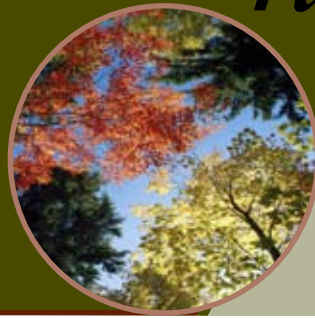




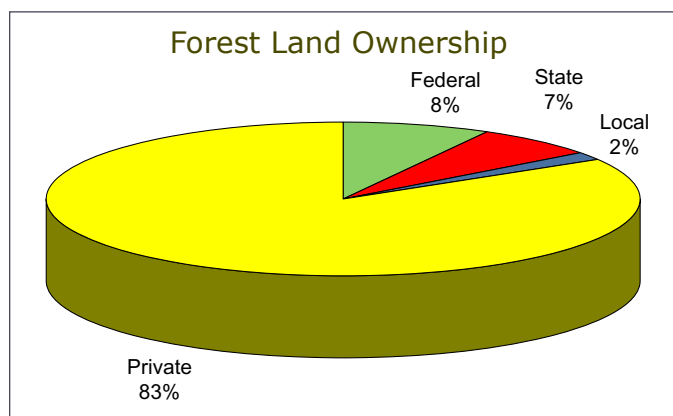
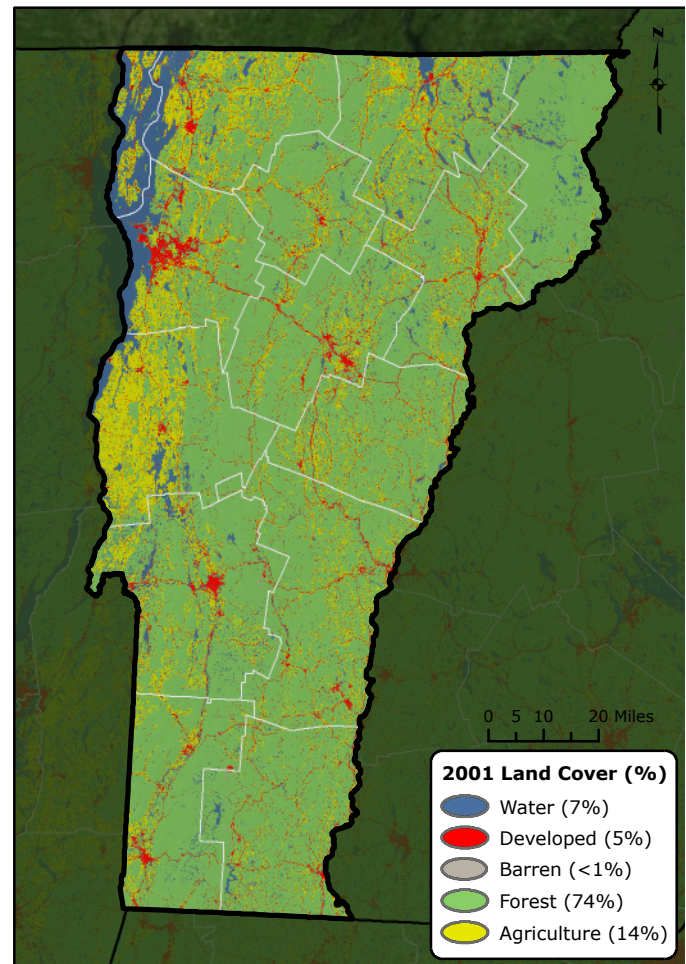
# Forest Health VERMONT *highlights*



## Forest Resource Summary

Vermont's forests are valuable ecologically, economically, and socially. Covering 76 percent of the State, forests provide jobs, stability to the landscape, wildlife habitats, 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.

In 2009, Vermont celebrated its centennial year of the State Forestry Division. With the theme of "Get into the Forest" events focused on the State's rich forestry history and exploring the wealth of opportunities its forests provide. Information on these activities can be found at <http://www.vtfor.com>.

