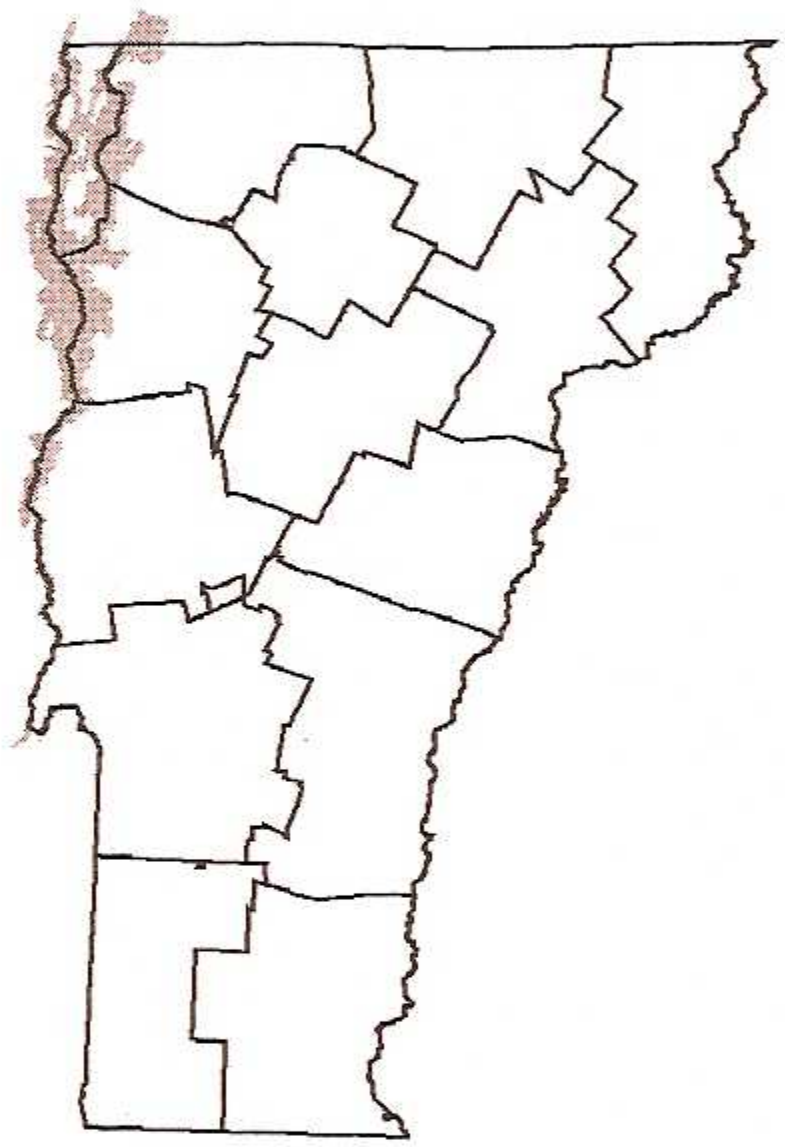
FOREST INSECT AND DISEASE CONDITIONS IN VERMONT 2006



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We gratefully acknowledge the financial and technical support provided by the USDA Forest Service, Northeastern Area State and Private Forestry that enables us to conduct the surveys and publish the results in this report. This report serves as the final report for fulfillment of the Cooperative Lands – Survey and Technical Assistance and Forest Health Monitoring programs.

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Agency of Natural Resources

July 18, 2007

Dear Vermont Forester:

Enclosed is the *2006 Vermont Forest Insect & Disease Conditions Report.* This report is provided to foresters practicing in Vermont to inform them of current pest conditions and to assist in forest management decisions. Produced by the Department of Forests, Parks and Recreation, Division of Forestry, Forest Resource Protection Section, it provides data on 2006 pest problems and recommendations for managing forest and pest interactions.

This report contains maps showing the general location of major pest problems detected in 2006. We have detailed survey maps showing more specific location of reported damage available in our field offices if you care to look at them. All detected and mapped damage sites are now scanned into a state GIS system. This information is provided for your use in developing forest management plans or carrying out silviculture operations. This information may influence the use value appraisal program forest management plans. A copy of this report will also be posted on the Department of Forests, Parks and Recreation's website at: http://www.vtfpr.org/protection/publications.cfm

The most significant forest health event during 2006 was the continued outbreak of Forest Tent Caterpillar, with 342,802 acres of defoliation mapped by aerial survey compared to 229,711 acres in 2005. Other forest health conditions of concern is the continued decline and mortality of upper elevation paper birch, rising populations of Saddled Prominent in the NE Kingdom, and the increasing threat of invasives. Once again, nursery stock infested with Hemlock Woolly Adelgid was introduced into Vermont. Fortunately, all of the introduced nursery stock was found and destroyed. Invasive exotic plants such as bush honeysuckle, buckthorn, and barberry continue to gain a foothold in the understory of Vermont's forests.

In the back of this I&D Conditions Report are separate short reports, *Health of Sugar Maple in Vermont, 2006 and Common Pests of Christmas Trees in Vermont, 2006.* Pest and non-pest diagnostic services are available free of charge from the Forest Biology Lab. All specimens are welcome. If you are not sure of submitting procedures, call Dr. Trish Hanson at 802-241-3606 or email her at trish.hanson@state.vt.us.

The retirement trends continue within the Forest Resource Protection Section with Allan Sands from our Springfield office retiring. Allan had over 35 years of dedicated service. Fortunately, we have been able to re-hire for this position with Jim Esden coming onboard.

We gratefully acknowledge the financial and technical support provided by the USDA Forest Service, Northeastern Area State and Private Forestry that enables us to conduct the surveys and publish the results in these reports.

Sincerely,

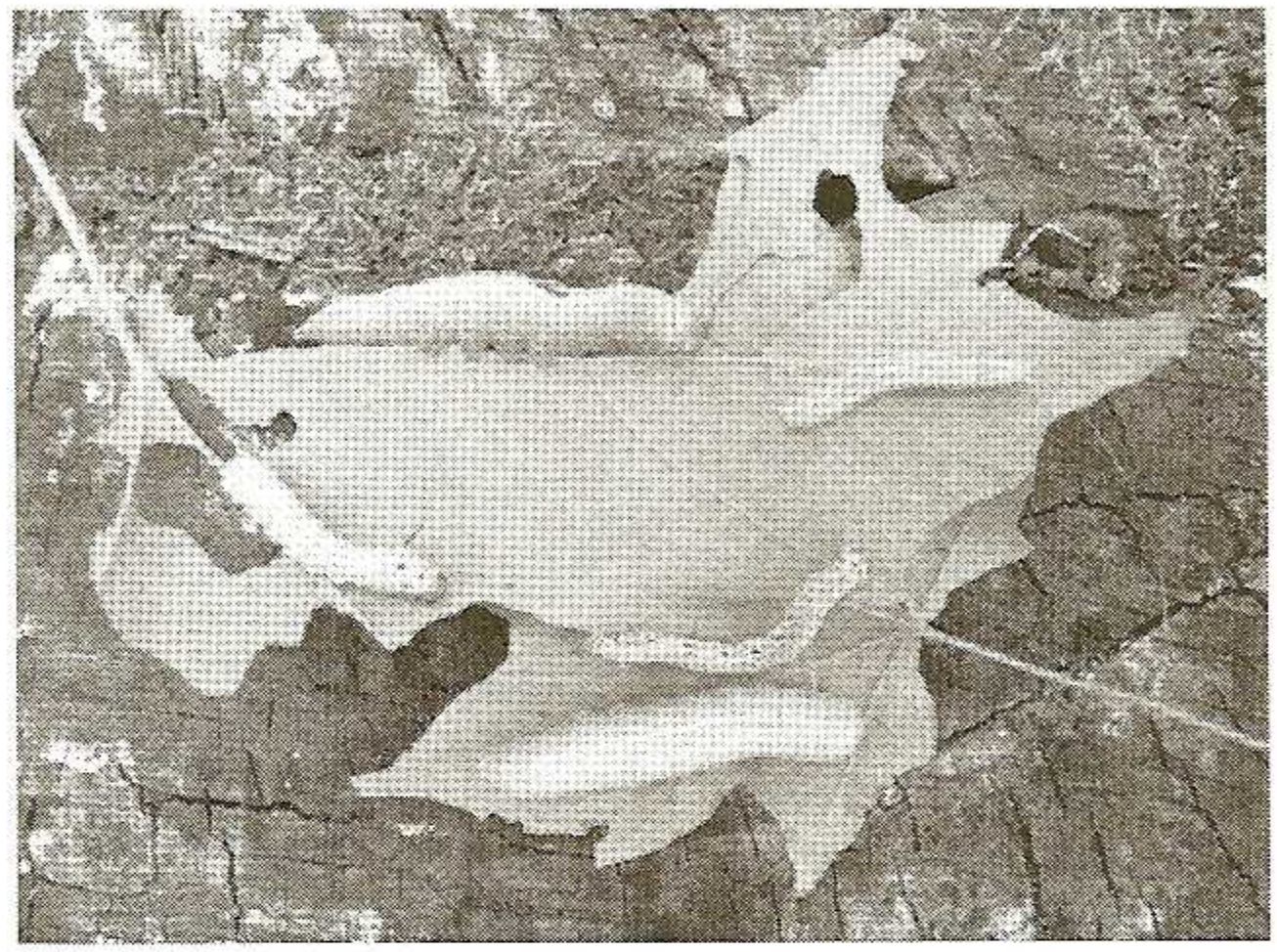
Scott E. Pfister, Ph.D.
Forest Resource Protection Chief

P.S. Additional copies of this publication are available upon request, or you may copy any portion of this material. Pest leaflets are also available.

FORESTS, PARKS & RECREATION
VERMONT

FOREST INSECT AND DISEASE CONDITIONS IN VERMONT

CALENDAR YEAR 2006



**Caterpillars found in a Greensboro Sugarbush on August 1, 2006.
The top two are saddled prominent, center left is green striped mapleworm, lowest center is a white-dotted prominent, not a green fruitworm on steroids; the experts say that the looper (center) is hemlock looper.**

PREPARED BY:

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**AGENCY OF NATURAL RESOURCES
DEPARTMENT OF FORESTS, PARKS & RECREATION**

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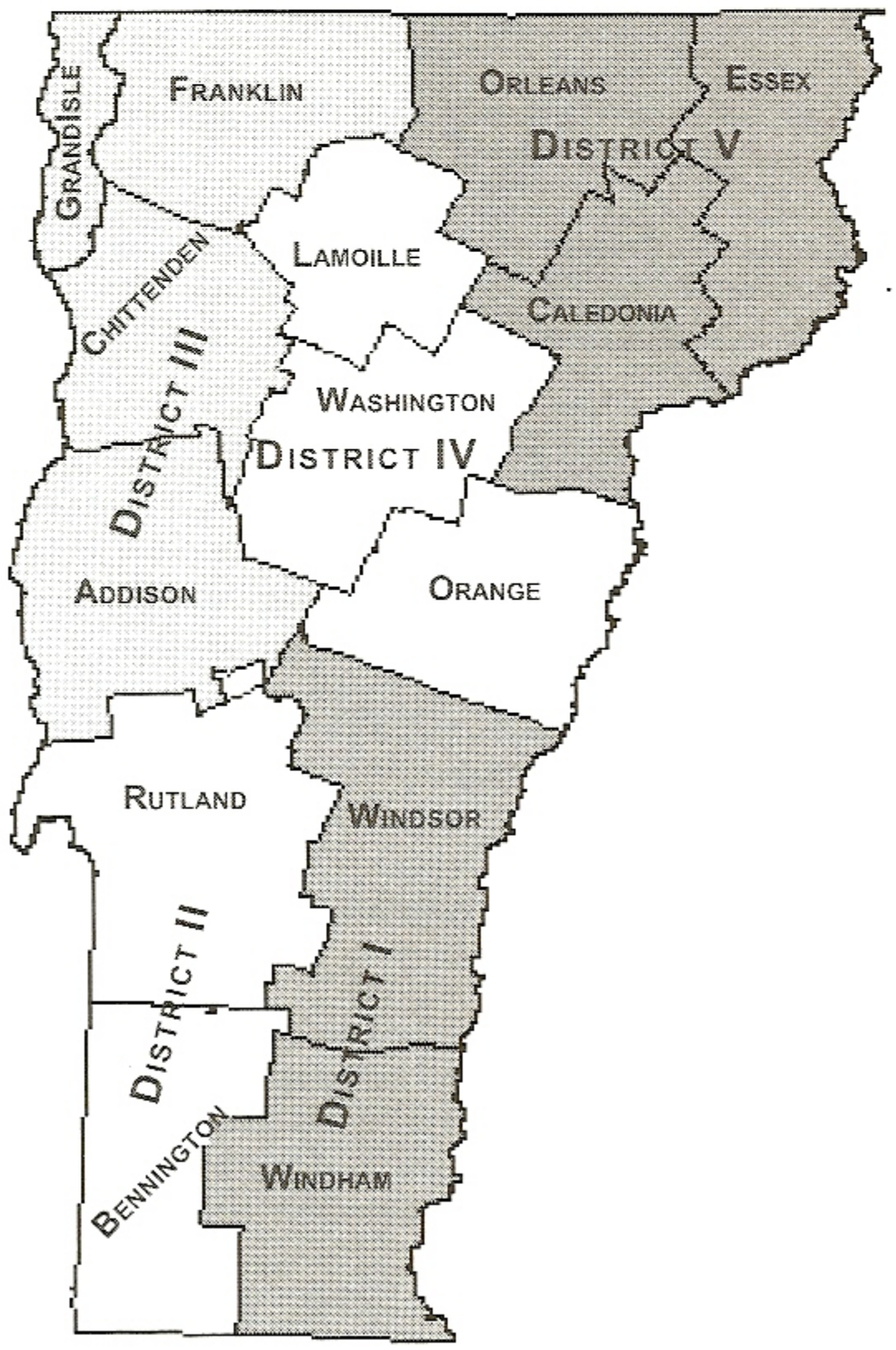

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2006 Vermont Forest Insect and Disease Highlights

Anthracnose and other foliar diseases were unusually abundant this year due to the wet weather. **Maple Anthracnose,** caused by *Discula spp*. and\or *Aureobasidium apocrytum*, became very heavy and noticeable statewide by late in the season.

Balsam Shootboring Sawfly, *Pleroneura brunneicornis*, population levels were up from last year, this being an even year. Damage to balsam and Fraser fir Christmas trees was common at moderate levels on some individual trees. This insect is not expected to be a problem in 2007.

Beech Bark Disease, caused by *Crytococcus fagisuga* and *Nectria coccinea* var. *faginata*, remains noticeable throughout the state and continues to cause above-normal decline and mortality in many locations. Guidelines have been drafted for managing Agency of Natural Resources lands to optimize mast yields in beech mast production areas important to black bear and other wildlife.

Birch Decline and Mortality increased this year especially on paper birch at upper elevations. Decline began showing up after recent drought years, and successive years of defoliation.

Forest Tent Caterpillar, *Malacosoma disstria,* populations increased this year, with 342,802 acres of defoliation mapped by aerial survey compared to 229,711 acres in 2005. Damage increased in the central mountains this year but remained heavy in the valleys and the Taconic range. Populations were so high in many stands that caterpillars defoliated less favored hardwoods, including beech… but not red maple.

Refoliation was spotty in many north-central stands but was more complete than in 2005. No significant dieback has been observed yet in these north-central stands that did not refoliate in 2005.

Gypsy Moth caterpillars were occasionally present in noticeable numbers in oak and maple stands being defoliated by forest tent caterpillar. Gypsy moth caterpillar mortality was also reported, with disease often killing them at young instars. Egg mass counts remain low in focal area monitoring plots. No noticable defoliation is expected in 2007.

Statewide acres mapped as **hardwood decline and mortality** have continued to decrease over the past three years. Although good growing season rainfall may account for some of the improvement, the acreage mapped in 2006 under-represents the area of decline. In most of the state, sketchmapping was done in mid-summer, before decline symptoms develop. Southern Vermont declines were associated with recent forest tent caterpillar defoliation and beech bark disease.

Larch Decline mortality continues in small patches in widely scattered locations, and is particularly noticeable in Essex and Orleans counties. The recent increase in decline is attributed to drought years and subsequent invasion by eastern larch beetle.

There was a decrease in mapped areas of **logging-related decline** this year, although it continues to be evident in widely scattered locations.

Saddled Prominent, *Heterocampa guttivata*, increased noticeably in some areas. Light defoliation of sugar maple and associated hardwoods, sometimes accompanied by sightings of individual larvae and the sounds of frass dropping in mid to late summer, were common throughout much of the northern region. Heavy defoliation was mapped in Essex, Orleans and Caledonia. Other defoliators, especially the greenstriped mapleworm, *Dryocampa rubicunda*, and the hemlock looper, *Lambdina fiscillaria,* were often seen in association with saddled prominent and contributed to the amount of defoliation.

Septoria Leaf Spot of paper birch, caused by *Septoria betulae*, was very heavy and widespread in much of the state this year. Many paper birches were virtually leafless by late summer.

The area of **spruce-fir decline and mortality** decreased dramatically in 2006 as tree health improved following drought and balsam woolly adelgid stress seen in 2003.

Wet Sites - The total mapped area of forest decline due to flooding decreased this year, and ground observations suggest that the mapped area under-represents actual damage.

Wind Damage - Three counties experienced wind events: Caledonia, Bennington and Windham. A September 9th microburst in Hartland and Hartford led to areas of blowdown and areas of scattered broken and wind thrown trees. A February wind storm in Northern Bennington and Southeastern Rutland Counties blew down large white pines in widely scattered locations between Dorset and Londonderry, and conifers in Shrewsbury. And an early December windstorm caused light damage to susceptible species and trees with defects.

VERMONT 2006 FOREST HEALTH MANAGEMENT RECOMMENDATIONS

The following recommendations summarize information of particular importance to forest managers. Additional information can be found in the full report on Forest Insect and Disease Conditions in Vermont 2006, under specific pests mentioned or in separate summaries for sugarbush and Christmas tree managers in the appendix. For assistance in identifying pests, diagnosing forest health problems, on-site evaluations, and insect population sampling, or to obtain copies of defoliation maps, management recommendations, and additional literature, contact forest resource protection personnel or your county forester.

General Tree Condition was good. For the fourth consecutive year, the growing season weather was favorable. The season was also unusually long, with winter conditions disappearing early in the spring, and mild weather through the fall. It *was* wet, leading to foliar diseases on many species. Even so, many infected leaves seemed to tolerate the fungi, and remained green well into August.

The extent of **Sugar Maple and other Hardwood** defoliation by forest tent caterpillar increased in 2006, and expanded into the central mountains. Meanwhile, the impacts of lecanium scale remain noticeable statewide, and saddled prominent caused some heavy defoliation in the northeastern counties.

Statewide, lecanium scale populations declined dramatically, although there was heavy feeding in scattered hardwood stands. Overstory trees are recovering in most areas where dieback in 2005 was attributed to scale. However, there is substantial dieback of sugar maple regeneration in some stands. Seedlings and saplings may appear dead, with no live shoots in 2006. However, some with healthy root systems are sprouting from the stem or roots. You should suspect that dieback of sugar maple regeneration is from scale if the 2005 shoots are covered with sooty mold, if 2005 shoots of ash regeneration are stunted, and most beech shoots are healthy.

In southern, central and western Vermont, where forest tent caterpillar populations have been high, there were so many caterpillars in 2006 that they ate less favored species like beech and birch… although they still avoided red maple. In addition to feeding on foliage, they fed on developing sugar maple samaras. If logging has been scheduled to coincide with the bumper seed crop of 2006, check in the spring, when these seeds should be sprouting, to make sure germination is adequate.

Over 340,000 acres of defoliation were mapped in 2006, with 100,000 acres now defoliated at least twice, and 10,000 defoliated three years in a row. Decline and mortality are occurring, often in stands which have been recently thinned, or on ridges, dryer slopes or wet areas. Scattered mortality has also been observed in unthinned stands on good sites; the occasional dying tree may be one that the caterpillars defoliated early and more often compared to its neighbors.

Although defoliated trees are expected to recover, further stresses could tip the balance against them. Our recommendation is to avoid additional disturbances to allow for future stresses that we can neither predict nor control. Drought, in particular, can be a killer, if it comes on the heals of defoliation. Sales should be postponed where there has been moderate or heavy defoliation. Wait two or three years to see which trees remain healthiest, amending UVA plans if necessary. It's best to mark sales of recently defoliated stands during the growing season, so crown condition can be rated.

Shoestring root rot (*Armillaria*) is clearly a factor in some stands with high mortality. Look for clumps of mushrooms near the root collar in the fall, and sunken or oozing bark. Sometimes these are evident before crown symptoms appear, and help in identifying trees that are likely to die.

Maples growing on less-forgiving acidic sites are known to be more vulnerable following defoliation. Recently completed research by the US Forest Service confirms that relationships observed in Pennsylvania between nutrition and health are also applicable to northern New England. Specifically, sugar maples are more likely to be declining on sites with low levels of magnesium and calcium. Maples on these sites are more sensitive to thinning and other disturbances that occur before they have a chance to recover from defoliation.

Although moth catches remained high last summer, egg mass surveys suggest that the outbreak is winding down. Even where defoliation is predicted, we are not encouraging aerial spraying outside of sugarbushes. Widespread spraying of large forestland blocks can actually prolong outbreaks.

In northeastern Vermont, and other areas not defoliated by forest tent caterpillar, look for defoliation by saddled prominent, which was mapped on 1,340 acres on Essex, Orleans and Caledonia Counties. The caterpillars may be high in the trees, so look for fragments of sugar maple and beech leaves on the forest floor to detect early feeding. This insect causes defoliation later in the season than forest tent caterpillar, with damage peaking in late July or early August. There was some heavy sugar maple dieback and mortality following Vermont's last outbreak. Management considerations in defoliated stands are the same as for stands defoliated by forest tent caterpillar.

Dieback and mortality continues from **Beech** bark disease. Guidelines have been drafted by the Agency of Natural Resources to optimize mast yields in beech mast production areas on Agency lands. These guidelines still need field testing, but are available for use on private lands for those who may be interested. With the recent spike in the disease, it's a good time to select clean-stemmed, healthy crowned beech for retention.

Septoria leaf spot caused foliage browning of **Birch** statewide. Meanwhile paper birch decline from recent drought, ice damage, and defoliation continued at upper elevations. It's especially important at this time to pay attention to the health of birch during stand inventories, to evaluate the desirability of salvage in declining stands, and to evaluate trees for hazard in locations where there's a lot of human activity.

The pine shoot beetle quarantine area has changed again. **Pine** logs, bark, and unprocessed bark mulch may currently be moved freely within a large region including Vermont, New Hampshire and southern New England. However, there are restrictions on movement to parts of New York, Maine, Quebec, and other areas. Quarantine details can be found at www.vtfpr.org/protection/for_protect_forhealth.cfm.

Although no European wood wasp has been found in Vermont pine stands, it has been trapped in 27 counties in New York and two in Pennsylvania, as well as in Ontario. Quarantine restrictions for this pest are in development, and will affect movement of pine materials.

Expect a decline in health of **White Pine** on wetter sites. Because the recent growing seasons have been wet, these sites are likely to have been saturated, causing root mortality. In addition, many pines on these sites with high humidity and poor air drainage lost all of their previous-year's needles in 2006 because of brown spot needle blight.

