
The **Viburnum leaf beetle** caused scattered heavy damage on native highbush cranberries in the spring. The **imported willow leaf beetle** was very common, causing light to moderate defoliation on willows.

**Invasive non-native plants** are becoming a more serious threat to tree regeneration, especially in southern and central Vermont. While well-established plants can be difficult to control, efforts to eradicate new sightings of plants can be very effective in reducing the likelihood of establishment. The Vermont Department of Forests, Parks, and Recreation increased efforts in 2008 to educate staff about plant identification, develop survey and management procedures, and establish demonstration areas where public and private individuals can learn techniques for addressing new or well-established invasive plant populations.

## Monitoring of Forest Health

Forest health is much more than tree health, but trees are a major component of forests, and tree health will ultimately affect all other forest ecosystem components. In Vermont, forest surveys assist the State in assessing trends in aspects of forest sustainability such as biodiversity, forest ecosystem health and vitality, climate change and carbon cycles, and soil and water conservation.

North American Maple Project plots across Vermont showed that 97 percent of sugar maple trees were healthy in 2008. This represents unprecedented good tree health following major stress events during this decade, including the 1999 to 2001 droughts and the 2003 to 2006 forest tent caterpillar defoliation. Recovery is shown in the crown condition index chart, where positive values show percent improvement in branch and foliage health above the long-term average.



Vermont cooperates with the U.S. Forest Service to inventory and assess trends in the forest resource through the Forest Inventory and Analysis Program. The current inventory of Vermont was completed in 2008. Updated results are available at <http://fia.fs.fed.us/>, and a comprehensive report will be completed in 2009. Additional measurements are collected on a subset of these plots to provide a more holistic assessment of forest ecosystem health. Descriptions and updates for these forest health monitoring measurements (P3 plots) are available at <http://www.fia.fs.fed.us/program-features/indicators/>.

The Vermont Monitoring Cooperative, Vermont's intensive forest ecosystem monitoring and research program, has initiated work on a "State of Forest Health" report that will be compiled from 18 years of ecosystem monitoring in Vermont. In addition, archives of hundreds of new documents and data sets were posted in 2008 at <http://sal.snr.uvm.edu/vmc/>.



Ecosystem research information is collected for the Vermont Monitoring Cooperative.



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