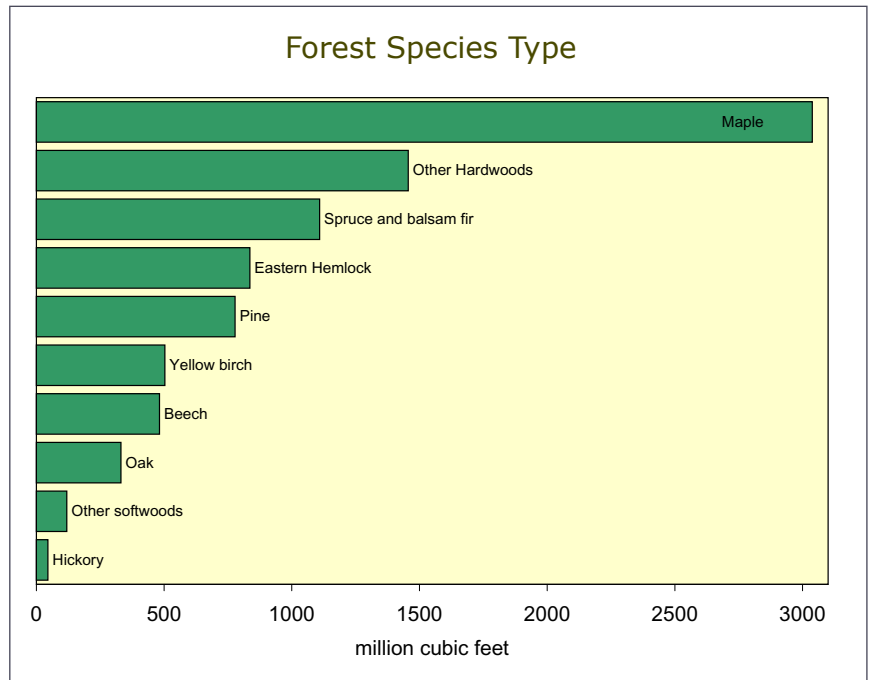


## Forest Health Programs in the Northeast

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.

Given the growing concerns about climate change and greenhouse gas reductions, Vermont forests are recognized as playing a major role in reducing carbon dioxide and mitigating climate changes. A Vermont-specific Web site has been developed on climate change and forests. It can be found at [http://www.vtfpr.org/html/for\\_climatechange.cfm](http://www.vtfpr.org/html/for_climatechange.cfm).

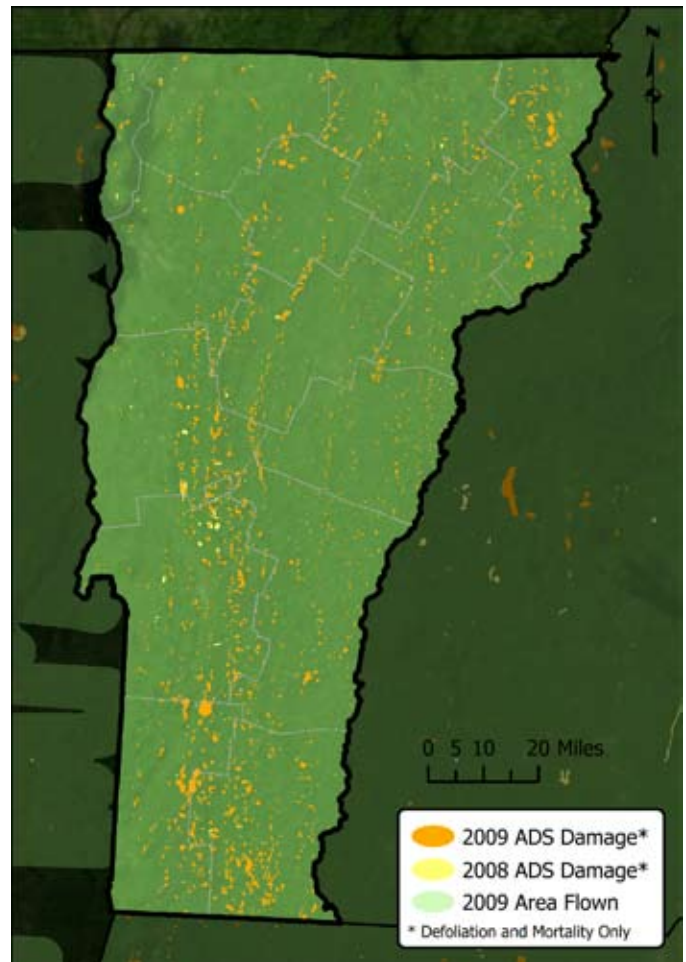
An updated Forest Plan is being developed that will provide strategies to address new and emerging forest health threats. Current priorities have emphasized creation and maintenance of healthy and sustainable forest ecosystems “with a prosperous and sustainable forest products industry, abundant recreational opportunities, and a combination of ownership patterns supporting a working forest landscape and undeveloped forest land.”