Hemlock remains threatened by hemlock woolly adelgid, with warm winters increasing its chance of establishment in Vermont. Nonetheless, we discourage pre-infestation salvage of hemlock. By Vermont quarantine, hemlock nursery stock from infested counties may not be brought into the state. Hemlock logs, lumber with bark, and chips are admissible only to sites with a compliance agreement.

Although there were no major new problems in **Spruce, Balsam Fir or Eastern Larch,** mortality continued in existing decline areas from a complex of stressors, including past insect damage and drought stress. With root rots and bark beetles established in those sites, harvesting activities should be done in large groups, patch clearcuts, or other non-selective methods.

Sites should be inspected for **Invasive Exotic Plants** wherever management activities are planned. It may be worthwhile to eradicate isolated plants from a stand so they do not become widespread following disturbance, or to control a more significant invasion when a regeneration cut is being planned. You must be a certified pesticide applicator through the Vermont Agency of Agriculture to apply herbicide on any land you do not own.

INTRODUCTION

The information in this report is based largely on aerial surveys to detect forest damage, as well as ground surveys and observations of Vermont Forestry Division staff.

A statewide aerial survey was flown between July 5 and July 24 in district 1,2,3 and 4 to target the early defoliators. District 5 was surveyed between August and September 11 to target late season defoliators and general forest condition. Part of the survey was conducted using the digital sketchmapping tool developed by the US Forest Service.

ACKNOWLEDGEMENTS

Thanks to the many individuals who contributed to this report, including Mary Burnham, Dan Dillner, Jim Esden, Tess Greaves, Ellen Hinman, Jay Lackey, Lars Lund, Hollis Prior (retired), Pete Reed (retired), Allan Sands (retired), and Tom Simmons from our Forest Resource Protection staff. Assistance in conducting aerial detection surveys, ground checks and other information was provided by members of our Forest Management staff including Louis Bushey, Jeremy Goetz, Richard Greenwood, Aaron Hurst, Mike Johnson, Matt Leonard, Eric Hansen, Sam Schneski, Tony Smith and Dave Wilcox. Diagnostic and pest management assistance were provided by Vladimir Gouli, Ross Bell (retired), Scott Costa and from the University of Vermont; Jon Turmel, Emilie Inoue, Tim Schmalz, Matt Wood, and Cary Giguere from the Vermont Agency of Agriculture; Kyle Lombard from New Hampshire's Division of Forests and Lands; Charlene Donahue and Dick Dearborn (retired) from the Maine Forest Service; Chuck Lubelczyk from Maine Medical Center Research Institute, Vector-borne Disease Laboratory; Charlie Burnham and Ken Gooch from the Massachusetts Division of Forests and Parks; Georgette Smith from Natural Resources Canada; Joe Elkinton from the University of Massachusetts; Dylan Perry and Doug Allen (retired) from SUNY College of Environmental Science and Forestry; Dennis Souto and Margaret Miller-Weeks from the USDA Forest Service. Assistance in conducting aerial surveys and processing map data was provided by Bill Frament and Tom Luther from the US Forest Service, Forest Health Protection.

We gratefully acknowledge the financial and technical support provided by the USDA Forest Service, Northeastern Area State & Private Forestry that enables us to conduct the surveys and publish the results in this report.

Finally, this document about current forest health, and the diagnostic and survey work required to produce it, would not be possible without support from the State of Vermont and from citizens who find the information useful.

WEATHER AND PHENOLOGY

2006 weather statistics based on Burlington data are summarized in Figure 1. All temperature and precipitation in the narrative below are from our Essex weather station unless otherwise noted.

Fall 2005

The leaves stayed on the trees very late last fall—well into November in some valley locations. On November 21st, Lake Champlain set a record high level for the month at 98.98'. Rain changed to snow the next day, leaving 5.6" at Essex. Cold air behind the storm dropped the thermometer to 19°F overnight and down to 10°F the next night. The snow didn't stay very long, however, as record warmth arrived on the 29th—70°F and very windy! Early December was mostly dry and cold. Several storms tracked to the south of Vermont; only the continental air masses with low moisture content hit the state. A series of light snows with steady cold temperatures managed to build up a continuous snow cover. The lowest temperature recorded for the entire winter occurred on the morning of December 14th—minus 10°F!

Winter 2005-2006

After mid-December, the weather patterns became "zonal" (west to east)…blocking the arctic air and bringing above normal temperatures and only light precipitation. On January 13th, a major thaw finished off the snow cover, and set the stage for a heavy rain on the 18th. With temperatures in the mid-40's and 1.60" of rain, flooding was common all around the Champlain Valley. Runoff in the ditches along the back roads overflowed and washed out the road surfaces in many locations. Lake Champlain again began to rise over 99', and again set new records for the month of January. The rest of the winter continued relatively mild, with only light precipitation and minimal snow cover.

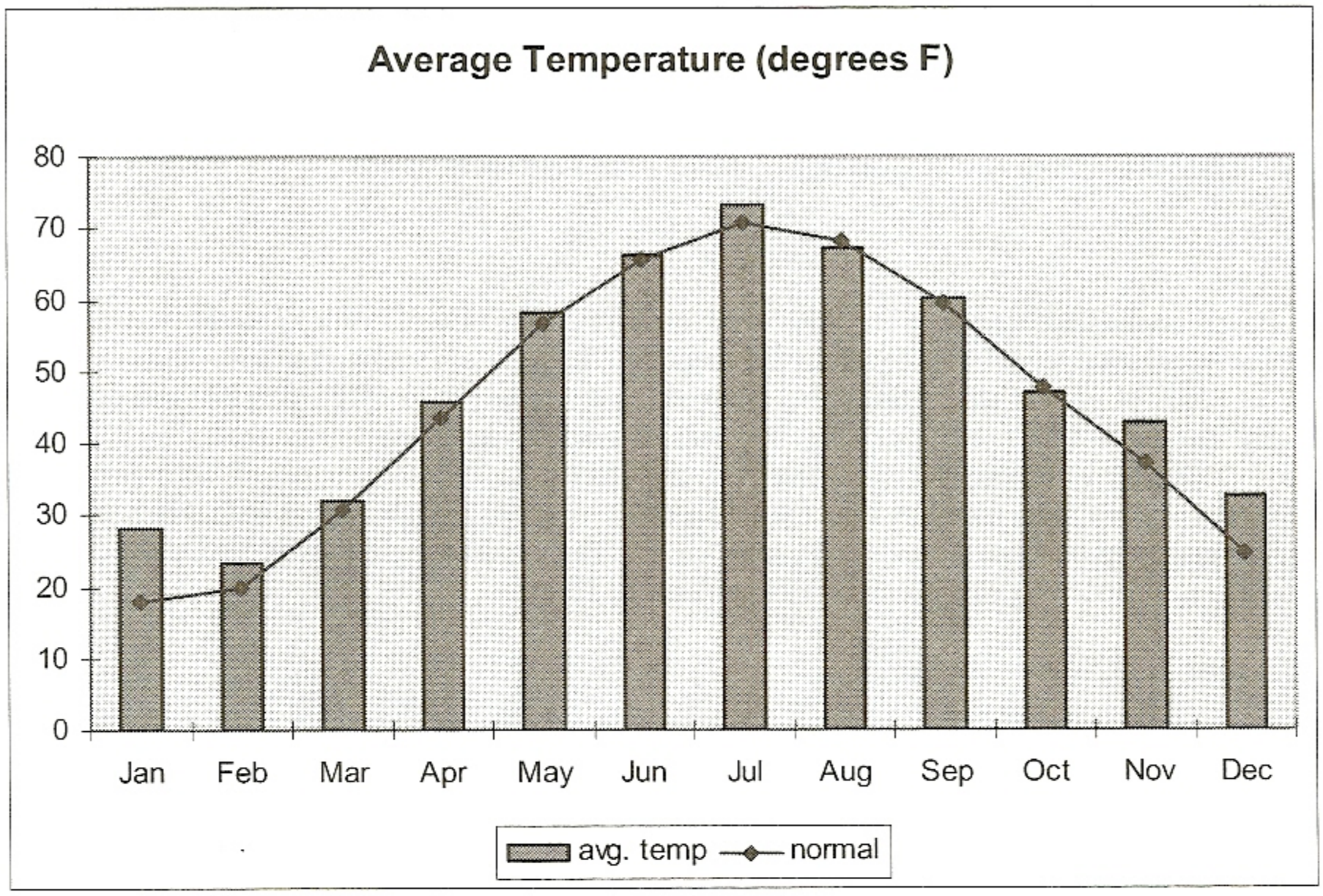
Finally, a decent snowfall—March 3rd! The weather prediction was for a trace to 3" in the valley and maybe 5"-7" on the western slopes of the Green Mountains. Essex weather station recorded 15.5", and reports of nearly 2' fell in the higher terrain. Snow amounts were very spotty. Wildly varying amounts were reported. This snow was very, very light and fluffy—only 0.35" of water content for over 15" of snow…about 1/5 of the "normal" proportion. It was essentially gone a week later. Bare ground showed through everywhere in the valley setting up the conditions for an early fire season. Environment Canada reported that the winter months (Dec-Feb.) were the warmest since records were kept for Canada as a whole.

March was dry and relatively warm. The sugaring season was described by many as "unusual"—bare ground, dry trees and syrup made in January! The season was not a disaster (some producers had very good production with good flavor), but it was characterized by frustrating fits and starts through February and early March. Then, a full-bore sprint in late March capped the season for most sugarmakers. Once again, the key to a successful season was the vacuum system—avoiding the mid-season shut down that many non-vacuum producers experienced.

Spring 2006

A steady rain changing to wet snow on April 4th dropped the fire danger for awhile, but it wasn't long before we were right back into a dry, warm spell with low humidity and steady wind. For fifteen days in the middle of April, only 0.15" of rain fell at the Essex station. Temperatures were in the 60's and even the low 70's for a time. By April 19th, red flag warnings were being issued in some localities—namely, southern Vermont and eastern New York State. This weather slowed the green-up and prolonged the worries over outdoor burning. Relief finally came on the afternoon of April 22nd, when over one and a half inches of steady rain fell over the next day and a half. Fire dangers dropped, the fields greened-up, and the leaves on the trees expanded.

The first two weeks of May started off with very pleasant weather—light precipitation and mild temperatures. However, a rainy spell began on May 12th that was to make this the wettest May on record at the Burlington weather station. It began twelve consecutive days of measurable rain totaling over 6". Even when it



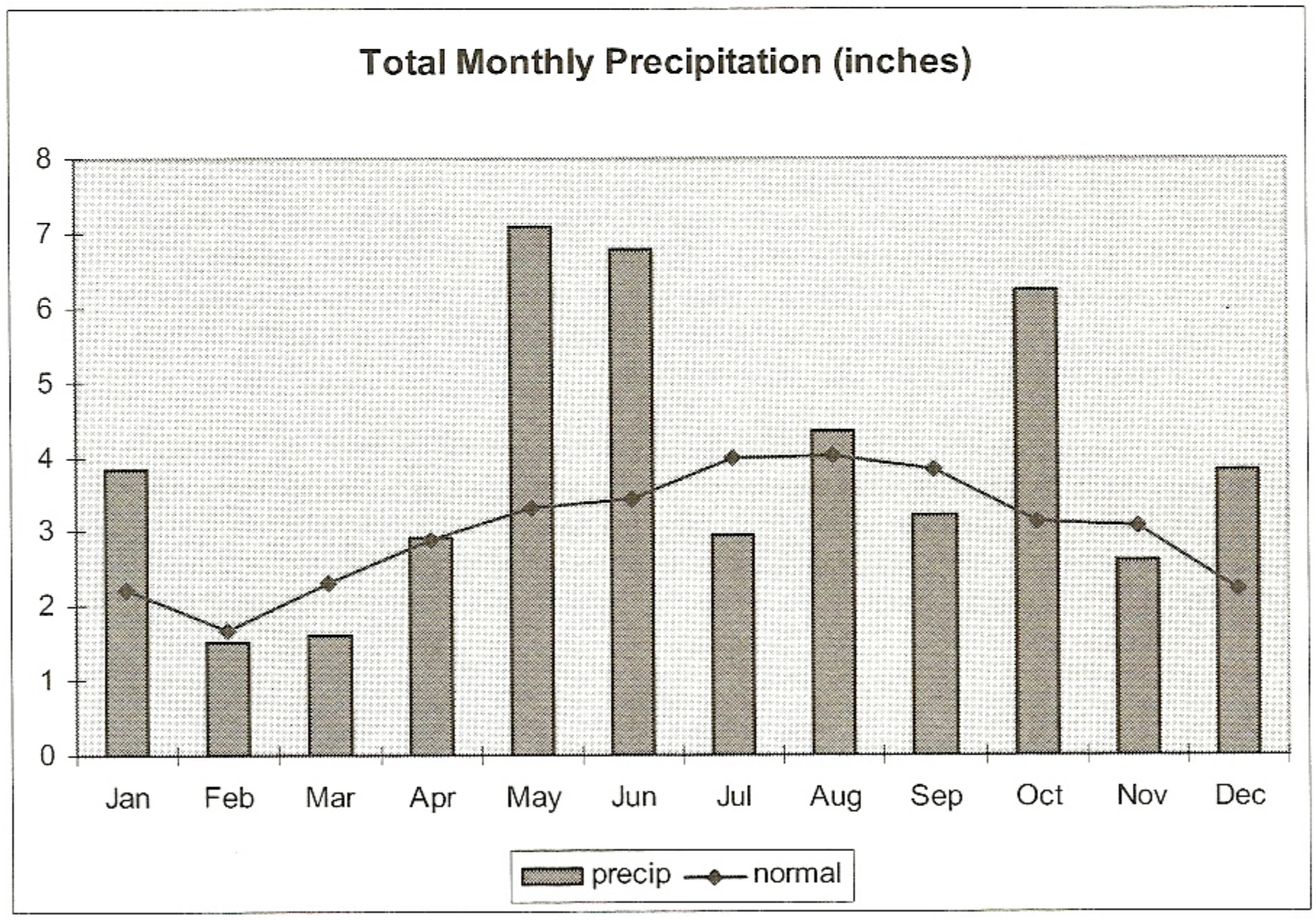


Figure 1. Monthly average temperature and monthly total precipitation in 2006, compared to normal, for Burlington, Vermont. 2006 ended as the third wettest year on record with 47 inches. Only 1983 and 1998 were wetter, both recording more than 50 inches. Normals are for years 1971-2000.

wasn't raining, it was cloudy and dreary. During eight of those days, Burlington received only 4 out of a possible 116 hours of sunshine. The whole northeast was affected; this was the worst rain and flooding in over 70 years for northern Massachusetts, New Hampshire and Maine. Somehow, throughout this period, the Protection Section of FPR managed to conduct an aerial spray project for forest tent caterpillars over much of the state.

Memorial Day weekend was very warm with high dew points and rain—tropical conditions for Vermont. Many trees and shrubs had heavy flowering last spring-- sugar maple, beech, yellow birch, red and silver maple, hop hornbeam, thornless honey locust, choke cherries, alternate-leaved dogwood, nannyberry, and the pine pollen was everywhere. This abundance of flowering translated into good seed crops for most of these species with the exception of apples. The timing of the rains adversely affected the pollination of the apple crop in the Champlain Valley (hurting quantity, but not quality). Weekly spring cumulative growing degree days appear in Figures 2 and 3. Sugar maple phenology observations are summarized in Figures 4 and 5 and Table 1.

Summer 2006

In general, the summer was hot and humid (13% more growing degree days than average). However, there were relatively few 90° plus days (6 total), but there were plenty of the 85° plus days with dew points in the 60's and lower 70's. The highest temperature of the summer was recorded on August 1st (94°F). Those high humidity days and the evenly spaced rain events provided the perfect conditions for leaf diseases to flourish. Anthracnose, tar spots, phyllosticta leaf spot, septoria—all were common and widespread. After the soggy months of May and June, rainfall was average or above average for the rest of the growing season (Figure 6). Those early rains caused considerable damage to farm crops from flooding and from late plantings. If you were able to avoid these problems, the summer offered good growing conditions for most crops. The blueberry crop was the best ever according to comments made by local commercial growers. According to the Northeast Regional Climate Center, this was the third wettest summer on record for the state.

Fall 2006

The fall foliage season got off to an early start with splashes of color showing up all over the region (Figure 7). The high elevation birches, especially, seemed early. A lot of this color, unfortunately, could be attributed to the many leaf problems that plagued the trees all summer. A couple of good frosts in mid-September helped bring the colors out. Overall, the foliage season started somewhat early, did not achieve an overwhelming peak, and then fell quickly. The high elevation leaves were down before the lower elevations turned, giving a muted effect to the panoramic views. As always, however, there were plenty of spectacular local views to be had by anyone seeking their autumn dose of natural beauty.

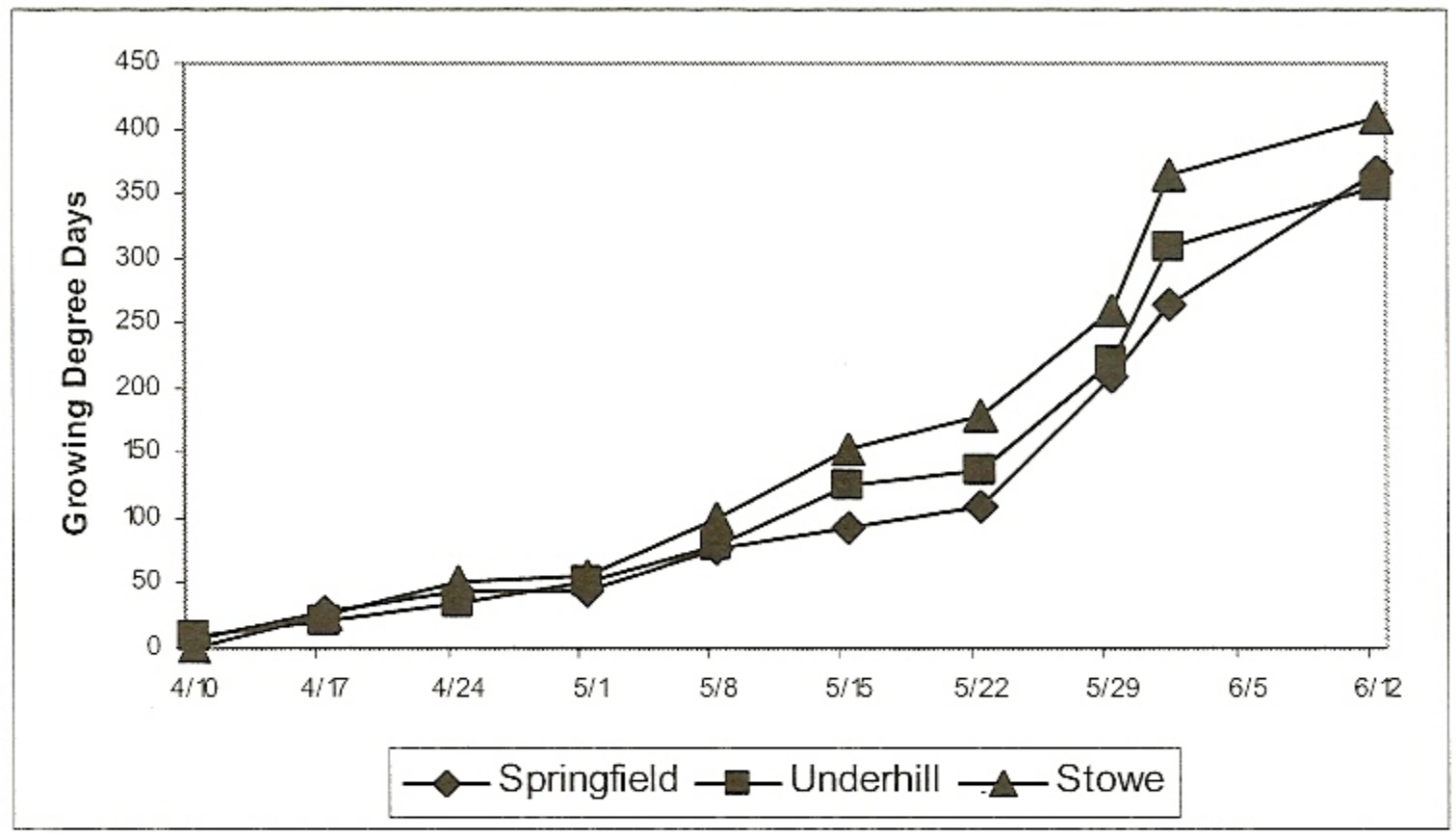


Figure 2. 2006 weekly spring cumulative growing degree days for Springfield, Underhill, and Stowe, Vermont. 50°F is used as the threshold of development.

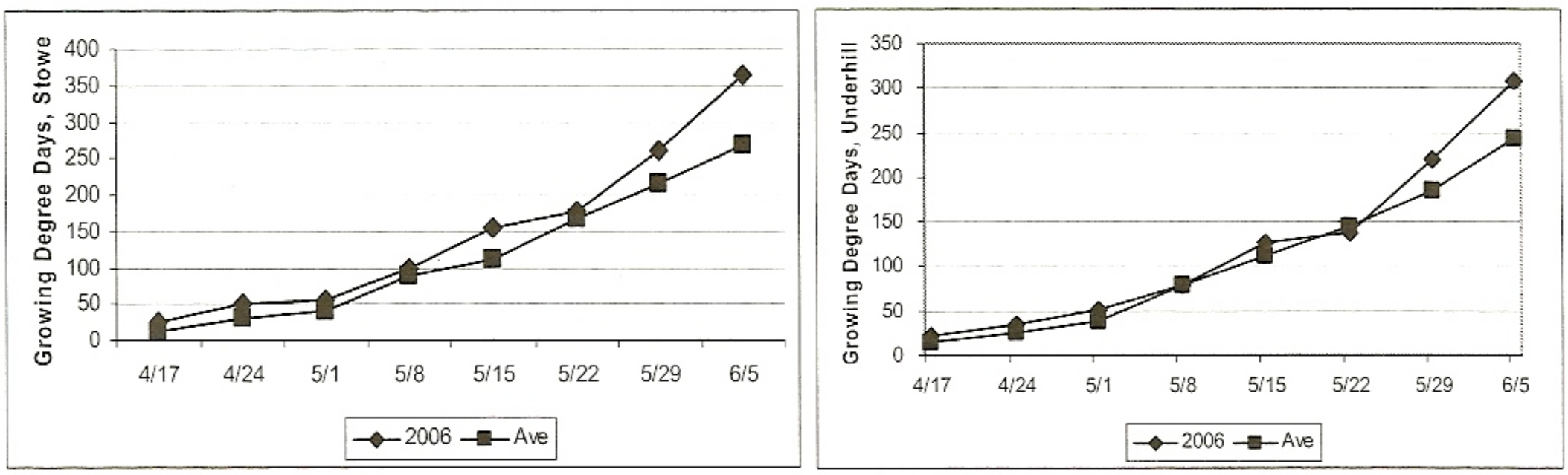


Figure 3. Weekly spring cumulative growing degree days for Stowe and Underhill, Vermont, in 2006 compared with mean 1993-2006 accumulations. 50°F is used as the threshold of development.

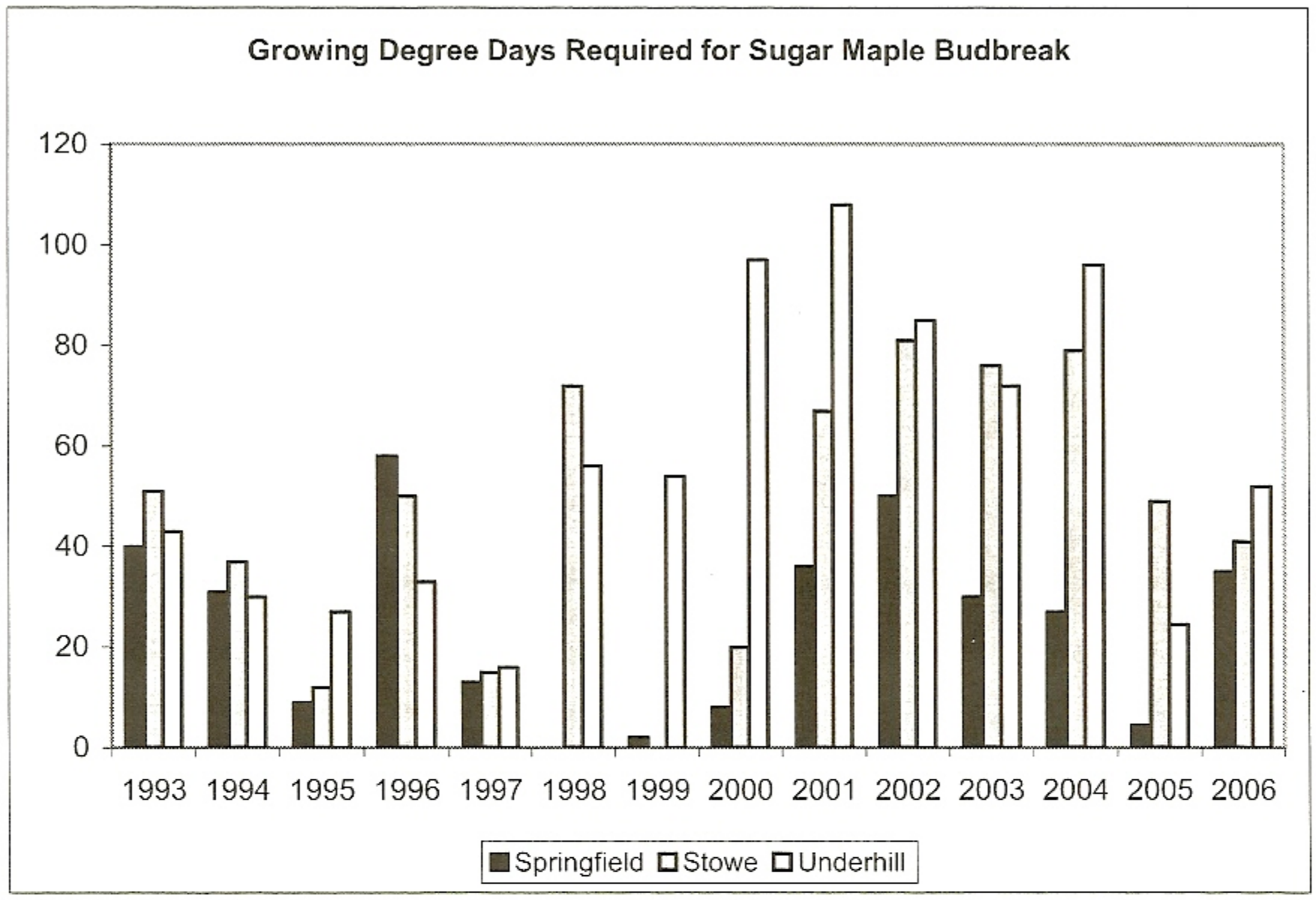


Figure 4. Growing degree days for sugar maple budbreak in Springfield, Stowe and Underhill 1993-2006.

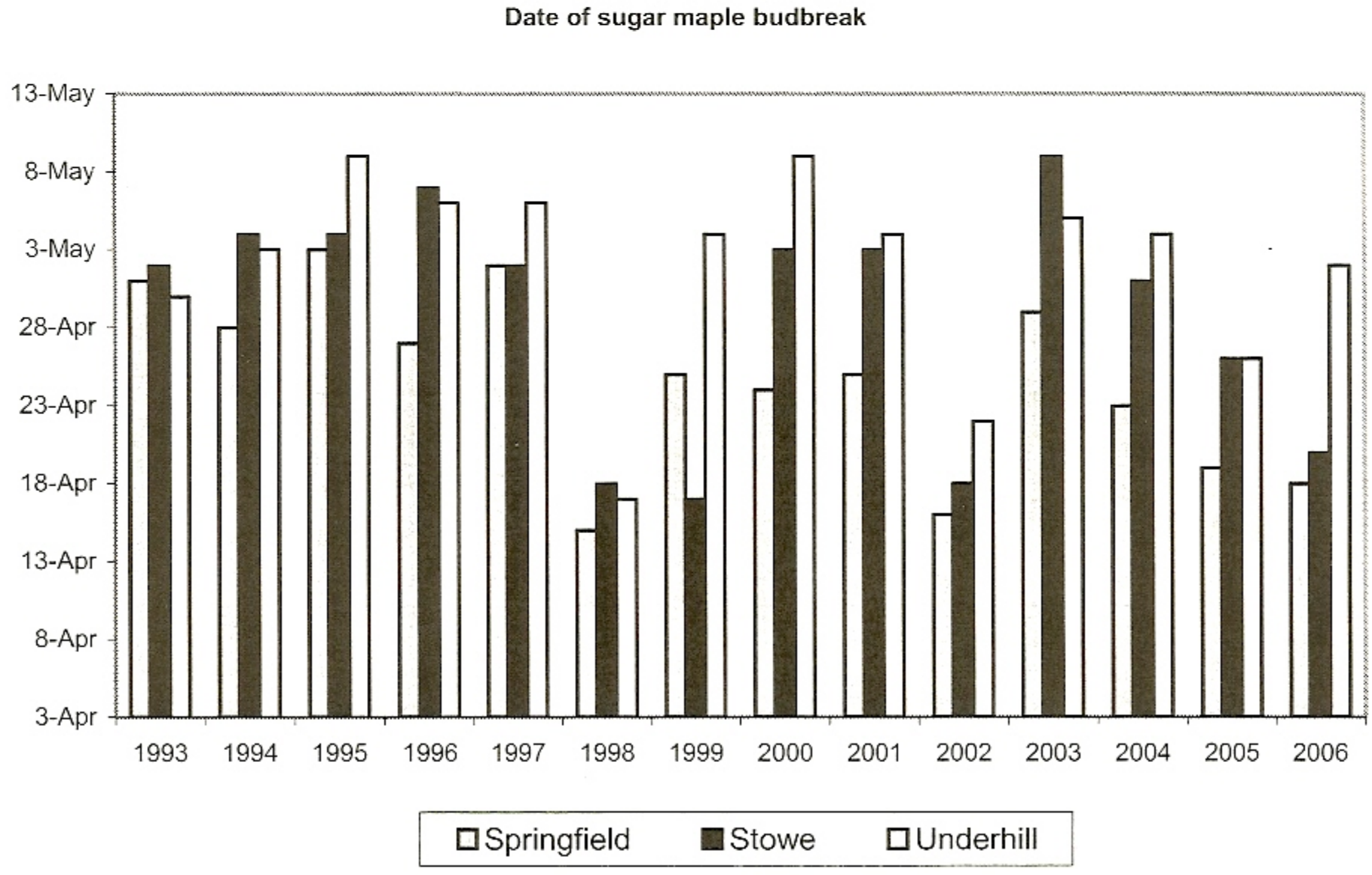


Figure 5. Dates of sugar maple budbreak in Springfield, Underhill and Stowe, Vermont, 1993-2006.

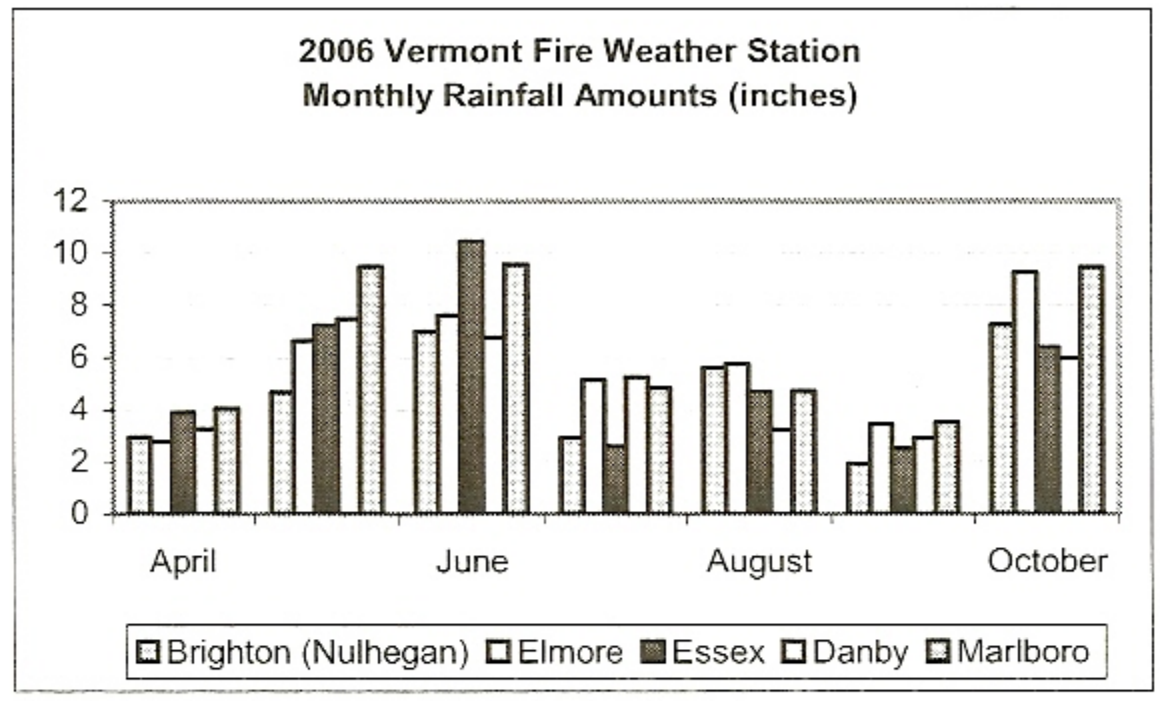
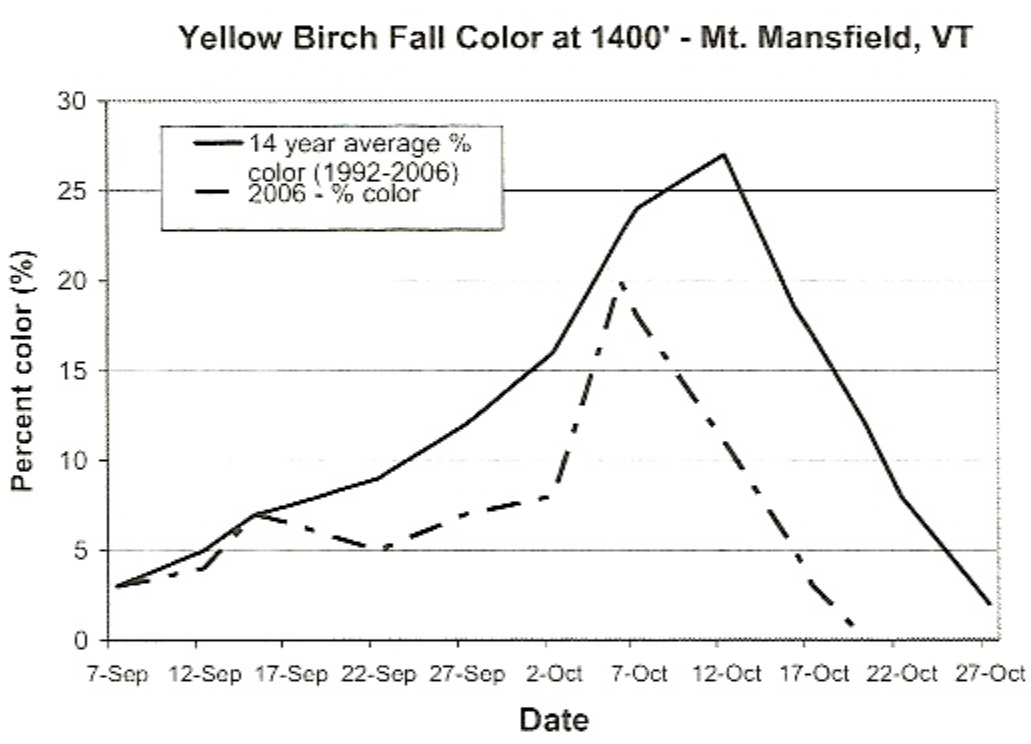
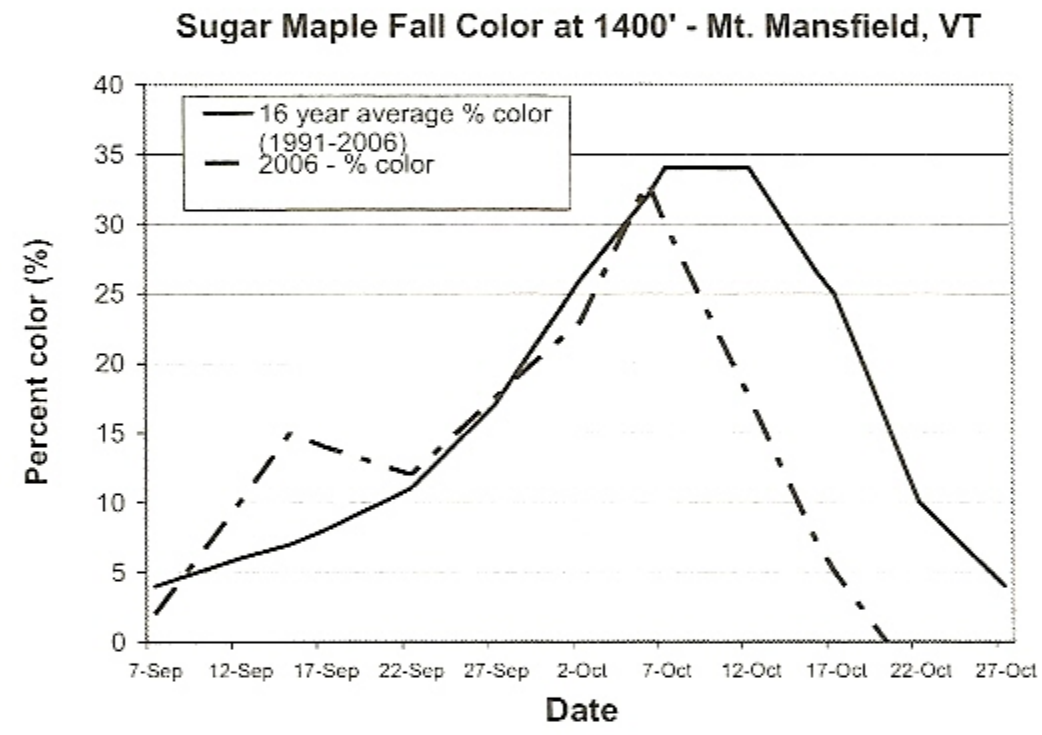
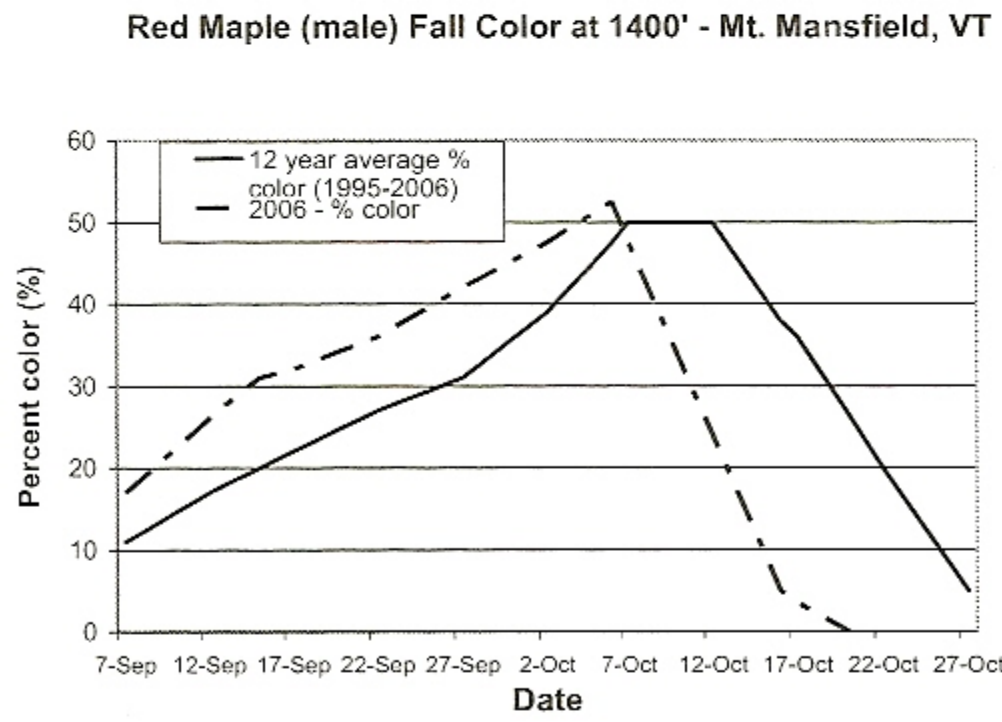


Figure 6: Monthly rainfall amounts (in inches) at Vermont fire weather observation stations through fire season, April - October, 2006.







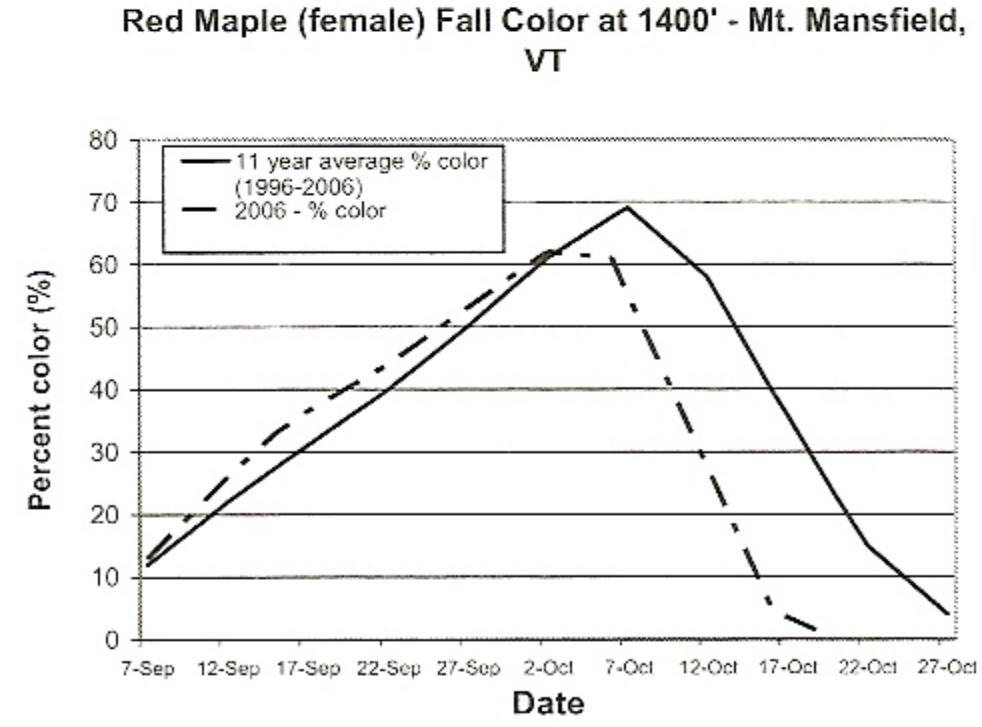


Figure 7. Progression of fall color for Yellow Birch, Sugar Maple and Red Maple at 425M at Mt. Mansfield Vermont.

Table 1. 2006 First observation dates of phenological development and growing degree day accumulation from 3 sites in Vermont. 50°F is used as the threshold of development.

Biological Indicator	Springfield	Stowe	Underhill
PLANT DEVELOPMENT			
Showing Green			
Fir, Balsam		5/8 (100)	
Budbreak			
Apple, MacIntosh		4/19 (33)	
Ash, White		5/5 (89)	5/15 (126)
Cherry, Black	4/14 (22)		
Fir, Balsam		5/9 (108)	5/15 (126)
Maple, Red	4/17 (28)		
Maple, Sugar	4/18 (35)	4/20 (41)	5/2 (52)
Oak, Red	4/29 (45)		
Flowers			
Apple, Dolgo Crab		5/10 (115)	
Aspen, Quaking	4/3 (6)		
Crocus	4/3 (6)		
Dandelion	4/14 (22)		
Elm, American	4/10 (6)		
Honeysuckle, Tartarian		5/23 (178)	
Lilac (first flowers)		5/20 (178)	5/25 (155)
Lilac (full bloom)			
Maple, Red	4/13 (13)	4/12 (7)	4/17 (22)
Maple, Silver			
Maple, Sugar		4/25 (53)	
Plum, Canada		5/6 (94)	
Shadbush		5/4 (78)	5/11 (109)
INSECT DEVELOPMENT			
Balsam shootboring sawfly laying eggs		5/4 (78)	
Forest tent caterpillar (egg hatch)	4/15 (22)		
Pear thrips (first adults)			9 (4/10)
OTHER OBSERVATIONS			
Spring peepers calling		4/10 (0)	
Full Green up	6/7 (317)		

HARDWOOD DEFOLIATORS

Bruce Spanworm

Bruce Spanworm, *Operophtera bruceata,* caused no noticeable defoliation in Vermont in 2006. However, under the direction of Joe Elkinton at the University of Massachusetts, we participated in regional pheromone trap surveys for a related species, the winter moth, *Operophtera brumata*, an invasive from Europe that has been defoliating deciduous trees in eastern Massachusetts for the past several years. The winter moth pheromone is also attractive to the native Bruce spanworm, so traps baited with the pheromone will capture both species.

Traps to collect *Operophtera* spp. were deployed in ten sites in Vermont (Table 2). Trappers noted that the lure was very attractive to this insect; many moths could be found downwind of the trap soon after placement. Moths captured in the traps were sent to researchers at UMass where DNA analysis could be used to differentiate between winter moth and Bruce spanworm and to determine if the two species have hybridized. None of the moths trapped were winter moth.

Table 2. Summary of site and collection data for 2006 Vermont survey for *Operophtera* spp. Data include counties, towns, sites, GPS coordinates, trapping dates, and numbers of moths collected during the survey.

County	Town	GPS Points – (NAD83)		Trapping Period	# of Moths Collected
Bennington	Shaftsbury	43.01267	73.16066	11/20 - 12/5	72
Chittenden	Colchester	44.54940	73.26110	11/15 - 11/27	5
Franklin	Sheldon	44.86356	72.87222	11/15 - 11/30	47
Lamoille	Hyde Park	44.58300	72.57835	11/15 - 11/30	28
Rutland	Killington	43.67453	72.81088	11/20 - 12/5	15
Washington	Cabot	44.41787	72.32875	11/15 - 11/30	27
Windham	Brattleboro	42.82057	72.56300	11/17 -12/8	109
Windham	Halifax	42.81688	72.68621	11/17 - 12/8	70
Windham	Wilmington	42.85306	72.82194	11/17 - 12/8	6
Windsor	Springfield	43.27406	72.53193	11/17 -12/8	58

Forest Tent Caterpillar

Forest Tent Caterpillar, *Malacosoma disstria,* populations increased this year, with 342,802 acres of defoliation mapped by aerial survey compared to 229,711 acres in 2005 (Table 3 and Figure 8). Damage increased in the central mountains this year but remained heavy in the valleys and the Taconic range. Populations were so high in many stands that caterpillars defoliated less favored hardwoods, including beech… but not red maple.