Vermont is famous for its fall foliage. Camel's Hump is pictured in the background.

### Aerial Surveys

In Vermont, 116,400 acres of damage were reported. Most of the damage, 46,150 acres of defoliation, was a result of Septoria leaf spot. Beech bark disease caused 14,322 acres of dieback and 11,147 acres of mortality. There were 4,856 acres of mortality and 4,048 acres of discoloration as a result of flooding and high water. The severe December 2008 ice storm resulted in 10,282 acres of trees with broken branches or broken main stems.



This map delineates aerial detection survey (ADS) results for Vermont in 2008 and 2009.



## Forest Damage

The Vermont Department of Forests, Parks & Recreation conducts aerial and ground 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 2009, over 110,000 acres of forest damage were mapped during the aerial survey. A variety of causes were involved. Nearly half the forest damage was reported on birch trees and involved defoliation by a leaf fungus, *Septoria* leaf blight. Wet conditions promoted fungal growth on birch and many other tree species. A winter ice storm on December 12, 2008, resulted in significant forest damage in southeastern Vermont. Another extensive area of forest damage was a result of beech bark disease, which is an exotic fungus that is transmitted to beech trees by a native beech scale insect. More than 25,000 acres of damaged trees from beech bark disease were mapped across the State. Most of the hardwood defoliation occurred on oak and involved a complex of leaf rollers and leaf tiers, with many of the areas defoliated in both 2008 and 2009.



Tree and branch breakage resulted from ice damage.

Tree health was good in 2009 following adequate moisture and low pest activity. Most of the common insect pests, including **gypsy moth, pear thrips, saddled prominent, maple leaf cutter, spruce budworm, eastern tent caterpillar,** and **birch defoliators** were at low population levels. Forest tent caterpillar populations were slightly higher than in 2008, although still very low, and no defoliation was observed. Fall webworm populations were high across the State, with scattered patches of heavy defoliation.

The wet weather in early summer contributed to several leaf problems. Yellow, chlorotic leaves and anthracnose were observed on hardwoods. White pine browning, caused by brown spot needle blight, was common. Another forest health concern was heavy seed production, especially on ash, which compromised leaf size and therefore tree productivity.

Three noteworthy summer storms affected parts of the State in 2009. A tornado in Washington on May 9 was accompanied by 1-inch hail and high winds in central and southern Vermont locations. A May 31 storm produced violent winds in a band from Addison County through northeastern Vermont. Another tornado on July 16 that touched down in Williamstown and Chelsea produced severe thunderstorms and flooding, and 3-inch hail in Westford. Branch and tree breakage occurred in the path of these storms. A winter windstorm on December 10 affected forested areas, mostly in Addison County.



Top photo: Areas of birch defoliation were seen during the 2009 aerial survey. Bottom photo: Oak defoliation in 2009 was caused by a complex of insects.





The **emerald ash borer** is considered a serious exotic pest threat because it is killing millions of ash trees in the Midwest and continues to be found further east



An emerald ash borer from [www.forestryimages.org](http://www.forestryimages.org).

from the original infestation in Michigan. In 2008, a localized infestation was found in Carignan, Quebec, just 30 miles from the Vermont border. 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. Restrictions on long-distance firewood movement into State and Federal campgrounds were implemented to prevent new introductions.

Development of strategies for detecting emerald ash borer includes a novel method using a native wasp. Surveys were undertaken to locate nest sites of *Cerceris fumipennis*, a wasp that provisions its nests with buprestid beetles, including the emerald ash borer, if present. In 2009, 19 wasp nest sites were found. Beetle collections from the sites yielded a variety of buprestid beetles, but no emerald ash borer.



Ash trees used to lure emerald ash borers were checked for emergence holes.

A new infestation of the **Asian longhorned beetle** was found in 2008 in Worcester, MA. Federal agencies surveyed nearby forests and have found this insect in additional locations. Vermont has increased efforts to identify likely methods of transport into



An Asian longhorned beetle from [www.forestryimages.org](http://www.forestryimages.org).

the State. A survey of Massachusetts residents who own Vermont property was conducted to determine if firewood may have been moved from infested areas of Massachusetts. On-site visits will be conducted in 2010.

Restrictions on long-distance firewood movement into State and Federal campgrounds from areas more than 50 miles away were implemented to prevent new introductions. Ground surveys of campgrounds have not resulted in any insect sightings. In addition, Vermont has an active program to alert the public about transporting the Asian longhorned beetle and other wood-boring insects into Vermont when moving firewood.

Details are available at <http://www.anr.state.vt.us/fpr/vtfr/firewood/index.cfm>.



An ash was girdled to attract emerald ash borers.



Campground surveys were made for Asian longhorned beetle and emerald ash borer.

A single **European wood wasp**, *Sirex noctilio*, was detected for the first time in Vermont by the Vermont Agency of Agriculture at one location in 2007. This insect can fly great distances and is detrimental to certain pine species, including Scots and red pines. Additional surveys were conducted in 2009 by the Agency of Agriculture, but no new sightings were found.

**Balsam woolly adelgid** damage symptoms were visible in central and southern Vermont, with declining areas mapped on over 5,000 acres. The **Viburnum leaf beetle** caused little damage on native high bush cranberries this year. The **common pine shoot beetle** was first detected in 1999 in northern Vermont. Since then, surveys have found the beetles in many counties. 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>.

Recent introductions of non-native forest pests have led to proactive surveys in cooperation with the national **Early Detection and Rapid Response** (EDRR) program. Surveys for non-native bark and ambrosia beetles were conducted at eight sites in Vermont in 2009. A total of 5,033 bark beetles (46 species) were collected; 2,518 (11 species) were considered common, and 2,173 (33 species) were considered uncommon. Two target species considered potential forest pests—*Xyleborus alni* and *Tomicus piniperda*—were captured. Two species were new to State records.

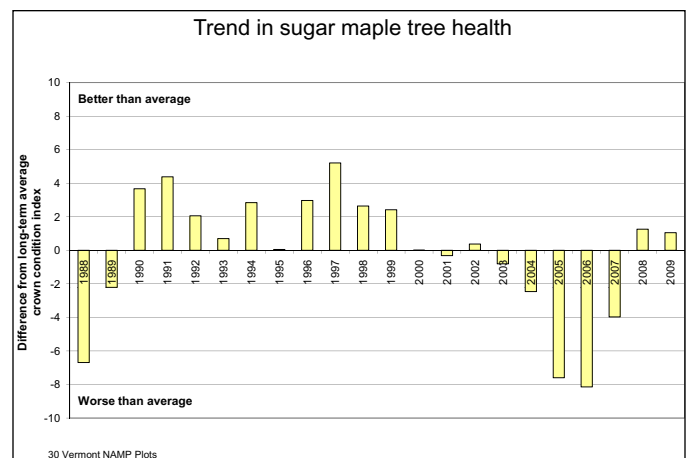
**Invasive non-native plants** are becoming a more serious problem for regeneration, especially in southern and central Vermont.

While well-established invasive plant populations 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 & Recreation increased efforts in 2009 to educate staff in 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. Interagency cooperation was initiated to determine priorities around the State.

## Monitoring Forest Health

Forest health is more than just tree health, but tree health affects all the other components in forest ecosystems. In Vermont, forest surveys help the State determine trends in forest sustainability indicators such as biodiversity, forest ecosystem health and vitality, climate change and carbon cycles, and soil and water conservation.