In addition to feeding on foliage, caterpillars fed on developing sugar maple samaras. Many seeds failed to develop, and hollow samaras fell prematurely. Others continued to mature, but with incomplete wings. Seeds without wings may be viable; the impact of defoliation on the bumper seed crop is unknown.

Refoliation was spotty in many north-central stands but was more complete than in 2005. No significant dieback has been observed yet in these north-central stands that did not refoliate in 2005.

Table 3. Mapped acres of damage by forest tent caterpillar in 2006.

County	Acres
Addison	7,160
Bennington	36,384
Caledonia	418
Chittenden	5,176
Franklin	326
Lamoille	1,049
Orange	16,478
Orleans	1,862
Rutland	82,181
Washington	14,730
Windham	59,563
Windsor	117,475
Statewide	**342,802**

Statewide, 209 sugarbushes were surveyed for egg masses during winter 2005-2006. Defoliation was predicted in two-thirds of these sugarbushes (Table 4).

Table 4. Results of forest tent caterpillar egg mass surveys in Vermont in 2006.

County	Average # New Egg Masses/10 Branches	New Egg Masses as a % of Total Egg Masses	Number of Sugarbushes Surveyed	% of Sugarbushes where Defoliation was Predicted
Addison	2.6	71%	28	39%
Bennington	7.7	80%	27	96%
Chittenden	5.7	86%	3	100%
Franklin	0.4	14%	5	0%
Lamoille	0.1	13%	7	0%
Orange	0.9	49%	14	21%
Rutland	6.4	69%	46	89%
Washington	0.4	68%	2	0%
Windham	3.5	75%	22	55%
Windsor	4.6	69%	55	76%
Statewide	3.2	59%	209	66%

Throughout the outbreak area, large numbers of caterpillars died in late instars from disease. Wet conditions and high caterpillar populations were ideal for spreading fungal and viral pathogens. The entomopathogenic fungus, *Furia gastropachae*, was identified by Vladimir Gouli on cadavers sent to the University of Vermont. However, many caterpillars did survive to pupation. Although large numbers of friendly flies were observed

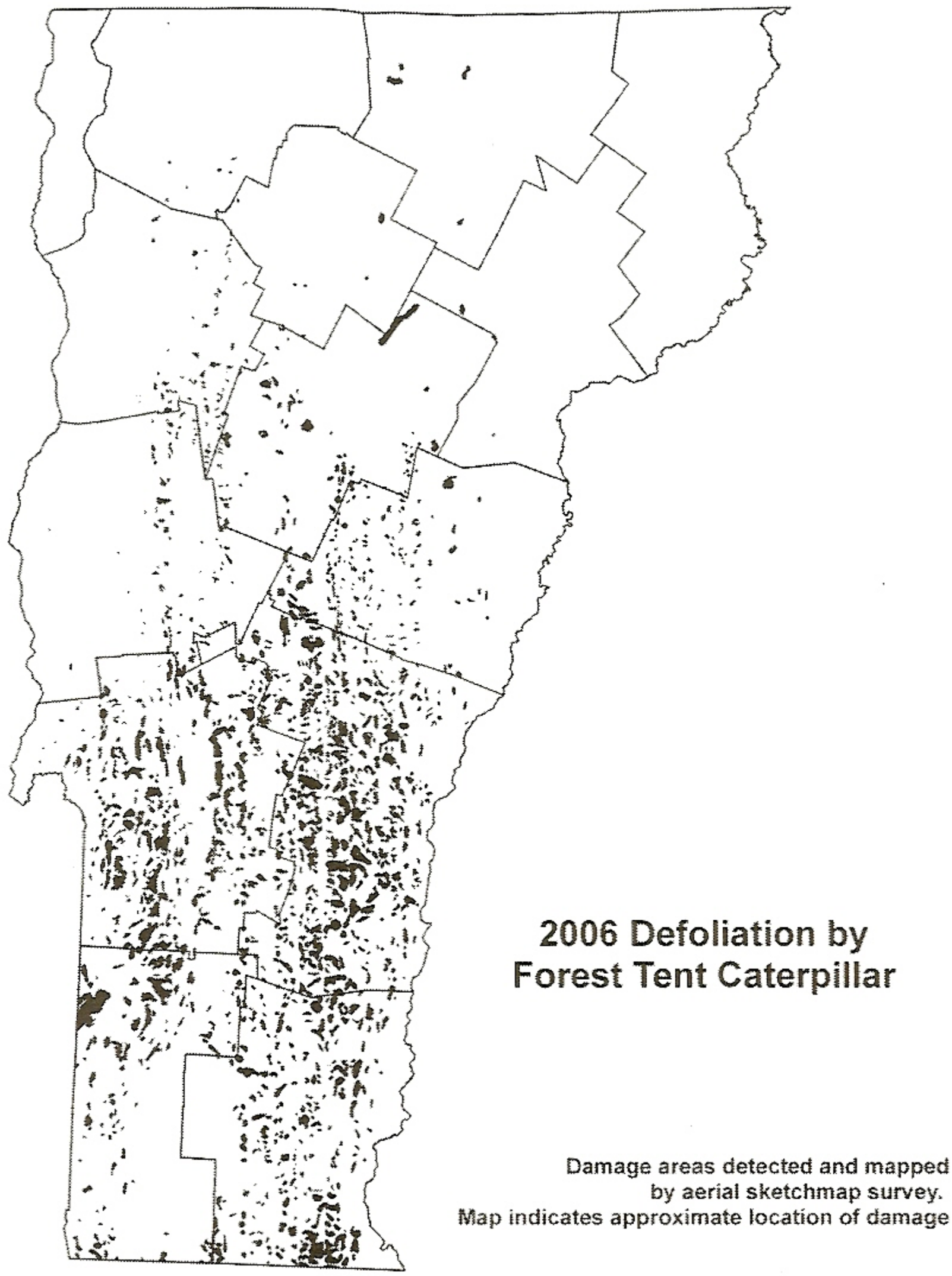


Figure 8. Mapped acres of forest tent caterpillar defoliation in Vermont in 2006.

and many pupae were parasitized, moth counts remained high in 2006, and have increased over 2005 counts in the central mountains. The average number of forest tent caterpillar moths caught in traps increased from 17.0 in 2005 to 17.8 in 2006 (Figures 11-12).

Overwintering egg mass counts are being conducted in winter 2006-07. As of late February, nearly 100 sugarbushes had been surveyed. The percent of egg masses that were new was low, averaging 19% statewide, and the average count of new egg masses per 10 branches was 0.5. This suggests that the outbreak has collapsed in most of the state, although some noticeable defoliation is expected in Addison and Orange Counties.

Maple, oak, ash, and basswood decline and mortality are now evident in some stands that have been defoliated more than once. Often, mortality is occurring in stands that have been recently thinned, or on ridges, dryer slopes or wet areas where the recent droughts predisposed the trees to decline following defoliation. However, scattered mortality has also been observed in unthinned stands on good sites.

Statewide, 168 sugarbush blocks, totaling 5,488 acres (Figure 9) were aerially sprayed in late spring with *B.t.* (Foray 48B at a rate of 16 b.i.u. per acre). Spray was applied by fixed-wing aircraft between May 18th and May 30th. Because of wet weather, which delayed the spraying of many blocks, and very heavy forest tent caterpillar population pressure in some stands, leading to early defoliation, some significant defoliation occurred prior to spray, particularly in the warmer climatic zones (Figure 10). However, the *B.t.* application was successful in killing caterpillars throughout the state, with caterpillar mortality beginning the day of spray. Forty-three out of 49 sugarmakers participating in the spray project who responded to a questionnaire believed that spraying was effective in killing forest tent caterpillars.

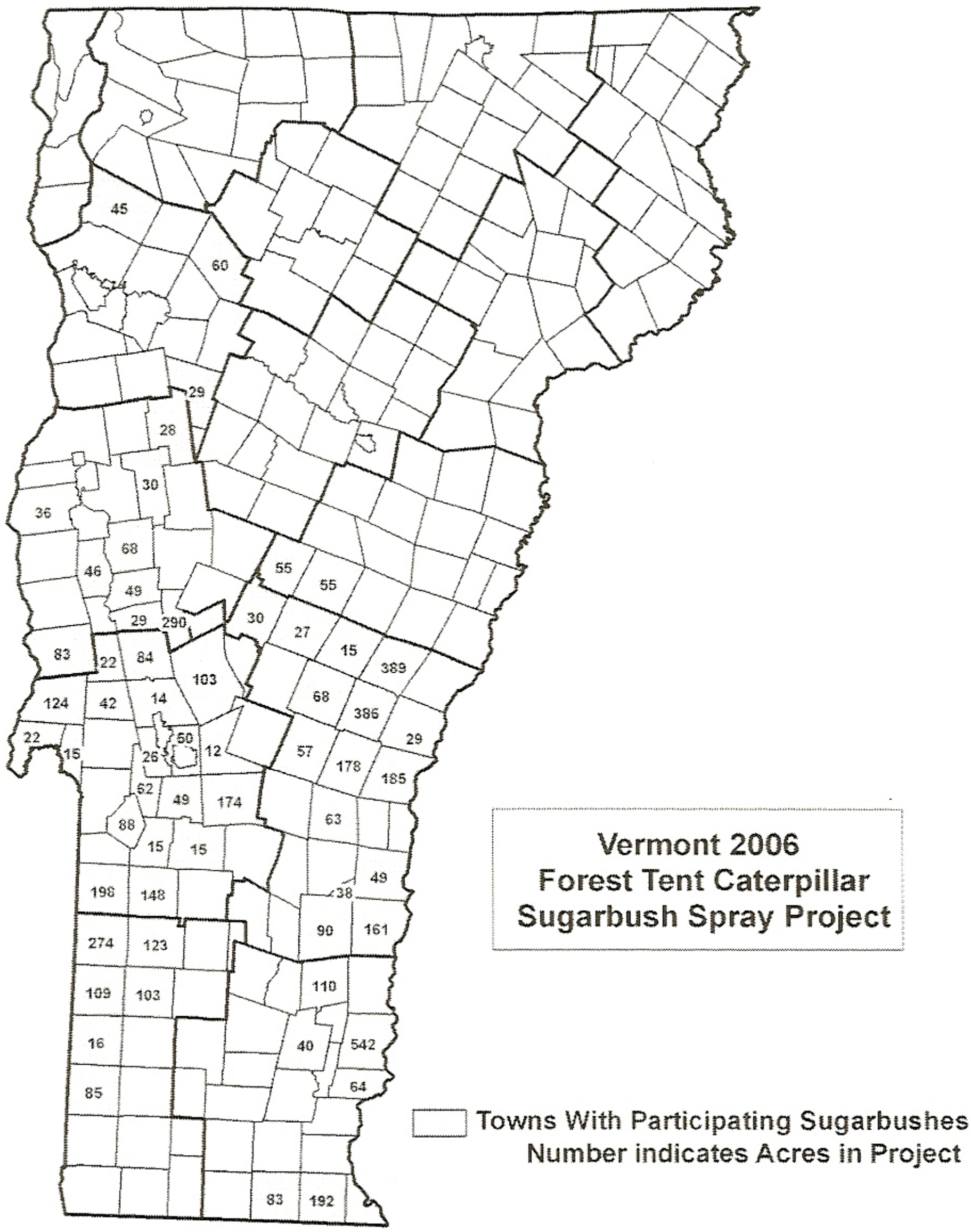


Figure 9. Towns and numbers of acres per town involved in the sugarbush spray project for forest tent caterpillar in 2006.

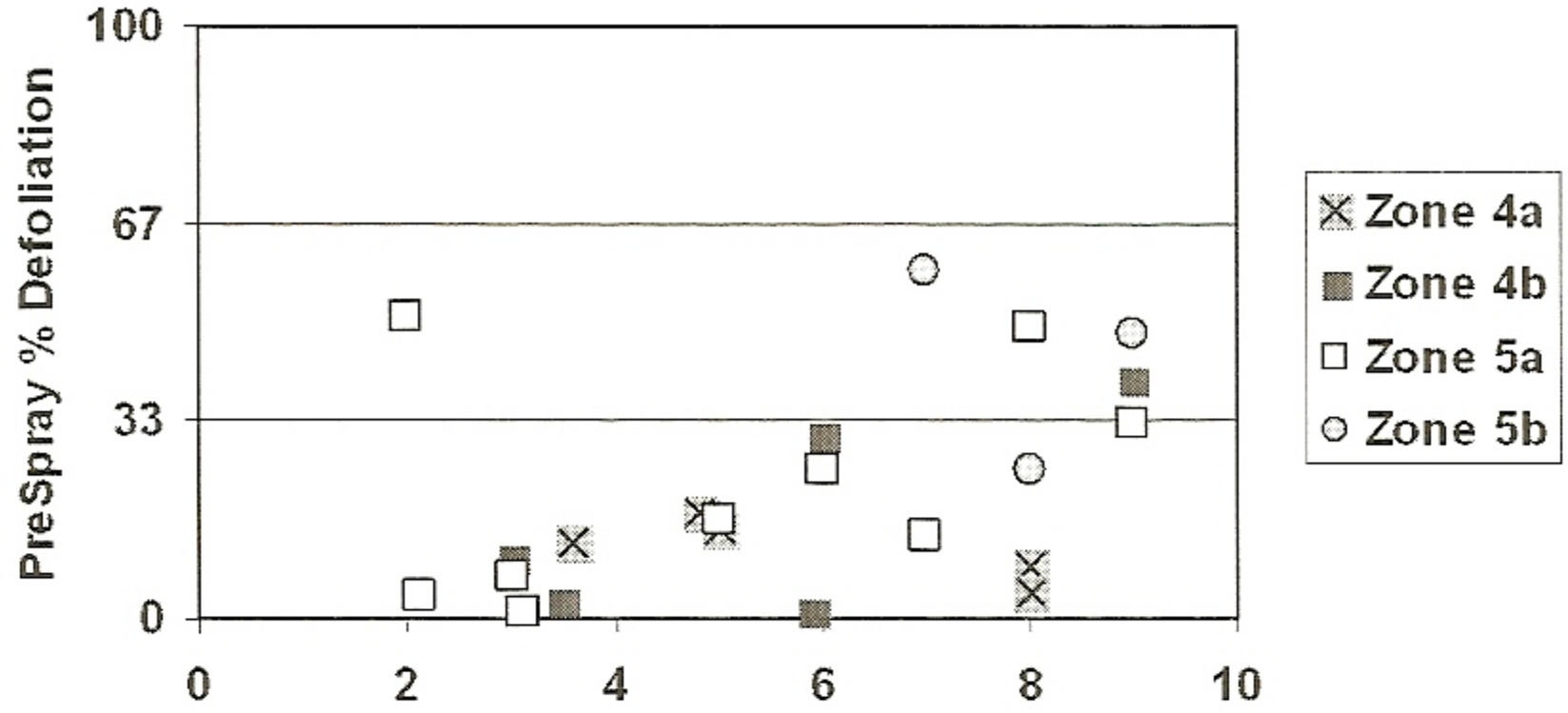
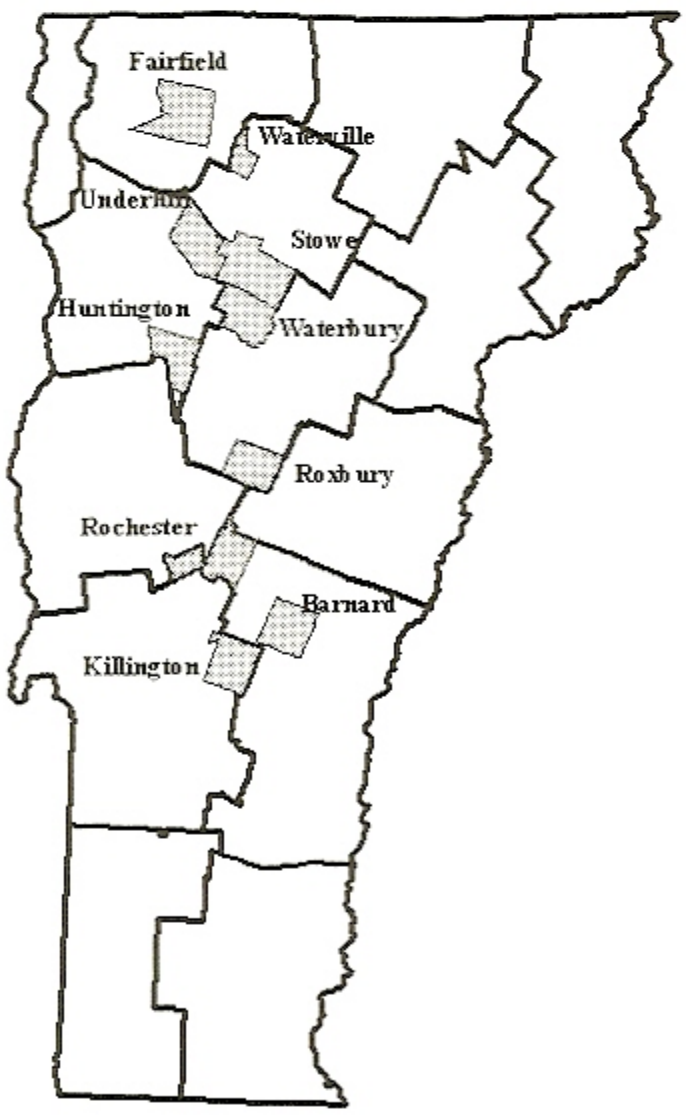


Figure 10. Total percent defoliation of sugar maple at the time of spray compared to forest tent caterpillar population density, as determined by average winter egg mass count per ten 30" branches, by climatic zone. Data are from 22 sprayed sugarbushes.



Average # of moths caught/trap

	2002	2003	2004	2005	2006
Barnard	4.6	12.3	23.0	----	----
Castleton	----	----	----	17.0	17.3
Fairfield	----	1.3	1.7	----	4.3
Huntington (NAMP 027)	9.2	6.7	10.0	15.7	16.0
Killington	6.8	9.7	20.0	15.3	21.0
Rochester	5.0	4.7	9.0	4.7	29.0
Roxbury	16.0	14.7	13.3	7.3	22.0
SB 2200	3.8	11.7	18.3	23.3	35.3
VMC 1400, Underhill	3.6	3.0	0.3	7.3	9.3
VMC 2200, Underhill	3.0	7.0	6.3	11.7	6.3
VMC 3800, Stowe	1.0	2.7	10.3	26.0	5.7
Waterbury	2.0	0.7	1.3	41.0	22.3
Waterville	0.0	2.0	1.3	17.7	24.7
Average	**5.0**	**6.4**	**9.6**	**17.0**	**17.8**

Figure 11. Average number of forest tent caterpillar moths caught in pheromone traps, 2002-2006. There were 4-5 traps per location in 2002 and 3 traps per location in 2003-2006. (You may note some minor revisions to 2002-2004 counts from previous reports due to corrections made to our database records.)

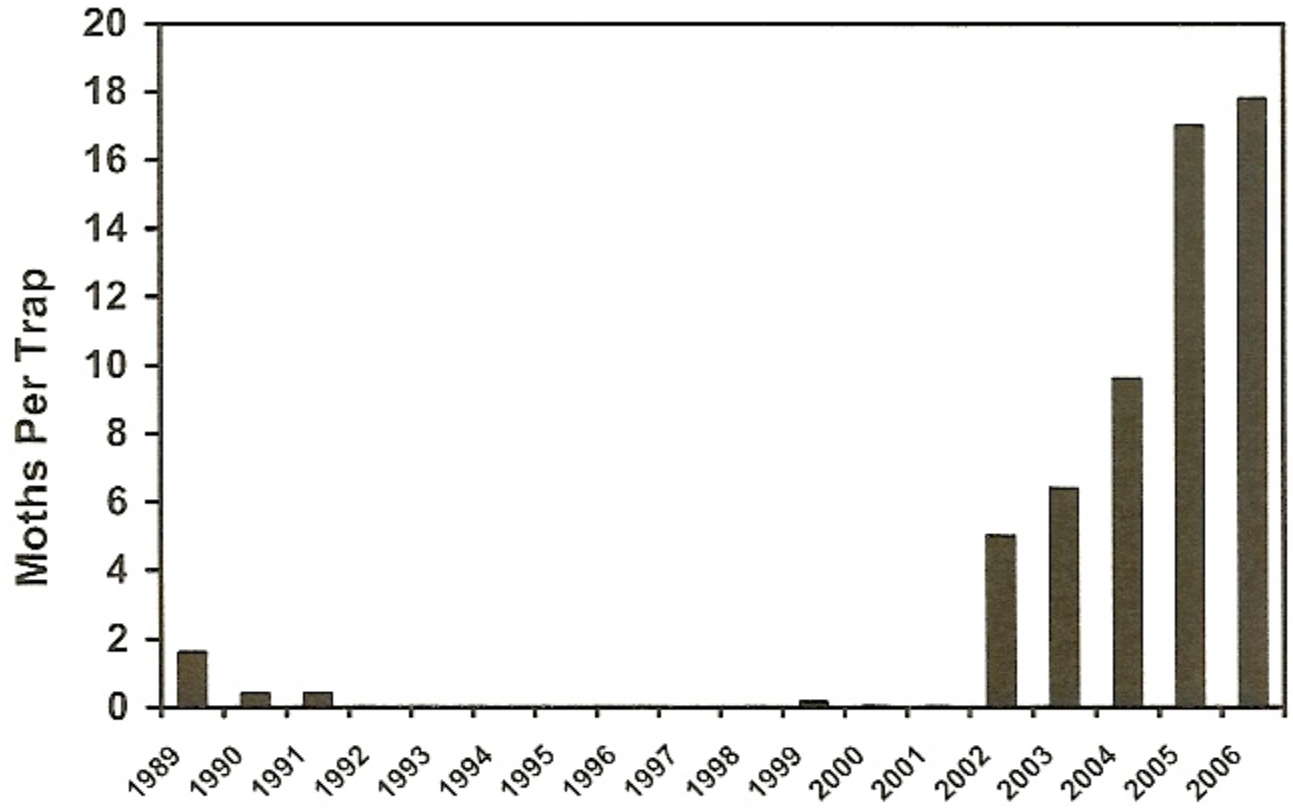
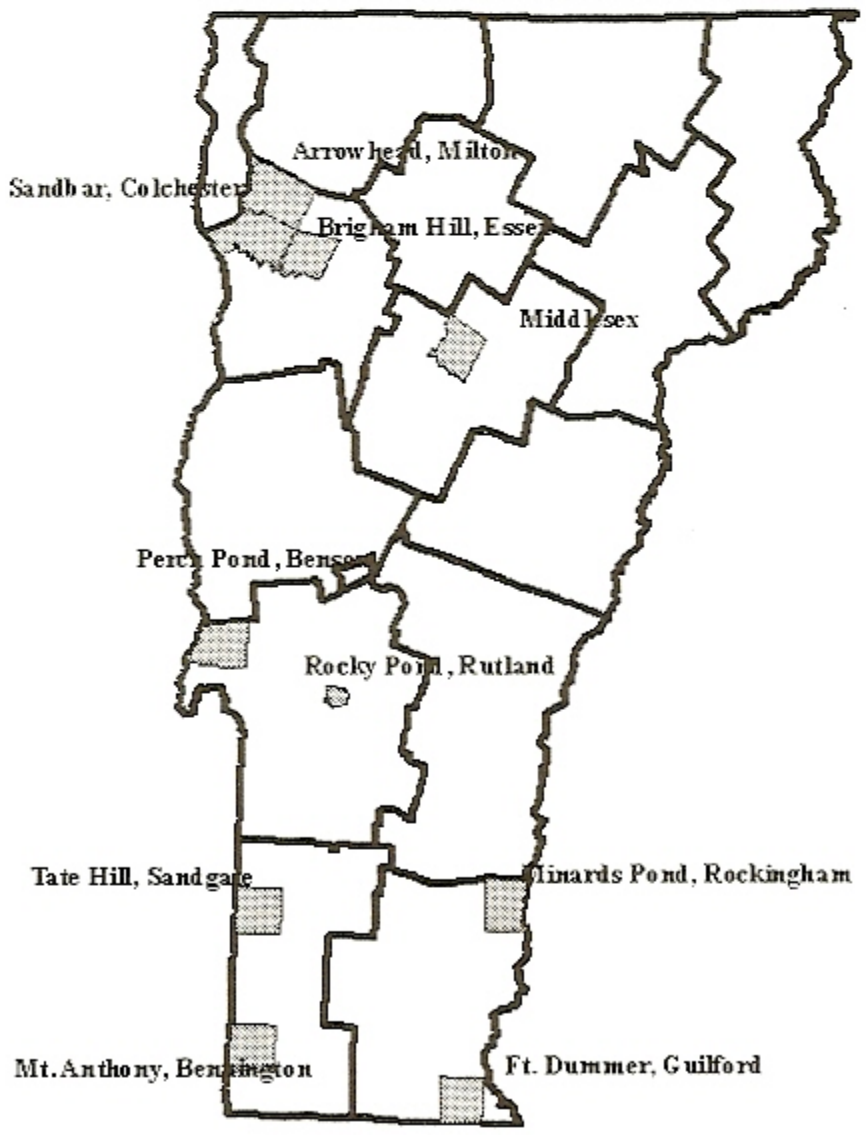


Figure 12. Average number of forest tent caterpillar moths caught in pheromone traps 1989-2006. Five multi-pher traps per site baited with RPC 2-component lures through 2001. PheroTech lures were used in 2002-2006. Three traps per site in 2003-2006.