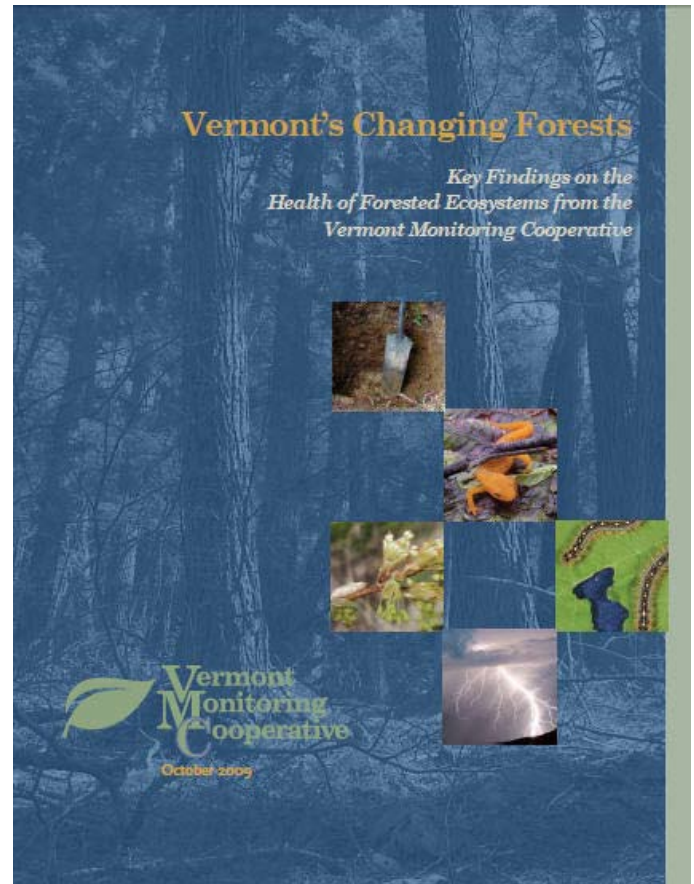
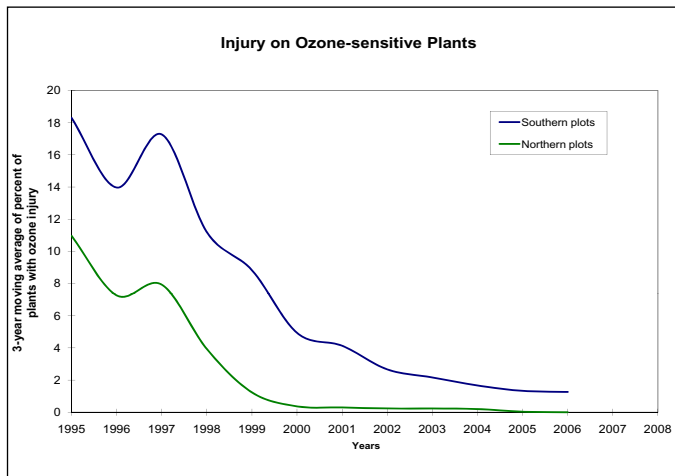
**North American Maple Project** (NAMP) plots across Vermont showed that 95 percent of sugar maple trees monitored were healthy in 2009. This represents better than normal tree health, especially considering major stress events during this decade: the 1999-2001 droughts and the 2003-2006 forest tent caterpillar defoliation. Recovery is shown in the **tree health chart**, where positive values show percent improvement in tree health (crown condition index) above the long-term average. Some areas of the State, especially in the Taconics of southwestern Vermont, had lingering mortality as a result of past forest tent caterpillar defoliation. The NAMP monitoring plots also indicated continuing mortality above normal (1.2 percent mortality of canopy trees).





Vermont cooperates with the U.S. Forest Service to inventory and assess trends in its forest resource through the **Forest Inventory and Analysis** (FIA) program. The current inventory of Vermont was completed in 2008. Updated results are available at <http://fia.fs.fed.us/>, and a comprehensive report is planned for 2010. Additional measurements have been collected on a subset of the FIA plots to make assessments of additional forest ecosystem health measurements. Evaluations of plant injury from ozone exposure have been collected on Vermont plots since 1994. Dramatic reductions in ozone-induced damage have been recorded over this time period. However, monitoring shows continued damage to some sensitive plants, especially in southern Vermont where ozone levels tend to be higher. Descriptions and updates on additional 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, completed a report synthesizing 18 years of ecosystem monitoring. The report, "Vermont's changing forests: key findings on the health of forested ecosystems from the Vermont Monitoring Cooperative," is posted at <http://sal.snr.uvm.edu/vmc/>.



Cover of "Vermont's Changing Forests: Key Findings on the Health of Forested Ecosystems from the Vermont Monitoring Cooperative."



Forest Health Protection  
 USDA Forest Service  
 271 Mast Rd.  
 Durham, NH 03824  
 603.868.7708  
 Web site: [www.na.fs.fed.us](http://www.na.fs.fed.us)



Vermont Department of Forests,  
 Parks and Recreation  
 103 South Main Street - 10 South  
 Waterbury, VT 05671-0601  
 802.241.3606  
 Web site: [www.vtfpr.org](http://www.vtfpr.org)  
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