Gypsy Moth caterpillars were occasionally present in noticeable numbers in oak and maple stands being defoliated by forest tent caterpillar. Gypsy moth caterpillar mortality was also reported, with disease often killing them at young instars. Egg mass counts remain low in focal area monitoring plots. For the first time since the focal area plots were established in 1986, no egg masses were found in the three Champlain Valley sites, which is favored gypsy moth habitat. One egg mass was found in 1 of 2 plots in Middlesex (Figures 13-14). No noticeable defoliation is expected in 2007.



# of Gypsy Moth Egg Masses per 1/25th Acre Plot:

	2003	2004	2005	2006
Arrowhead	1.5	2.5	0	0
Brigham Hill	2.5	2.0	1.5	0
Ft. Dummer	0	-----	0	0
Middlesex	0	2.0	0	0.5
Minards Pond	0.5	2.0	0	0
Mount Anthony	1.5	0	0	0
Perch Pond	0	0	0.5	1
Rocky Pond	0	0	0.5	3
Sandbar	3.0	1.5	0	0
Tate Hill	0	30.0	18.0	3
Average	**1.0**	**4.4**	**2.1**	**0.8**

Figure 13. Gypsy moth egg mass counts from focal area monitoring plots, 2006. Average of two 15 meter diameter burlap-banded plots per location.

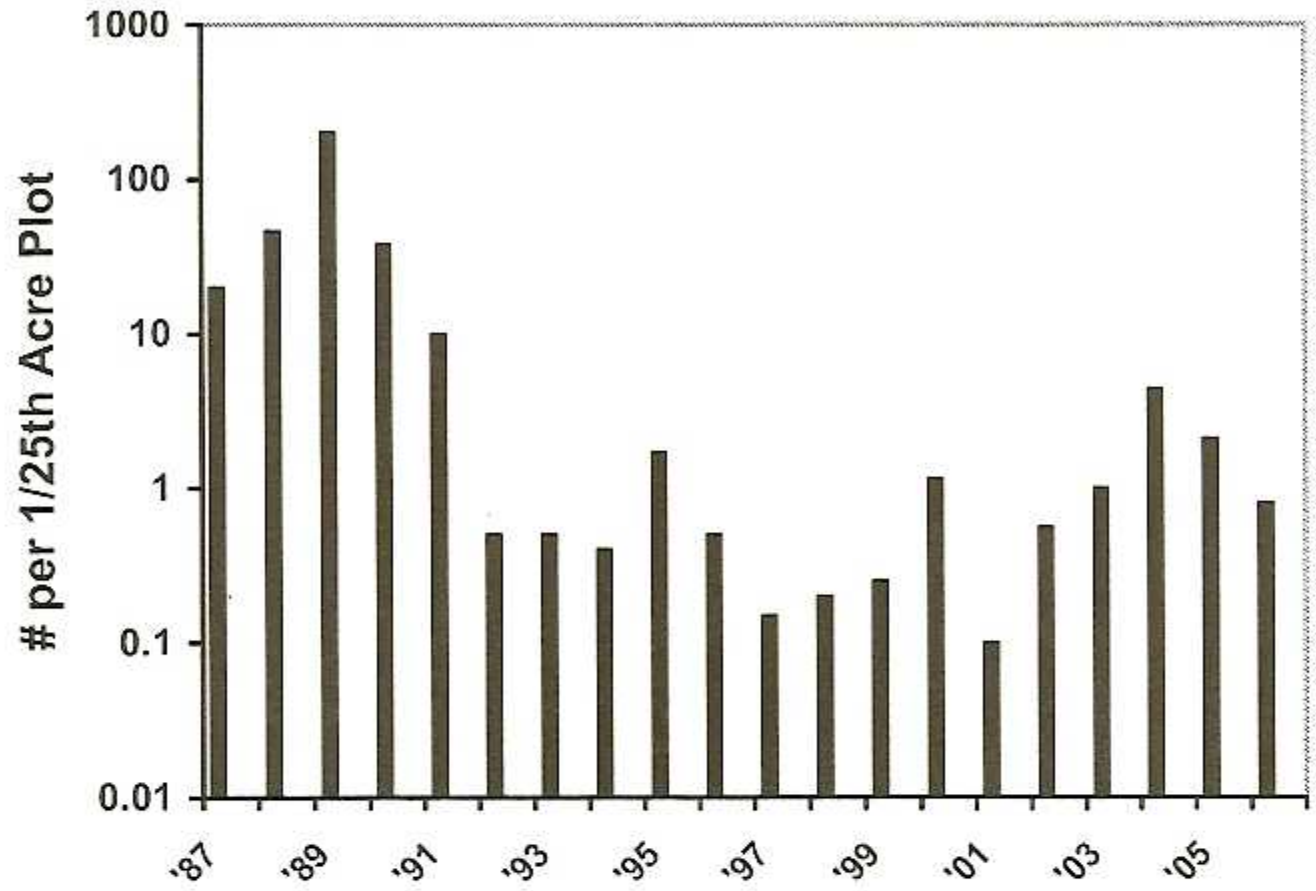
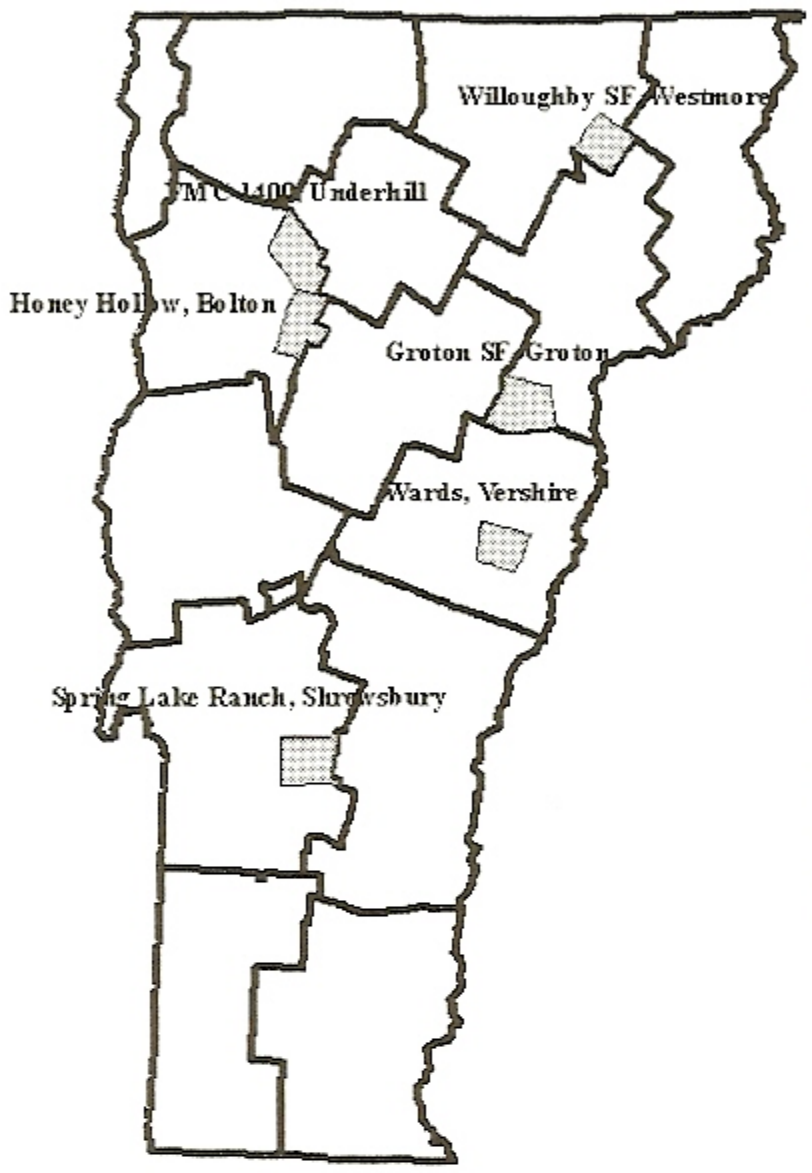


Figure 14. Gypsy moth egg mass counts from focal area monitoring plots, 1987-2006. Average of ten locations, two 15m diameter burlap-banded plots per location.

Saddled Prominent, *Heterocampa guttivata*, increased noticeably in some areas. Light defoliation of sugar maple and associated hardwoods, sometimes accompanied by sightings of individual larvae and the sounds of frass dropping in mid to late summer, were common throughout much of the northern region. Heavy defoliation was mapped on 1,340 acres in Essex, Orleans and Caledonia Counties (Table 5). This is an insect of concern because the defoliation occurs later in the season (July) than for forest tent caterpillar and has sometimes led to considerable sugar maple dieback and mortality after just one or two years of heavy defoliation. Other defoliators, especially the greenstriped mapleworm, *Dryocampa rubicunda*, and the hemlock looper, *Lambdina fiscillaria,* were often seen in association with saddled prominent and contributed to the amount of defoliation. Average number of saddled prominent moths caught in pheromone traps increased from 0.2 to 2.0 in 2006 (Figure 15-16).

Table 5. Mapped acres of damage by saddled prominent in 2006.

County	Acres
Caledonia	385
Essex	669
Orleans	289
Statewide	**1,343**



Average # of moths caught per trap

	2004	2005	2006
VMC 1400	0	0.3	0
Groton SF	2.3	0	3.3
Honey Hollow	0.3	0.7	5.3
Spring Lake Ranch	2.0	0	2.0
Wards	1.0	0	0.3
Willoughby SF	0	0	1.0
Average	**0.9**	**0.2**	**2.0**

Figure 15. Average number of saddled prominent moths caught in pheromone traps in Vermont in 2006.

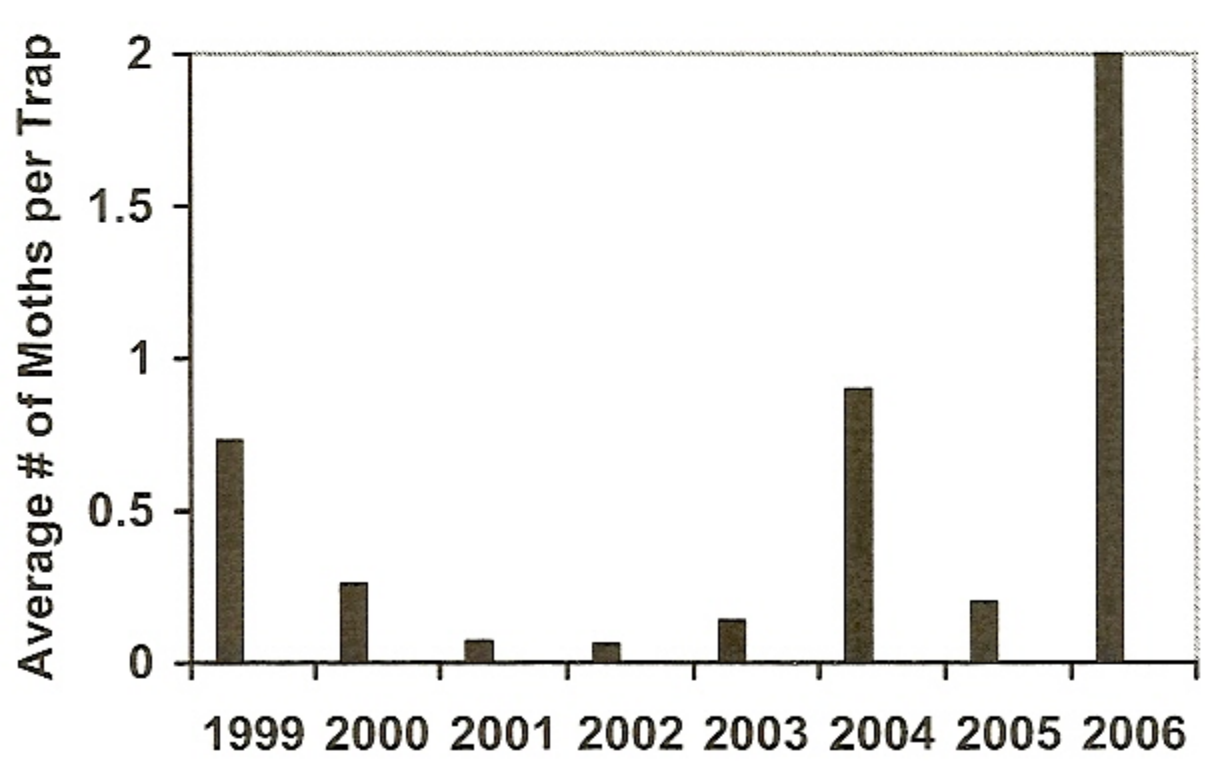


Figure 16. Average number of saddled prominent moths caught in pheromone traps 1999-2006. Average of 3-4 multi-pher traps per location, and 5-6 locations per year.

OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Birch Leaf Miner *Fenusa pusilla*	Birch species	Throughout	Only light damage in southern VT in 2006; light to moderate in north. Overshadowed by *Septoria* leaf spot in some areas.
Birch Skeletonizer *Bucculatrix canadensisella*	Paper birch Yellow birch	Widespread in northern VT	Light damage.
Bruce Spanworm *Operophtera bruceata*			See narrative.
Cherry Scallop Shell Moth *Hydria prunivorata*	Cherry	Throughout	Scattered nests observed.
Dogwood Sawfly *Macremphytus tarsatus*	Grey stemmed dogwood	Fair Haven	Heavy defoliation.
Early Birch Leaf Edgeminer *Messa nana*	Birch species	Throughout	Only light damage in 2006.
Eastern Tent Caterpillar *Malacosoma americanum*	Cherry Apple	Throughout	Tents commonly observed along roadsides and in ornamental trees. Heavy damage was widespread again this year. Some caterpillar mortality observed, but egg masses for 2007 can be found.
Fall Webworm *Hyphantria cunea*	Hardwoods	Throughout	Moderate to heavy population levels. Increasing, with webs more noticeable than 2005. Heaviest seen in northern VT for many years.
Forest Tent Caterpillar *Malacosoma disstria*			See narrative.
Greenstriped Mapleworm *Dryocampa rubicunda*	Sugar maple	Northeast VT	Moderate defoliation in association with saddled prominent. First sightings of this insect in many years.
Gypsy Moth *Lymantria dispar*			See narrative.
Hemlock Looper *Lambdina fiscellaria*	Sugar maple	Northeastern VT	Feeding in association with saddled prominent.

INSECT	HOST(S)	LOCALITY	REMARKS
Hickory Tussock Moth *Lophocampa caryae*	Hickory specie	Windsor County	Individual larvae.
Imported Willow Leaf Beetle *Plagiodera versicolor*	Willow	North central and northeastern VT	Causing heavy defoliation in scattered, localized areas.
Japanese Beetle *Popillia japonica*	Many	Throughout	Light to moderate damage to ornamentals.
Locust Leaf Miner *Odontata dorsalis*	Black Locust	Windham County and elsewhere	As in 2005, damage remains much lighter than previous years.
Maple Leaf Cutter *Paraclemensia acerifoliella*	Sugar maple	Throughout	Damage increasing. Mostly light but occasional moderate damage reported.
Maple Trumpet Skeletonizer *Epinotia aceriella*	Sugar Maple	Throughout	Noticeable, but no significant damage in southern VT. Light to moderate damage with populations up somewhat in northern VT.
Maple Webworm *Tetralopha asperatella*	Sugar Maple	Throughout	Population remains high in southern VT, but lower than in 2005. Only light defoliation observed in northern VT.
Orange-humped Mapleworm *Symmerista leucitys*	Sugar Maple	Rutland and Windsor Counties	Individual larvae.
Saddled Prominent *Heterocampa guttivata*	Sugar Maple	Widely scattered	See narrative.
Viburnum Leaf Beetle *Pyrrhalta viburni*	Viburnum species	Widespread	Light damage observed.
White Marked Tussock Moth *Orgyia leucostigma*	Hardwoods	Throughout	Individual larvae and pupae more commonly observed than normal.

SOFTWOOD DEFOLIATORS

Siberian moth

The Siberian moth, *Dendrolimus sibiricus,* is considered a significant defoliator of conifers in northern Asia and could be devastating to conifer forests in the northeast. Because early detection is essential to minimize the impact of any introduction, we conducted surveys for the third consecutive year to determine the presence and distribution of the Siberian moth in Vermont. Surveys were conducted in four counties: Chittenden, Orleans, Rutland and Windsor. Sites included bonsai dealers and nurseries. Two modified gypsy moth milk carton traps, each baited with lures attractive to the Siberian moth, were placed near favored host tree species at high-risk sites. Traps were deployed between June 30 and July 12, 2006 and were retrieved from them between September 5-19, 2006. No *D. sibiricus* moths were caught at any of the survey sites. A summary of trap locations, trapping dates and number of site visits appears in Table 6.

Table 6. Summary of site and collection data for 2006 Vermont survey for Siberian moth. Data include counties, towns, GPS coordinates, trapping dates, numbers of visits, site description and numbers of Siberian moths collected during the survey.

County	Town	GPS Points – (NAD83)	Start/End dates	Number of visits	Type of Business and trap placement	# of exotics
Chittenden	Jericho	N44.44941, W72.99321	6/30/06 – 9/15/06	6	Bonsai: Natural evergreens on outskirts of sales area	0
Orleans	Derby	N45.00237, W72.09606	7/11/06 – 9/19/06	5	Bonsai: Natural evergreens on outskirts of sales area	0
Windsor	White River Junction	N43.62079, W72.35282	7/10/06 – 9/20/06	5	Wholesale nursery	0
Chittenden	Williston	N44.44633, W73.11774	6/30/06 – 9/15/06	6	General nursery	0
Rutland	Rutland Town	N43.52520, W72.95652	7/12/06 – 9/18/06	3	Retail home improvement store with nursery	0

OTHER SOFTWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Arborvitae Leaf Miner *Argyresthia thuiella*	Northern white cedar	Widespread	Decreasing. Only light damage observed.
European Pine Sawfly *Neodiprion sertifer*	Scots Pine	Pawlet	Ornamentals.
Larch Casebearer *Coleophora laricella*	Eastern larch	Rutland and Bennington Counties in southern VT, scattered locations in northern VT	Damage remains noticeable at low levels.

SAPSUCKING INSECTS, MIDGES AND MITES

Balsam Woolly Adelgid

Dieback and mortality caused by Balsam Woolly Adelgid, *Adelges piceae,* was down from 5,903 acres mapped in 2005 to 1,386 acres in 2006 (Table 7). Although dead trees remain noticeable from the previous infestation, the rate of tree mortality is decreasing, and no new areas have been detected. Moderate to high populations were observed, however, at a former site of infestation in Groton State Forest.

Table 7. Mapped acres of damage by balsam woolly adelgid in 2006.

County	Acres
Addison	57
Bennington	167
Essex	1,015
Rutland	83
Windham	51
Windsor	12
Total	1,385

Hemlock Woolly Adelgid

Hemlock Woolly Adelgid, *Adelges tsugae*, is not known to be established in Vermont. However, the insect continues to be introduced inadvertently, in spite of quarantine regulations.

In October, the VT Agency of Agriculture, Food and Markets found that a May shipment of trees from New Jersey to a nursery in Bennington County had included trees infested with hemlock woolly adelgid. All 20 trees from that shipment were destroyed, as were 29 other hemlocks that could have been infested because they had been at the importing nursery. Native and planted hemlock near the nursery and the 4 outplanting sites were inspected for hemlock woolly adelgid. No signs of the insect were found.

Surveys to continue following up on the introduction of infested nursery stock in 2004 were conducted at ten sites where trees from the 2004 shipments had been stored or planted. Two hundred 1-meter long hemlock branches were examined at each site. All sites were negative for the adelgid.

As part of a more general detection survey, 1875 branches were examined in an additional eleven hemlock forest stands in seven towns in Windsor and Windham counties. Again, all sites were negative.

Lecanium Scale

Lecanium Scale, *Parthenolecanium corni*, populations were down substantially from 2005, but remain heavy in scattered sugarbushes and forest stands. In scattered locations, including northern hardwood forest stands in Weston and Landgrove, the 2005 scale infestation has caused complete mortality of small sugar maple seedlings, and almost complete dieback of larger seedlings and saplings in the understory. Some recovery of the larger regeneration occurred in 2006, with very scattered epicormic and root sprouting. The shoot growth of white ash regeneration was also reduced, but no mortality of ash seedlings or saplings was observed.

Oystershell Scale

Oystershell scale, *Lepidosaphes ulmi*, populations were light in most locations. Dieback was not detected by aerial survey. However, populations of the scale insect increased from 2005 in survey plots at three tree canopy levels (suppressed, intermediate and codominant) at Camel's Hump State Forest in 2006. (Figure 17 and Table 8)

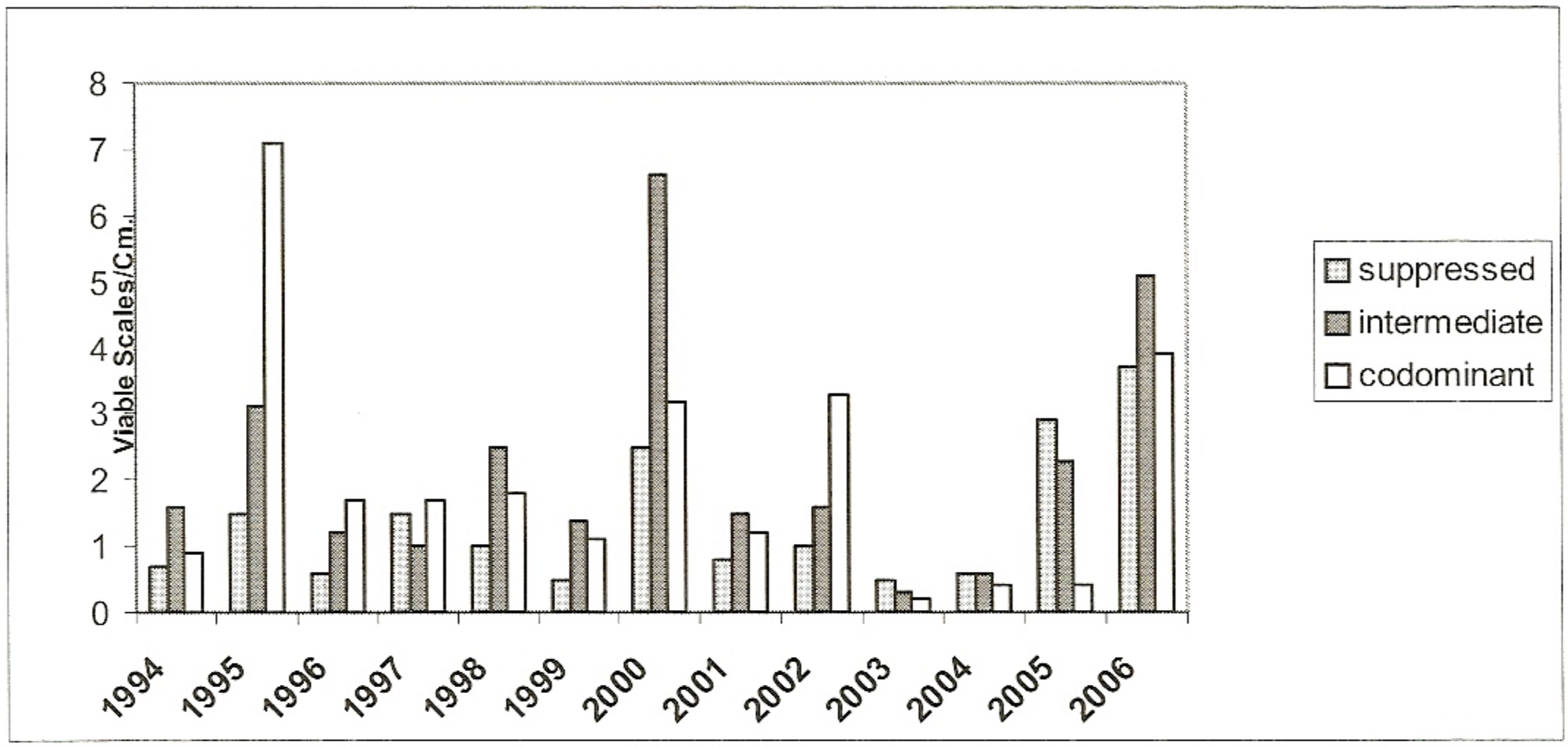


Figure 17. Oystershell scale population in three tree canopy levels in Camel's Hump State Forest, 1994-2006. Average for 10 current year twigs/tree per crown class, collected in autumn.

Table 8. Number of oystershell scales on current year beech twigs in Camel's Hump State Forest, 1994-2006.

	Average Number of Mature Viable Scales Per Twig												
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Suppressed	2.1	9	0.6	2.1	4	0.7	2.9	4.2	11	2.1	1.4	5.6	4.0
Intermediate	8.4	16.8	1.2	2.6	3.3	2.8	12.1	10.4	14.7	1.2	2	2	6.2
Codominant	3.4	11.3	0.2	4.5	4.2	2.7	7.3	1.4	4	0.7	3.4	3.8	3.4

OTHER SAPSUCKING INSECTS, MIDGES, AND MITES

INSECT	HOST(S)	LOCALITY	REMARKS
Balsam Gall Midge *Paradiplosis tumifex*	Balsam fir	Walden Athens	Continued heavy in Walden plantation; light damage to Christmas trees observed in Athens. Scarce elsewhere.
Balsam Twig Aphid *Mindarus abietinus*	Balsam fir	Throughout	Very light damage to Christmas trees and ornamentals, but sooty mold observed.
Balsam Woolly Adelgid *Adelges picea*			See narrative.
Beech Scale *Cryptococcus fagisuga*			See beech bark disease.
Boxelder Bug *Leptocoris trivittatus*	Boxelder	Northeastern VT	Low populations.
Erineum Gall Mite *Aceria elongatus*	Sugar maple	Throughout	Occasionally seen.
Hemlock Woolly Adelgid *Adelges tsugae*			See narrative.
Lecanium Scale *Parthenolecanium corni*			See narrative.
Maple Bladder Gall Mite *Vasates quadripedes*	Sugar maple	Widely scattered	Occasional.
Maple Spindle Gall Mite *Vasates aceris-crummena*	Sugar maple	Widely scattered	Occasional.
Oystershell Scale *Lepidosaphes ulmi*			See narrative.
Pear Thrips *Taeniothrips inconsequens*	Sugar Maple	Northern Vermont	Mostly light damage seen. Occasional moderate damage to individual trees.
Pine Bark Adelgid *Pineus strobi*	White pine	Widely scattered	Consistent levels.
Pine Spittlebug *Aphrophora parallela*	White pine Hemlock	Widespread	Remains noticeable, with more reports than 2005. Some sites in northern VT with moderate levels.

INSECT	HOST(S)	LOCALITY	REMARKS
Ragged Spruce Gall Aphid *Pineus similis*	Red spruce	Widespread	Remains common.
Spruce Spider Mite *Oligonychus ununguis*	Conifers	Throughout	Remains common at light levels in Christmas tree plantations in southern VT.
Woolly Alder Aphid *Paraprociphilus tessellatus*	Alder	Northeastern VT	High populations on occasional trees.

BUD AND SHOOT INSECTS

Balsam Shootboring Sawfly

Balsam Shootboring Sawfly, *Pleroneura brunneicornis*, population levels were up from last year, this being an even year. Damage to balsam and Fraser fir Christmas trees was common at up to moderate levels on some individual trees but population levels remain much lower than in 1998 and 2000 when there was much more concern about this insect. Numbers of adults caught on 3 x 5 yellow sticky cards placed in mid-crowns of trees in Lamoille County increased slightly this year but were still at low levels (3.1 per card). Damage was a bit higher than population levels of adults would indicate due to the prolonged bud development (increasing the egg-laying period) associated with the cool wet spring. This insect is not expected to be a problem in 2007.

OTHER BUD AND SHOOT INSECTS

INSECT	HOST(S)	LOCALITY	REMARKS
Balsam Shootboring Sawfly *Pleroneura brunneicornis*	Fraser fir Balsam fir	Widespread	See narrative.
Maple Petiole Borer *Caulocampus acericaulis*	Sugar maple	Caledonia, Orleans and Rutland Counties	Occasionally observed.
Pine Gall Weevil *Podapion gallicola*	Red pine	Scattered throughout	Very heavy in young saw timber-sized stand in Barnard. Associated with Diplodia and shoot dieback.
White Pine Weevil *Pissodes strobi*	White pine Spruces	Throughout	Occasional damage to open-grown trees and Christmas trees. Common but populations appear to be stable.
White-spotted sawyer *Monochamus scutellatus*	White pine Balsam fir	Widely scattered	Minor damage.

BARK AND WOOD INSECTS

Emerald Ash Borer

Emerald Ash Borer, *Agrilus planipennis*, was not found in Vermont surveys in 2006. The insect continues to expand its range from the established areas in Michigan, to sites in Ontario, Indiana and Ohio. In 2006, we surveyed ash trees at locations at high risk for introductions (nurseries with ash stock and sawmills processing ash) or areas where ash decline had been observed (Table 9). Results from surveys at 33 sites and 487 trees found no emerald ash borer insects or confirmed symptoms. Surveys were done in 10 of the 14 counties (Table 10). Species of ash and ash health were recorded, along with symptoms from other ash boring insects. The data were collected using national survey protocols and were added to the US Forest Service national database.

Table 9. Number of sites surveyed for emerald ash borer in each risk category, Vermont, 2006.

Site Risk Categories	Number of Sites
Adjacent to nursery	28
Adjacent to sawmill	1
Campgrounds	4
Total Sites	33

Table 10. Number of sites surveyed for emerald ash borer in Vermont counties, 2006.

County	Number of Sites
Addison	4
Bennington	3
Caledonia	1
Chittenden	9
Franklin	0
Grand Isle	2
Lamoille	2
Orange	2
Orleans	1
Rutland	0
Washington	5
Windham	1
Windsor	3
Total Sites	33

Brown Spruce Longhorn Beetle

Surveys continued in 2006 for the Brown Spruce Longhorn Beetle, *Tetropium fuscum*, a European beetle that has been found attacking and killing apparently healthy red spruce trees in Nova Scotia. Large, cross-vane Colossus Panel Traps, baited with BSLB lure (a host volatile) and UHR ethanol were used to survey four sites for the presence of this beetle in spruce stands in Caledonia, Essex, and Orleans Counties in Vermont. Beetles collected during the survey were screened to separate Cerambycids from other Coleoptera. Cerambycids, Scolytids and other selected beetles were labeled and maintained for our permanent collections.

Eleven specimens required diagnostic follow-up. These beetles matched the genus of the target species, and warranted further examination by *Tetropium* specialists. The eleven *Tetropium* specimens were sent to Georgette Smith, Research Scientist at Natural Resources Canada in Fredericton, New Brunswick. All eleven specimens (7 females and 4 males) were the indigenous *Picea*-feeding species, *Tetropium cinnamopterum*. No *Tetropium fuscum* beetles were caught at the survey sites. A summary of trap locations, trapping dates and number of site visits appears in Table 11.

Table 11. Summary of site and collection data for 2006 Vermont survey for *Tetropium fuscum*, the brown spruce longhorn beetle. Data include counties, towns, GPS coordinates, trapping dates, numbers of visits, and numbers of *T. fuscum* collected during the survey.

County	Town	GPS Points – (NAD83)	Start/End dates	# of visits	# of exotics
Caledonia	Sutton	N44.64016, W72.06731	5/18/06 to 8/27/06	5	0
Caledonia	Burke	N44.66377, W71.97512	5/18/06 to 8/25/06	6	0
Essex	Victory	N44.55949, W71.78142	5/18/06 to 8/25/06	4	0
Orleans	Holland	N44.97326 W71.92978	6/1/06 to 8/25/06	5	0

Oak Splendor Beetle

The Oak Splendor Beetle, *Agrilus biguttatus*, is a major pest of oaks in Europe, causing damage similar to that of the two-lined chestnut borer (*Agrilus bilineatus*) in this country. The beetle is also associated with the European version of oak decline and has become more common within its natural range in recent years. *A. biguttatus* is not known at present to occur in the United States but, as part of the regional CAPS effort, this survey was conducted to help aide in tracking efforts that are being conducted throughout the U.S.

Log samples were collected at four sites, one in Rutland County, two in Bennington County, and one in Windham County. White oak was sampled at three of the survey sites, and chestnut oak was taken at the fourth. Five bolts were taken from each of the four sites (Table 12). The oak bolts were transported to a rearing facility, where they were placed in individual rearing chambers constructed of builder's tubes 30 cm in diameter and 43 cm long. The back opening of the tube was covered with 5 mm luan mahogany, and the front opening was fitted with 1 mm screen that was secured with a metal band. A 4 cm hole was cut in the screen and the lid of a snap-on rearing cup was secured with hot-melt glue to the center of each screen.

Insects that emerged from the boles were collected and identified. No *Agrilus biguttatus* were reared from the log samples. However, members of four orders of insects were found in the collecting cups. These included Coleoptera (eight species in five families), Hymenoptera (one species in each of two families), Lepidoptera (one species) and Psocoptera (one species). Three specimens of *Encyclops caerulea*, also known as the Oak Bark Scaler (Family Cerambycidae), were among the beetles collected.

Table 12. Summary of site and collection data for 2006 Vermont survey for *Agrilus biguttatus*, the oak splendor beetle. Data include counties, towns, GPS coordinates, log collection dates, oak species, and numbers of *Agrilus biguttatus* found.

County	Town	GPS Points – (NAD83)		Collection Date	Oak species	# of Exotics Found
Bennington	Sandgate	43.1506	73.2276	May 10	*Quercus alba*	0
Rutland	Benson	43.7568	73.2808	May 12	*Quercus alba*	0
Windham	Guilford	42.8229	72.5589	Apr 19	*Quercus alba*	0
Bennington	Pownal	42.7646	73.2549	Apr 27	*Quercus prinus*	0

Sirex Woodwasp

The sirex woodwasp, *Sirex noctilio*, is endemic to Europe, Asia, and northern Africa and has successfully established in Australia, New Zealand, South America, and South Africa. Based on its native range in Europe and Asia, it could establish in any climate zone of North America where pine occurs. According to the Animal and Plant Health Inspection Service (APHIS), the insect is considered a secondary pest of trees in its native range. However, it is a major pest in exotic pine plantations in the Southern Hemisphere. Females carry a fungus, *Amylostereum areolatum*, that they deposit in trees when laying their eggs. This fungus and the mucus injected by the wasp rapidly weaken and kill host trees, and the developing larvae feed on the fungus.

Using sampling protocols developed by the USDA Forest Service, we participated in regional survey efforts aimed at *Sirex noctilio*. Thirty 8-funnel Lindgren traps baited with a lure consisting of alpha-pinene (70%) and beta-pinene (30%) were deployed in Scotch or red pine stands in four counties in Vermont in 2006. Trapping dates were May 18 – Sept 21 in the ten sites in Caledonia County, June 6 – October 4 in the ten sites in Orange County, May 31 – September 29 in the five sites in Rutland County, and June 5 – October 4 in the five sites in Windsor County. Lures were changed every 4-6 weeks. Trap collections were made once every two weeks, and trap catches were screened by personnel at the Forest Biology Lab. No *Sirex noctilio* were collected in traps. Five members of the family Siricidae, representing two species (*Urocerus cressoni* Norton and *Sirex nigricornis* Fabricius), were collected, and a total of 351 Cerambycidae and 1,188 Scolytidae were captured in the thirty traps (Table 13). Seven specimens of the Common Pine Shoot Beetle, *Tomicus piniperda*, were collected in Caledonia County, and all were collected at the same site in Kirby where they were first found in 2000.

Table 13. Summary of site and collection data for 2006 Vermont survey for *Sirex noctilio*. Lindgren funnel traps baited with a lure consisting of alpha-pinene (70%) and beta-pinene (30%) were used for the survey.

County	VT #	Town	GPS points NAD 83, DD		Tree Species	# of *Sirex noctilio*	# Other Siricids	# Cerambycids	# Scolytids
Orange	S-OE-01	Bradford	43.98239	72.13262	Scotch	0	0	6	19
	S-OE-02	Newbury	44.03458	72.09068	Red	0	2	15	50
	S-OE-03	Fairlee	43.89044	72.22562	Scotch	0	0	12	27
	S-OE-04	Thetford	43.8343	72.24841	Red	0	0	44	62
	S-OE-05	Chelsea	43.99136	72.40146	Red	0	0	12	13
	S-OE-06	Chelsea	43.97602	72.44552	Scotch	0	1	29	24
	S-OE-07	Tunbridge	43.89275	72.49469	Scotch	0	0	4	15
	S-OE-08	Brookfield	44.03783	72.60258	Red	0	0	17	45
	S-OE-09	Williamstown	44.11063	72.61166	Red	0	0	12	15
	S-OE-10	Orange	44.16633	72.42474	Red	0	0	16	38
County Summary						0	3	167	308
Windsor	S-WR-1	Royalton	43.81387	72.51884	Red	0	0	6	44
	S-WR-2	Hartford	43.6495	72.39437	Scotch	0	0	3	18
	S-WR-3	Woodstock	43.63762	72.55302	Scotch	0	0	20	35
	S-WR-4	Bethel	43.79238	72.64921	Red	0	0	17	34
	S-WR-5	Bethel	43.81898	72.68358	Scotch	0	0	17	36
County Summary						0	0	63	167
Rutland	S-R-1	North Clarendon	43.5529	72.94372	Red-white mix	0	0	5	21
	S-R-2	Wallingford	43.46518	72.96648	Red	0	0	7	28
	S-R-3	Mt. Tabor	43.30255	72.99575	Red	0	0	2	14
	S-R-4	Dorset	43.28001	73.00513	Red	0	0	12	72
	S-R-5	Mendon	43.617	72.88562	Red	0	0	4	21
County Summary						0	0	30	156
Caledonia	S-Ca-1	Sutton	44.63986	72.0674	Red	0	0	0	183
	S-Ca-2	Burke	44.58417	71.98389	Scotch	0	0	1	12
	S-Ca-3	Lyndon	44.55846	71.9749	Scotch	0	0	11	37
	S-Ca-4	Lyndon	44.50235	71.9897	Scotch	0	0	6	21
	S-Ca-5	Kirby	44.51129	71.915	Scotch	0	1	17	35
	S-Ca-6	St. Johnsbury	44.42285	72.03081	Scotch	0	1	12	28
	S-Ca-7	Danville	44.4093	72.18304	Red	0	0	4	47
	S-Ca-8	Peacham	44.35402	72.15488	Red	0	0	11	83
	S-Ca-9	Walden	44.47104	72.22752	Scotch	0	0	4	42
	S-Ca-10	Groton	44.26465	72.27174	Scotch	0	0	25	69
County Summary						0	2	91	557
Overall Summary						**0**	**5**	**351**	**1,188**

OTHER BARK AND WOOD INSECTS

INSECT	HOST(S)	LOCALITY	REMARKS
Asian Longhorned Beetle *Anoplophora glabripennis*			Not observed or known to occur in VT.
Bronze Birch Borer *Agrilus anxius*	Paper birch Ornamental white birches	Widely scattered	Occasionally observed on declining birches; heavy damage observed around a home where recent construction had opened up a former birch stand.
Brown Prionid *Orthosoma brunneum*			Several specimens were found this year, not associated with any particular tree.
Brown Spruce Longhorned Beetle *Tetropium fuscum*			See narrative.
Carpenter Ant *Camponotus spp.*		Throughout	Frequent homeowner complaints.
Eastern Larch Beetle *Dendroctonus simplex*			See Larch Decline.
Elm Bark Beetle *Hylurgopinus rufipes* and *Scolytus multistriatus*			See Dutch Elm Disease.
Emerald Ash Borer *Agrilus planipennis*			See narrative.
Japanese Cedar Longhorned Beetle *Callidiellum rufipenne*			Not observed or known to occur in Vermont.
Locust Borer *Megacyllene robiniae*	Black locust	Addison, Chittenden, Franklin and Grand Isle Counties	Appears to be stable.
Maple Callus Borer *Synanthedon acerni*	Sugar and red maple	Brattleboro	In ornamentals and in recent transplants.
Northern Engraver *Ips borealis borealis*	White spruce	Greensboro	Attacking drought-stressed forest trees.

INSECT	HOST(S)	LOCALITY	REMARKS
Northeastern sawyer *Monochamus notatus*	White pine	Weston	Emerging from stressed trees.
Oak Splendor Beetle *Agrilus biguttatus*			See narrative.
Pigeon Tremex *Tremex columba*	Sugar maple	Danville, Williston, Waterbury, Stowe, Morrisville, Jeffersonville, Hyde Park and elsewhere	Many seen this year. Associated with stressed trees, including trees degraded by beech bark disease.
Pine Engraver *Ips pini*	White and red pine	Wells, Castleton, Proctor, Brandon and other locations	Remains common on declining trees, especially those stressed by recent drought on ledgey or wet sites. Predatory clerid beetles associated with some populations.
Pitted Ambrosia Beetle *Corthylus punctatissimus*	Sugar maple	Derby, Coventry	Noticeable mortality of small saplings. Increasing.
Redheaded Ash Borer *Neoclytus acuminatus*	Ash	Highgate	Infesting weakened tree.
Round-headed Apple Tree Borer *Saperda candida*	Apple Crabapple	Champlain Valley Northeast Kingdom Woodstock Barre	Associated with orchard trees and occasional ornamentals.
Russian Leather Beetle *Osmoderma eremicola*	Beech	Middlebury	Found in decayed cavity of weakened tree.
Sirex woodwasp *Sirex noctilio*			See narrative.
Sugar Maple Borer *Glycobius speciosus*	Sugar maple	Throughout	Remains a common cause of defect on slow-growing maples.
Two-lined Chestnut Borer *Agrilus bilineatus*	Red oak	Rutland and Bennington Counties	On dead and dying trees defoliated by forest tent caterpillar.
Whitespotted Sawyer *Monochamus scutellatus*	White pine and balsam fir	Throughout	Active infestations seen in weakened and dying conifers. Adults not as common at large as last year, although some continue to be brought in to verify that they are not Asian longhorned beetles.

ROOT INSECTS

INSECT	HOST(S)	LOCALITY	REMARKS
Japanese Beetle *Popillia japonica*	Many	Throughout	Light to moderate levels.

FRUIT, NUT AND FLOWER INSECTS

INSECT	HOST(S)	LOCALITY	REMARKS
Asiatic Garden Beetle *Autoserica castanea*	Many flowers and ornamentals	Widespread	Moderate levels.
Ash flowergall mite *Aceria fraxiniflora*	White ash	Northeastern VT	High level of damage on occasional trees.
Maggots in Butternuts *Rhagoletis sp.*	Butternut	Chester	Destroying husks.
Plum Curculio *Conotrachelus nenuphar*	Apple Plum	Throughout	Remains common.
Western Conifer Seed Bug *Leptoglossus occidentalis*	Conifers	Throughout	Many reports of incidental findings in houses. Adults common, but fewer reports than 2005.

STEM DISEASES

Beech Bark Disease, caused by *Crytococcus fagisuga* and *Nectria coccinea* var. *faginata*, remains noticeable throughout the state and continues to cause above-normal decline and mortality in many locations. *Nectria* fruiting was commonly observed this fall, but healthy populations of the scale insect were difficult to find. There were 12,188 acres mapped this year (Table 14) compared to 42,191 in 2005 but this was probably an underestimate of the area affected. Guidelines have been drafted for managing Agency of Natural Resources lands to optimize mast yields in beech mast production areas important to black bear and other wildlife.

Table 14. Mapped acres of damage by beech bark disease in 2006.

County	Acres Mapped
Addison	3
Bennington	2,984
Caledonia	37
Chittenden	0
Essex	1,165
Franklin	311
Grand Isle	0
Lamoille	566
Orange	266
Orleans	191
Rutland	829
Washington	1,787
Windham	2,411
Windsor	1,640
Total	**12,190**

OTHER STEM DISEASES

DISEASE	HOST	LOCALITY	REMARKS
Annual Canker *Fusarium sp.*			None reported.
Ash Yellows *Mycoplasma-like organism*	White Ash	Widespread	Witches brooms commonly observed on declining ash surveyed for emerald ash borer.
Beech Bark Disease *Cryptococcus fagisuga* and *Nectria coccinea var. faginata*			See narrative.
Black Knot *Dibotryon morbosum*	Black Cherry	Throughout	Occasional damage to landscape trees.
Botryosphaeria Blight *Botryosphaeria sp.*			None reported.
Brown Cubical Rot *Polyporus schweinitzii*			Occasional.
Butternut Canker *Sirococcus clavigignenta-juglandacearum*	Butternut	Throughout	No increase in occurrence.
Caliciopsis Canker *Caliciopsis pinea*			None reported.
Cedar-Apple Rust *Gymnosporangium juniperi-virginianae*	Juniper	Widely scattered	High levels of infection due to early season rains.
Chestnut Blight *Cryphonectria parasitica*			None reported.
Cytospora Canker *Leucostoma kunzei*	Blue spruce	Widely scattered	Typical occasional dieback on landscape trees.
Delphinella Tip Blight of Fir *Delphinella balsamae*	Balsam fir	Widely scattered	Some moderate to heavy damage reported on Christmas trees in several locations.
Fireblight *Erwinia amylovora*			Occasional damage on landscape trees.

DISEASE	HOST	LOCALITY	REMARKS
Lilac Blight *Pseudomonas syringae*			Occasional damage reported.
Maple Canker *Steganosporium spp.*	Sugar maple	Widely scattered	Apparent on weakened branches.
Nectria Canker *Nectria galligena*			Occurring on stressed branches and dead material.
Oak Wilt *Ceratocystis fagacearum*			None reported or detected during annual aerial survey.
Phomopsis Gall *Phomopsis sp.*	Bitternut hickory	Orwell	Many galls on a few trees.
Red Ring Rot *Phellinus pini*	White Pine Other conifers	Scattered	Sometimes causing significant degrade, especially where past heavy weevil damage has occurred.
Sapstreak *Ceratocystis coerulescens*	Sugar Maple	Springfield	Large ornamentals.
Sirococcus *Sirococcus strobilinius*			None reported.
Tomentosus Butt Rot *Inonotus tomentosus*			None reported.
Verticillium Wilt *Verticillium albo-atrum*			None reported.
White Pine Blister Rust *Cronartium ribicola*	White pine	Throughout	Continues to kill some ornamentals, field trees and Christmas trees. Stable.
Woodgate Gall Rust *Endocronartium harknessii*	Scots pine	Throughout	Scattered reports of heavy damage to ornamentals, especially in Ludlow, Rutland and Guilford.
Yellow Witches Broom Rust *Melampsorella caryophyllacearum*	Balsam fir	Throughout	Typical levels of damage, especially for Christmas trees on former agriculture land where chickweed is present.

FOLIAGE DISEASES

Anthracnose and other foliar diseases were unusually abundant this year due to the wet weather. **Maple Anthracnose,** caused by *Discula spp*. and\or *Aureobasidium apocrytum*, became very heavy and noticeable statewide by late in the season. Nearly 3,400 acres of hardwood anthracnose were mapped (Table 15) in northeastern and north-central Vermont but this is a large underestimate of the true distribution and extent of the browning.

Table 15. Mapped acres of damage by Anthracnose in 2006.

County	Acres Mapped
Addison	0
Bennington	0
Caledonia	98
Chittenden	0
Essex	259
Franklin	O
Grand Isle	0
Lamoille	0
Orange	191
Orleans	2,329
Rutland	0
Washington	413
Windham	0
Windsor	0
Total	**3,391**

Septoria Leaf Spot of paper birch, caused by *Septoria betulae*, was very heavy and widespread in much of the state this year. Many paper birches were virtually leafless by late summer. Damage was particularly heavy at upper elevations and in northeastern Vermont, where 46,098 acres were aerially mapped (Table 16). Again, this is an underestimate of true distribution and extent of damage.

Table 16. Mapped acres of Septoria leaf spot in 2006.

County	Acres Mapped
Addison	0
Bennington	0
Caledonia	8,848
Chittenden	0
Essex	28,358
Franklin	0
Grand Isle	0
Lamoille	0
Orange	0
Orleans	8,892
Rutland	0
Washington	0
Windham	0
Windsor	0
Total	**46,098**

OTHER FOLIAGE DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Actinopelte Leaf Spot *Actinopelte dryina*			None reported.
Anthracnose *Glomerella spp.* *Apiognomonia spp.* *Gloeosporium spp.*	Lilac	Rockingham	See narrative and Ash Anthracnose. Ornamentals.
Apple Scab *Venturia inaequalis*	Apple	Throughout	Heavy damage due to early season rains.
Ash Anthracnose *Gnomoniella fraxini*	White ash	Throughout	Moderate to heavy damage commonly seen.
Balsam Fir Needlecast *Lirula nervata*	Balsam fir	Northeastern VT	Occasional damage.
Brown Spot Needle Blight *Scirrhia acicola* *Mycosphaerella dearnessii*	White pine Scots pine	Throughout	Unusually heavy damage noticed. Many forest trees and ornamentals lost all their older needles, resulting in very thin crowns.
Bullseye Spot *Cristulariella moricola*			None observed.
Cedar-Apple Rust *Gymnosporangium spp.*	Crabapple	Scattered	Leaf spots observed.
Coccomyces Leaf Spot *Blumeriella jaapii*	Cherry	Widespread	High levels of damage.
Cyclaneusma Needlecast (formerly Naemacyclus) *Cyclaneusma minus*			None reported.
Dogwood Anthracnose *Discula destructiva*			None reported.
Fir Fern Rust *Uredinopsis mirabilis*	Balsam fir	Throughout	Some heavy damage observed on Christmas trees and forest trees.

DISEASE	HOST(S)	LOCALITY	REMARKS
Fraser Fir Canker			None reported.
Probably *Fusarium sp.*			
Giant Tar Spot	Norway maple	Throughout	Unusually heavy damage.
Rhytisma sp.			
Larch Needlecast			None reported.
Possibly *Mycosphaerella sp.*			
Linospora Leaf Blight			None seen.
Linospora tetraspora			
Lophodermium Needlecast			None reported.
Lophodermium seditiosum			
Maple Anthracnose	Sugar maple		See narrative.
Discula spp. *Aureobasidium apocrytum.*			
Peach leaf Curl			None reported.
Taphrina deformans			
Phyllosticta Leaf Spot	Maples	Champlain Valley	
Phyllosticta minima			
Poplar Leaf Blight			None reported.
Marssonina spp.			
Powdery Mildew	Lilac	Scattered throughout	Ornamentals
Erysiphe polygoni			
Rhabdocline Needlecast			None reported.
Rhabdocline pseudotsugae			
Rhizosphaera Needle Blight	Balsam fir	Northern VT	Mostly light damage but increasingly common.
Rhizosphaera pini			
Rhizosphaera Needlecast of Spruce	Blue spruce	Throughout	Moderate to high levels of infection often seen.
Rhizosphaera kalkhoffi			

DISEASE	HOST(S)	LOCALITY	REMARKS
Septoria Leaf Spot *Septoria betulae*			See narrative.
Swiss Needlecast *Phaeocryptopus gaeumannii*			None reported.
Tar Spots *Rhytisma acerinum* *Rhytisma punctatum*	Red maple Striped maple Silver maple	Throughout	Noticeable this year.
Tubakia Leafspot *Actinopelte dryina*			None reported.
Venturia Leaf Blight *Venturia acerina*	Red maple Quaking aspen	Scattered	Slight damage.
Walnut Downy Leaf Spot *Microstroma juglandis*			Light levels of damage.
White Pine Needle Blight *Canavirgella banfieldii*	White pine	Scattered throughout	Low levels.
Willow Scab *Venturia saliciperda*			None reported.

ROOT DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Annosus Root Rot			None reported.
Heterobasidion annosum			
Brown Cubical Root Rot	White pine	Scattered	Sporophores more common in 2006.
Polyporous schweinitzii			
Dead Man's Fingers			None reported.
Xylaria sp.			
Phytophthora Root Rot	Fraser fir Balsam fir	Widely scattered	Continues to cause mortality of Christmas trees on poorly drained sites.
Phytophthora sp.			
Shoestring Root Rot	Sugar maple Red oak Many others	Throughout	Mycelial fans common on recently dead trees and mushrooms common in recently defoliated stands in southern Vermont where trees are declining. Prolific mushroom fruiting statewide.
	Fraser fir Balsam fir	Walden Scattered elsewhere	Heavy mortality of Fraser fir Christmas trees. Fraser-balsam crosses had less damage, while balsams had little damage.
Armillaria spp.			

DIEBACKS, DECLINES, AND ENVIRONMENTAL DISEASES

Birch Decline and Mortality

Birch decline and mortality increased this year (Figure 18), especially on paper birch at upper elevations. Aerial surveys mapped decline on 15,572 acres (Table 17 and Figure 19). Decline began showing up after recent drought years, and successive years of defoliation. The 1998 ice storm may have been involved in initiating decline in some areas.

Table 17. Mapped acres of birch decline and mortality in 2006.

County	Acres
Addison	1,905
Bennington	0
Caledonia	565
Chittenden	516
Essex	326
Franklin	123
Grand Isle	0
Lamoille	2,530
Orange	580
Orleans	3,354
Rutland	0
Washington	5,382
Windham	0
Windsor	291
Total	**15,572**

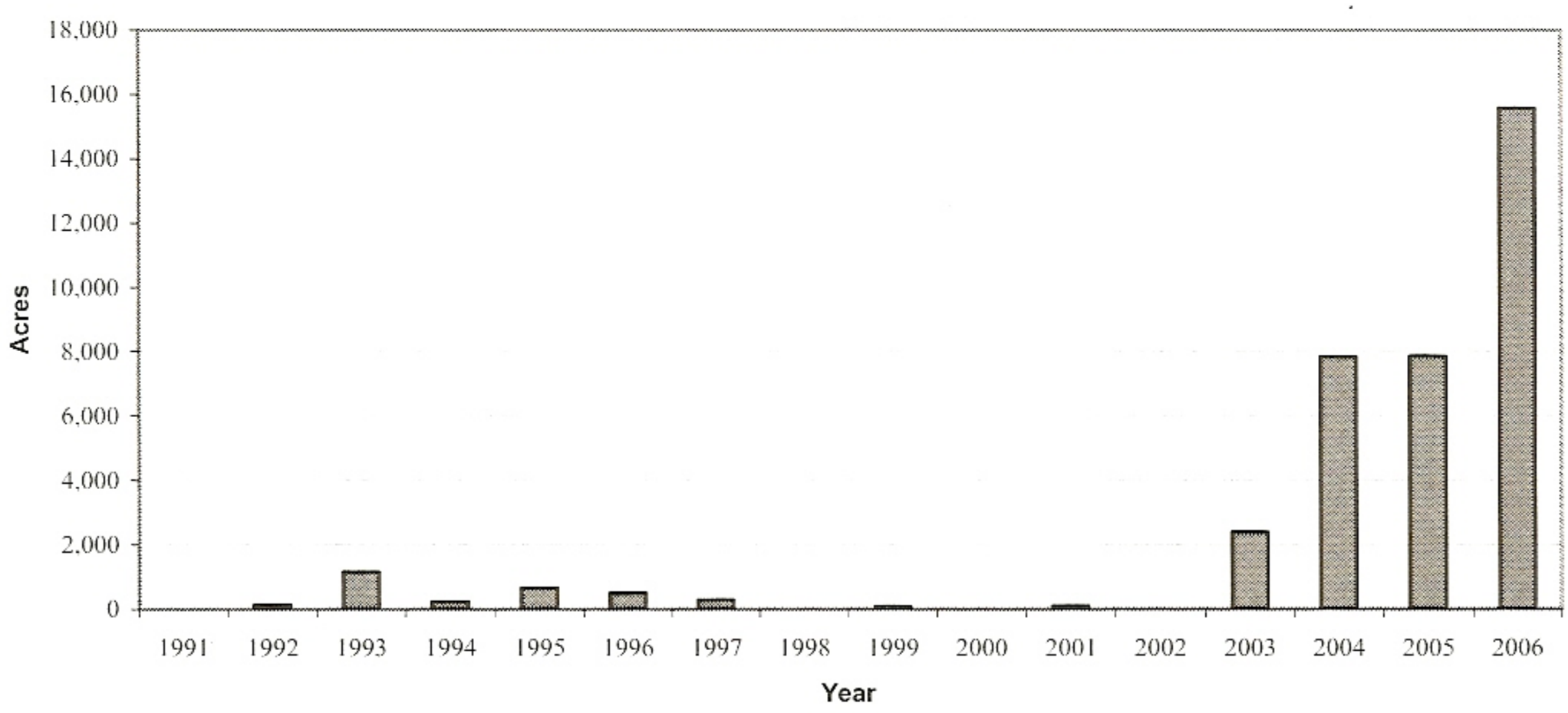


Figure 18. Trend in acres of birch decline and mortality from 1991 to present showing dramatic increase in 2006.

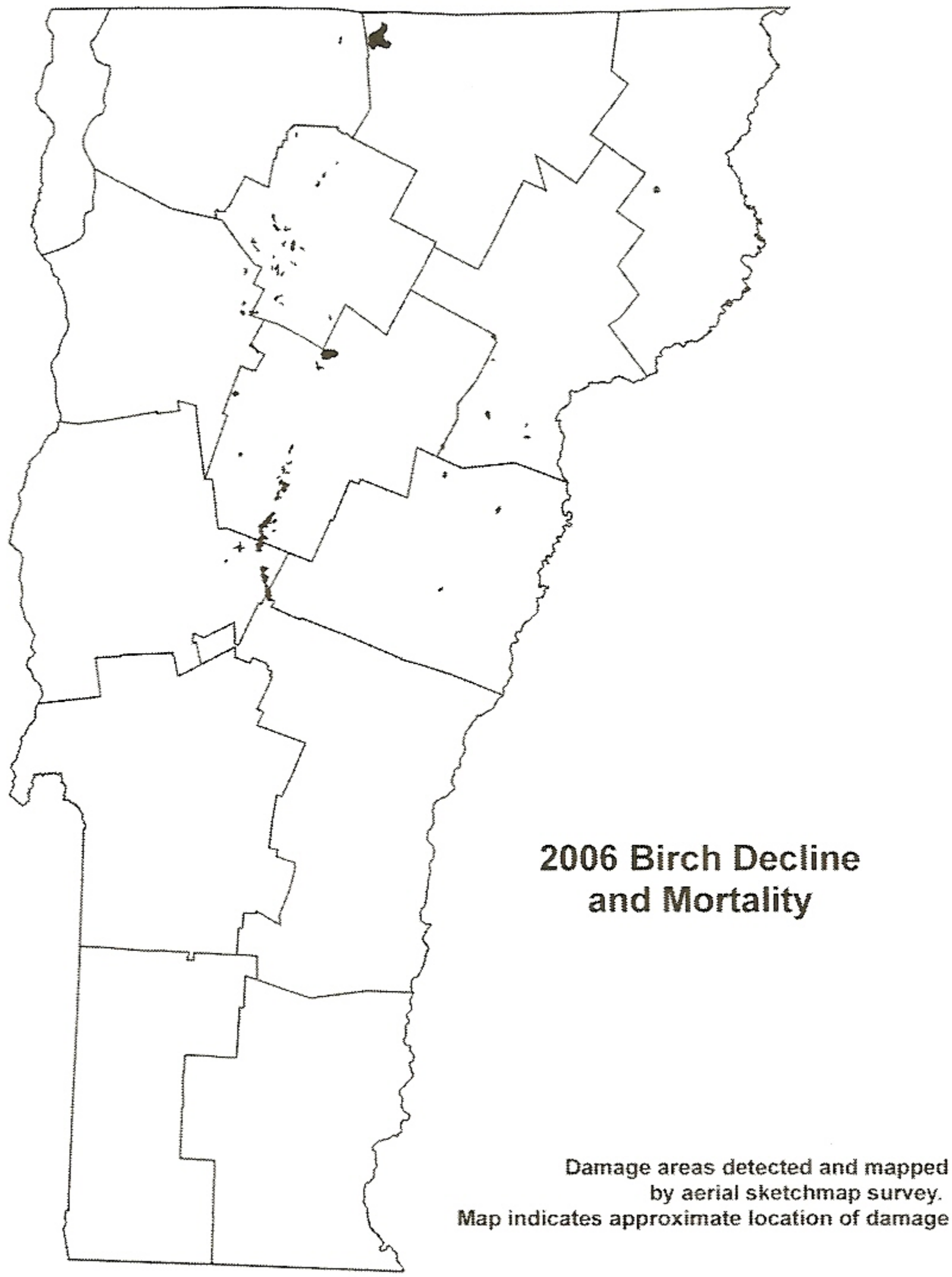


Figure 19. Birch decline and mortality in 2006. Mapped area is 15,572 acres.

Hardwood Decline and Mortality

Statewide acres mapped as hardwood decline and mortality have continued to decrease over the past three years (Figure 20). Statewide, hardwood forest decline was mapped on 7,783 acres this year (Table 18, Figure 21), compared to the 2003 peak of 50,039 acres. Although good growing season rainfall may account for some of the improvement, the acreage mapped in 2006 under-represents the area of decline. In most of the state, sketchmapping was done in mid-summer, before decline symptoms develop. In the three northeastern counties, where mapping was done later in the growing season, decline was more evident this year. In that region 6,594 acres were mapped, compared to 818 in 2005. Southern Vermont declines were associated with recent forest tent caterpillar defoliation and beech bark disease.

Table 18. Mapped acres of hardwood decline and mortality in 2006.

County	Acres
Addison	447
Caledonia	2,521
Chittenden	5
Essex	2,370
Franklin	373
Lamoille	38
Orange	115
Orleans	1,703
Washington	210
Total	**7,783**

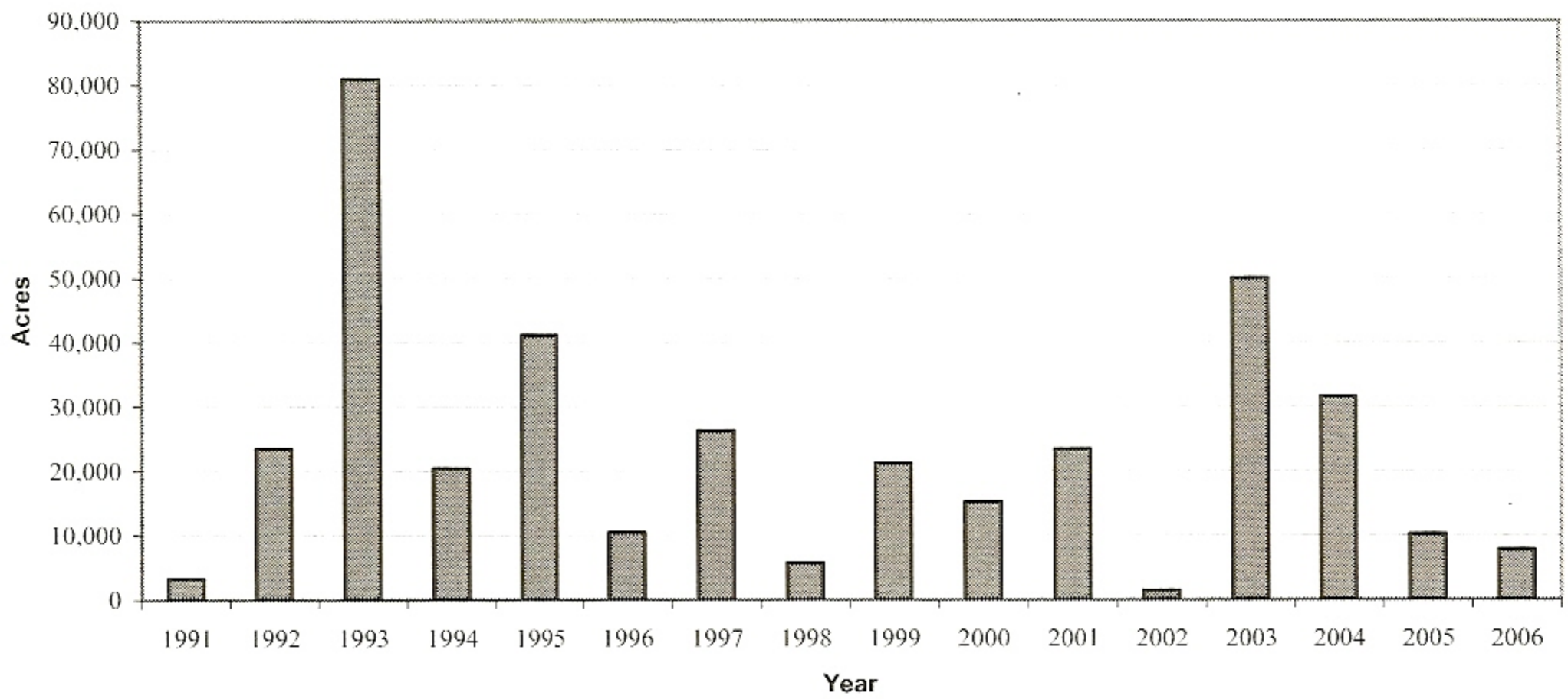


Figure 20. Trend in acres of hardwood decline and mortality from 1991 to present showing a decrease in 2006.

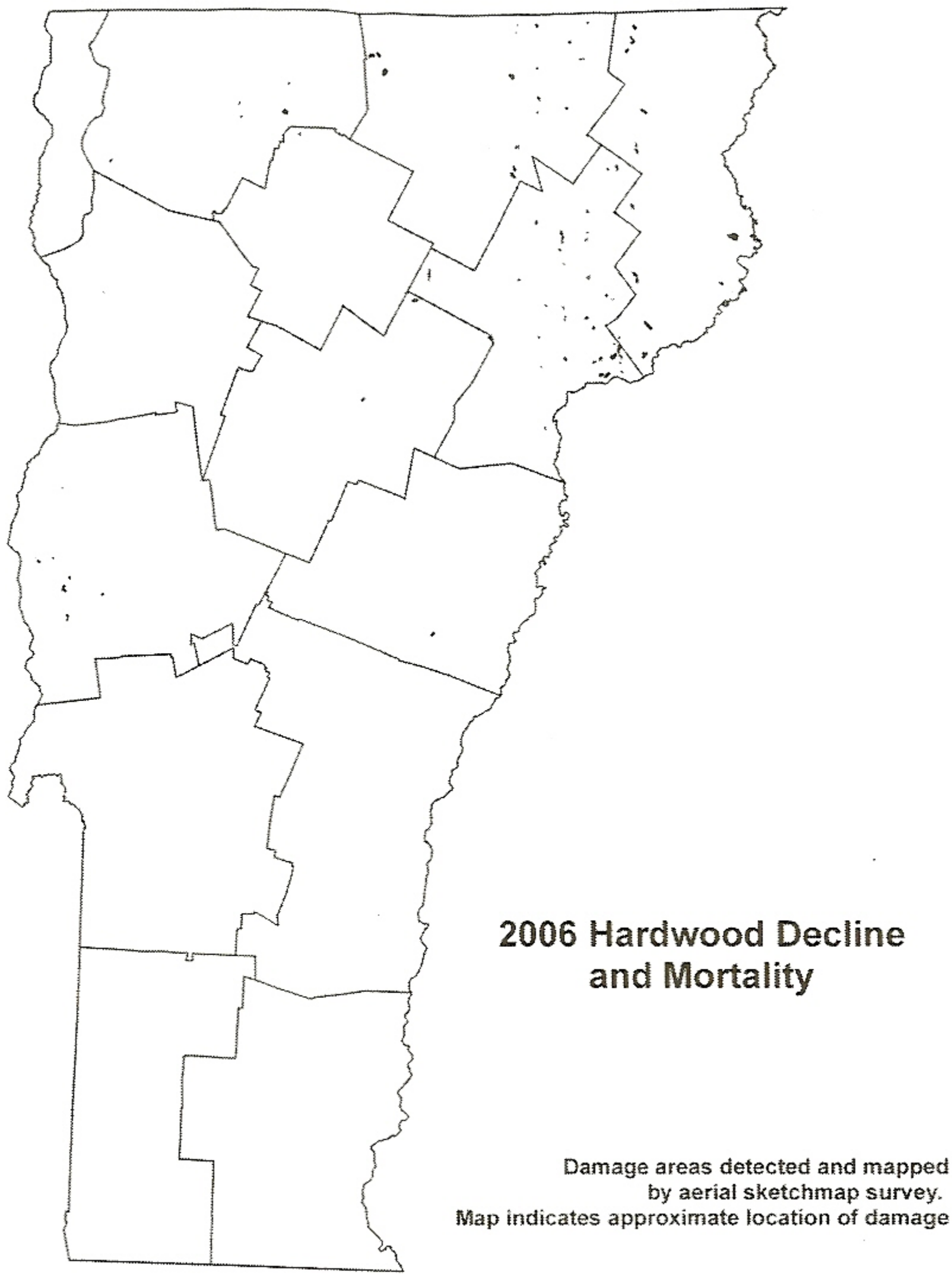


Figure 21. Hardwood decline and mortality in 2006. Mapped area is 7,783 acres.

Larch Decline

Mortality continues in small patches in widely scattered locations, and is particularly noticeable in Essex and Orleans counties. The recent increase in decline is attributed to drought years and subsequent invasion by eastern larch beetle (Table 19, Figure 22). A total of 1,932 acres of decline and mortality was mapped in 2006.

Table 19. Mapped acres of larch decline in 2006.

County	Acres
Bennington	54
Caledonia	47
Chittenden	14
Essex	1236
Franklin	32
Lamoille	46
Orleans	434
Rutland	70
Total	**1932**

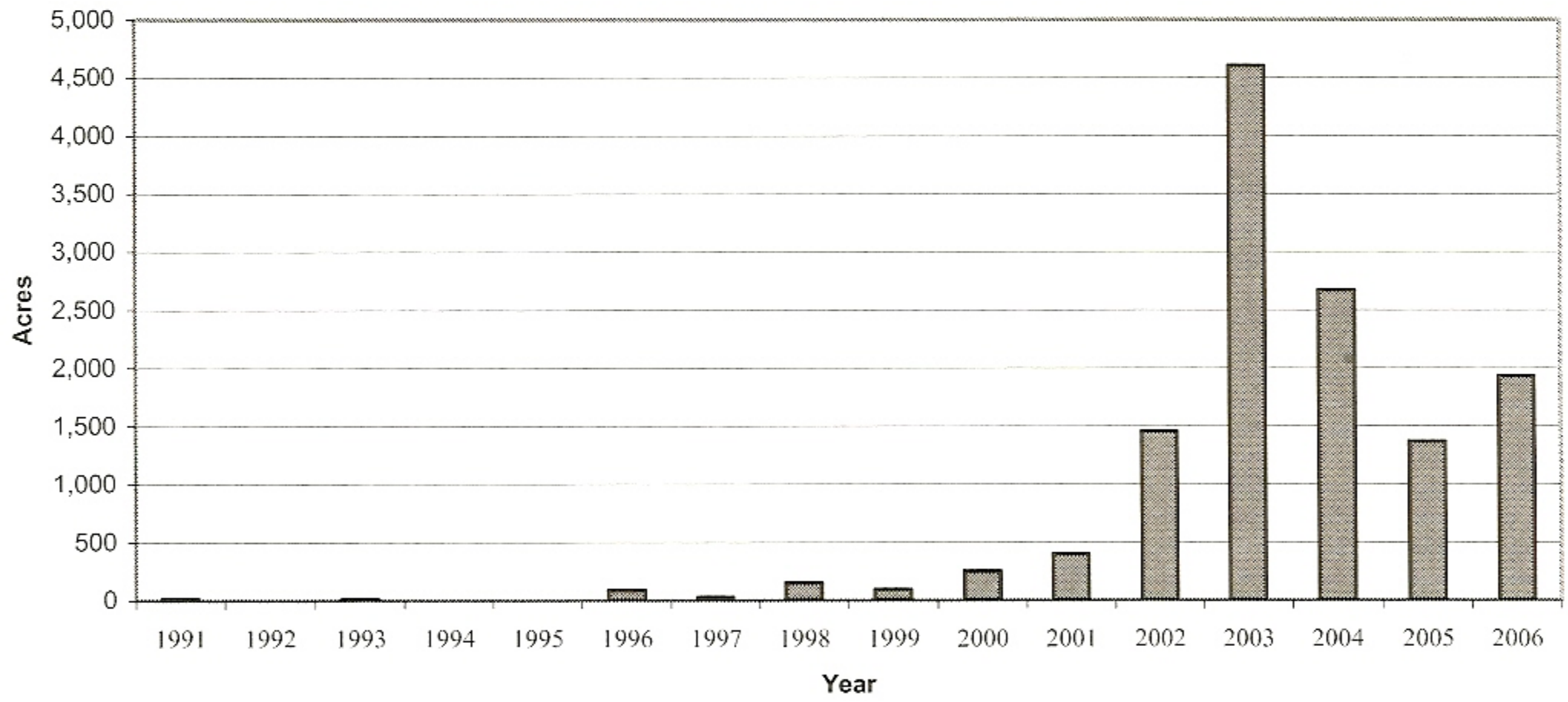


Figure 22. Trend in acres of larch decline from 1991 to present.

Logging-related Decline

There was a decrease in mapped areas of logging-related decline this year, although it continues to be evident in widely scattered locations. Total area mapped during aerial survey is 2,973 acres (Table 20).

Table 20. Mapped acres of logging-related decline and mortality in 2006.

County	Acres
Caledonia	997
Essex	258
Lamoille	183
Orange	742
Orleans	572
Washington	19
Windham	76
Windsor	126
Total	**2,973**

Ozone Injury

In 2006, 12 locations were visited to survey for ozone injury on bioindicator plants. Symptoms of ozone injury (stippling on upper leaf surface) were recorded at 42% of the sites (Table 21). Symptoms were most common on white ash plants, but were also found on some milkweed and black cherry. One location (Hyde Park) was discontinued in 2006 because fewer bioindicator plants are now available. Underhill was not visited. Information on symptoms of ground-level ozone injury on sensitive plant species is collected annually as part of the National Forest Healthy Monitoring Program. No symptoms of ozone injury were observed during other routine forest observations.

Table 21. Ozone bioindicator sites visited in 2006 and presence of ozone injury.

Town	Site Number	Injury
Bakersfield	4407277	None
Clarendon	4307268	None
Dover	4307215	Present
Groton	4407222	None
Hancock	4307287	Present
Lunenburg	4407168	None
Orange	4407223	None
Rupert	1050002	Present
Springfield	4307244	None
Sudbury	4307372	Present
Waterford	4407137	None
Woodstock	1050005	Present

Spruce-Fir Decline and Mortality

The area of spruce-fir decline and mortality decreased dramatically in 2006 as tree health improved following drought and balsam woolly adelgid stress seen in 2003-2005 (Table 22 and Figures 23 and 24).

Table 22. Mapped acres of spruce-fir decline and mortality in 2006.

County	Acres
Addison	62
Bennington	109
Caledonia	0
Chittenden	94
Essex	865
Franklin	262
Grand Isle	49
Lamoille	67
Orange	712
Orleans	245
Rutland	36
Washington	963
Windham	165
Windsor	79
Total	**3,708**

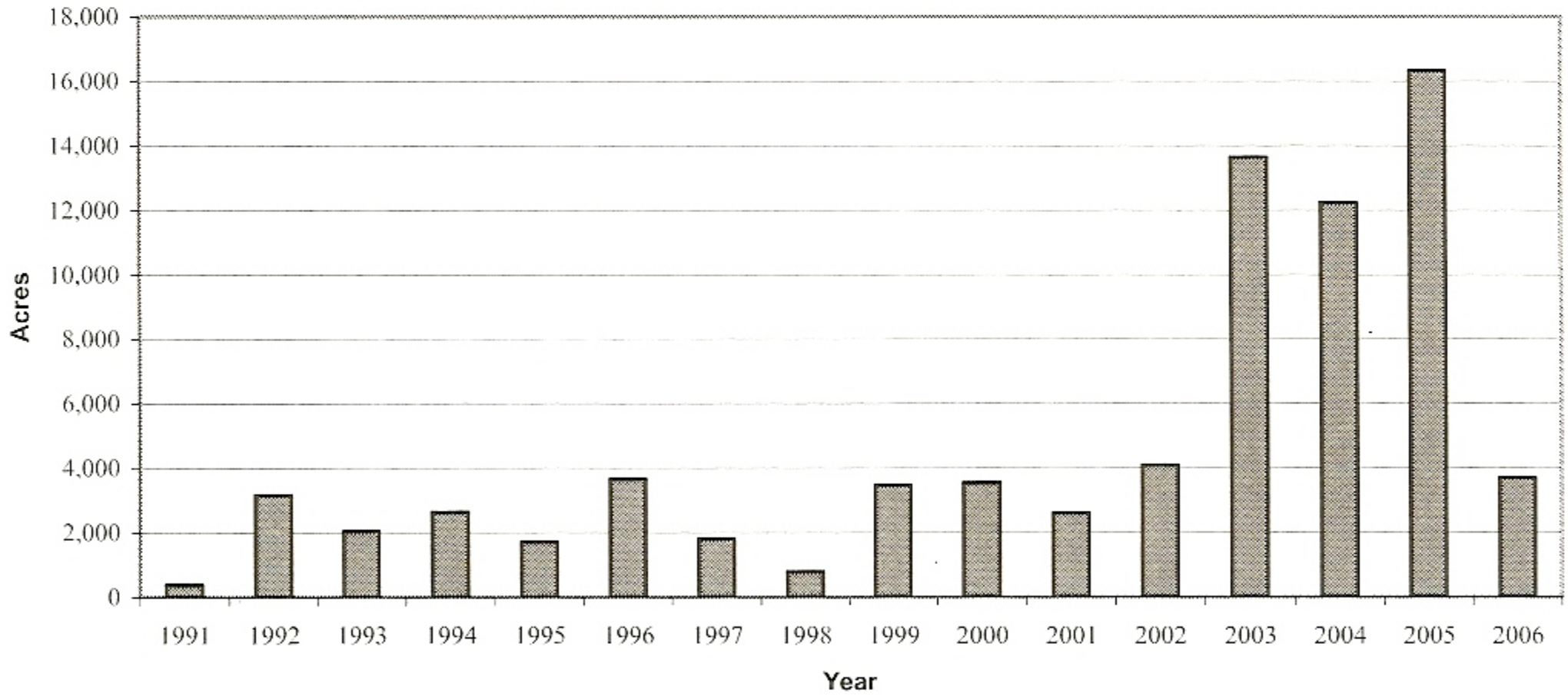


Figure 23. Trend in acres of spruce-fir decline and mortality from 1991 to present showing improved tree health in 2006.

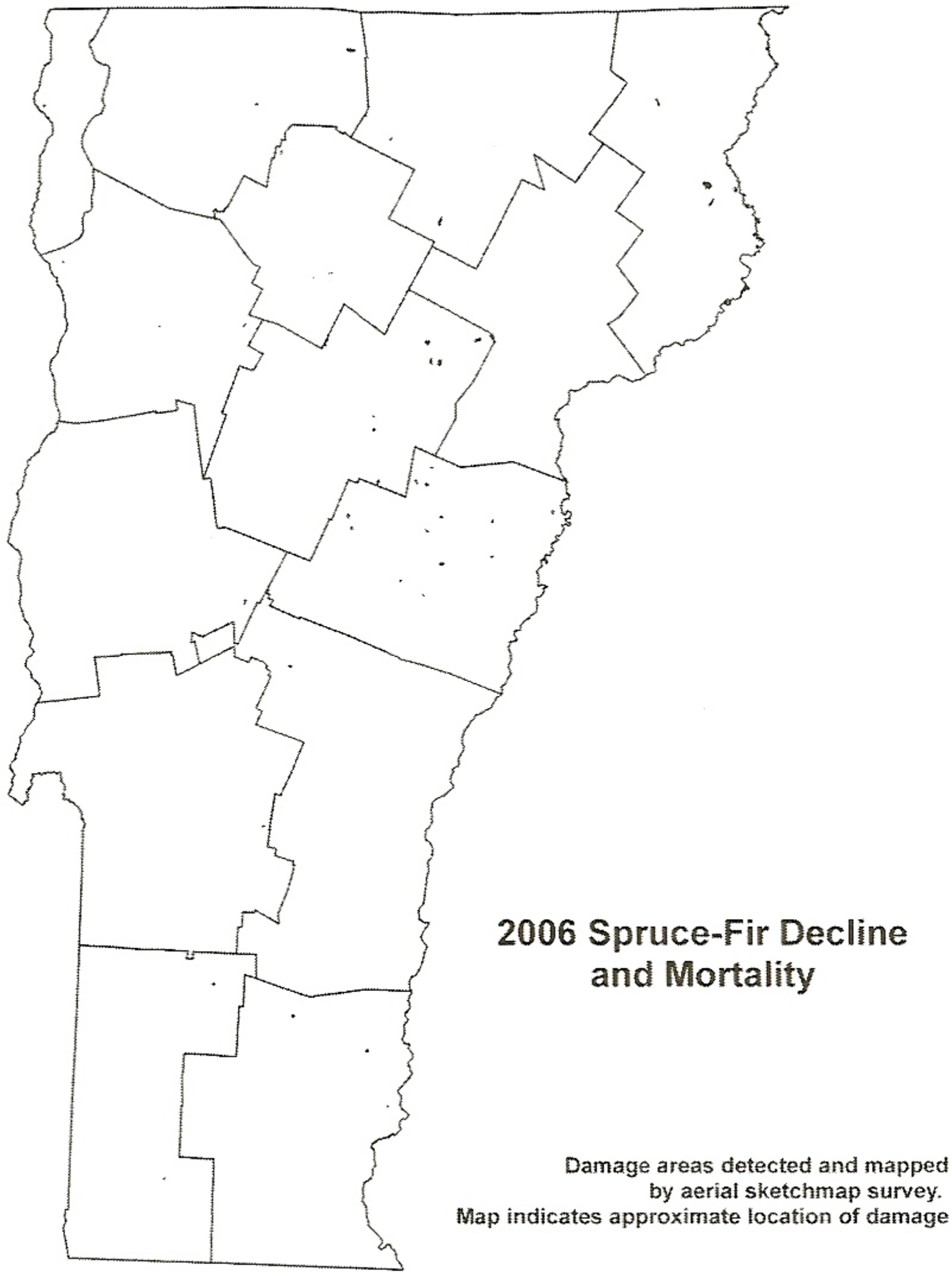


Figure 24. Spruce-fir decline and mortality mapped in 2006. Mapped area is 3,708 acres.

Wet Sites

The total mapped area of forest decline due to flooding decreased this year, and ground observations suggest that the mapped area under-represents actual damage. Aerial mapping showed 6,036 acres of decline associated with wet sites (Table 23, Figure 25).

Table 23. Mapped acres of dieback and mortality associated with wet site conditions in 2006.

County	Acres
Addison	12
Bennington	134
Caledonia	185
Chittenden	0
Essex	1,413
Franklin	723
Grand Isle	908
Lamoille	321
Orange	567
Orleans	1,082
Rutland	61
Washington	230
Windham	188
Windsor	211
Total	**6,036**

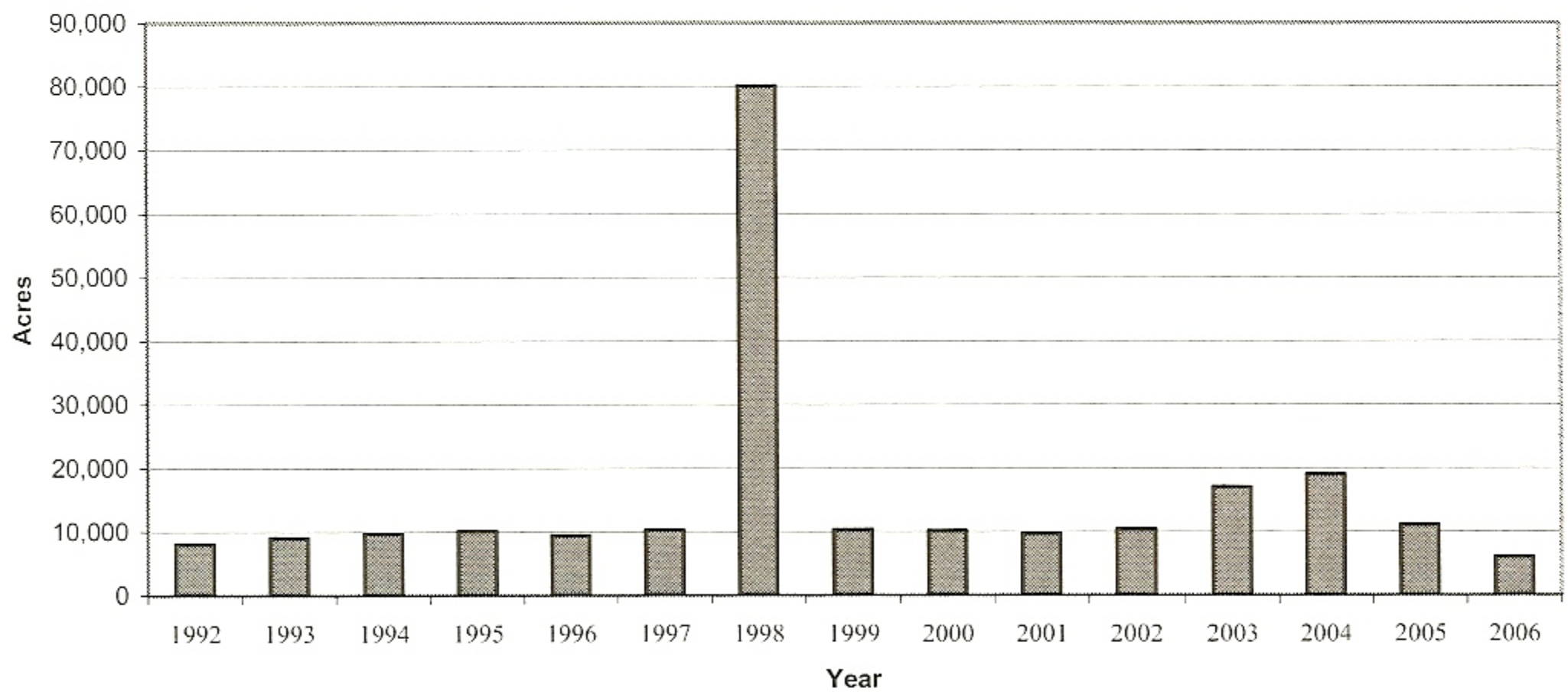


Figure 25. Trend in declines associated with wet site conditions showing improvement in 2006.

Wind Damage

The total mapped area of forest damaged by wind in 2006 was 750 acres (Table 24). Three counties experienced wind events: Caledonia, Bennington and Windham. A September 9th microburst in Hartland and Hartford led to areas of blowdown and areas of scattered broken and wind thrown trees. Trees that had already formed good abscission layers (ash) or had small, defoliated leaves (sugar maple) had less damage than the beech, pine, hemlock, oak and hickory that had more leaf surface. A February wind storm in Northern Bennington and Southeastern Rutland Counties blew down large white pines in widely scattered locations between Dorset and Londonderry, and conifers in Shrewsbury, and an early December windstorm caused light damage to susceptible species and trees with defects.

Table 24. Mapped acres of wind damage to forests in 2006.

County	Acres
Bennington	77
Caledonia	625
Windham	48
Total	**750**

OTHER DIEBACKS, DECLINES, AND ENVIRONMENTAL DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Air Pollution Injury	Sensitive plants	Widely scattered	See narrative. (Ozone Injury)
Ash Dieback			
Birch Decline			See narrative.
Delayed Chlorophyll Development			Not reported.
Drought	Numerous	Scattered	Drought stress from previous years is still resulting in decline on a wide variety of trees species.
Edema			Not reported.
Fertilizer Injury			Not reported.
Fire Damage			Not reported.
Frost Damage			Not reported.
Girdling Roots	Ornamentals	Throughout	Common cause of decline of planted trees.
Hardwood Decline and Mortality	Hardwoods	Scattered throughout	See narrative.
Heavy Seed	Sugar and Norway maple; ash; spruce; fir and cedar	Throughout	Extremely heavy cone crop on many conifers and heavy seed on many hardwoods. Thin crowns on some ornamentals. Foliage on affected trees was chlorotic in spring.
Herbicide Injury			Not reported.

DISEASE	HOST(S)	LOCALITY	REMARKS
Ice Damage			Not reported.
Improper Planting			Not reported.
Interior needle drop	Fir	Throughout	Yellowing of older needles heavier than usual this year on Christmas trees.
Larch Decline			See narrative.
Lightening			Not reported.
Logging-related Decline			See narrative.
Maple Decline			See Hardwood Decline narrative.
Mechanical Injury			Not reported.
Pesticide Injury			Not reported.
Salt Damage			Not reported.
Snow Breakage	Hardwoods	Scattered	Light damage from October 2005 snow storm still noticeable in scattered locations.
Spruce/Fir Dieback and Mortality			See narrative.
Wet Site			See narrative.
White Pine Needle Blight			See foliage diseases.
White Pine Mortality			Not reported.
Wind Damage			See narrative.
Winterburn			Not reported.
Winter Injury			Not reported.

ANIMAL DAMAGE

ANIMAL	SPECIES DAMAGED	LOCALITY	REMARKS
Beaver			None reported
Cattle			None reported
Deer			Occasional damage to yard shrubs
Moose			Continue to be a problem in Essex County
Mouse and Vole			No unusual damage
Porcupine			None reported
Sapsucker			Occasional damage to landscape trees
Squirrel			None reported
Woodpecker			None reported

TRENDS IN FOREST CONDITION

Trend in Sugar Maple Health on North American Maple Project (NAMP) Plots

For the 19th year, 38 sites and over 1,200 overstory sugar maple trees were surveyed to assess their condition, and biotic or abiotic stress agents. Less than 90% of overstory sugar maples on our NAMP plots were healthy for the first time in a decade (Figure 26). Recent defoliation by the forest tent caterpillar at 13 of the 38 sites has impacted tree health. Average foliage transparency was 25% for the second straight year, and is the highest average recorded over the 19 year history of this monitoring program (Figure 27). Average dieback increased to nearly 10% as long-term tree health impacts from forest tent caterpillar defoliation begin to take a toll on sugar maples. Thirteen NAMP plot-clusters had trees with moderate to heavy defoliation by the forest tent caterpillar in 2006, and 8 of these plots have been defoliated for 3-4 years. An additional plot was defoliated by saddled prominent. Trees with high dieback (greater than 15%) are another indication that long-term tree health has been impacted by defoliation. Nearly half the defoliated sites now have 10-44% of trees with high dieback (Figure 28). A complicating factor is that there was some defoliation by other pests (Bruce spanworm, maple leaf cutter and pear thrips) in years preceding the forest tent caterpillar outbreak. In 2006, the statewide mortality average was 1.2% of overstory sugar maple trees. Three plot-clusters had higher than normal mortality, and 38% of the new dead trees had been defoliated at least once over the past 4 years.

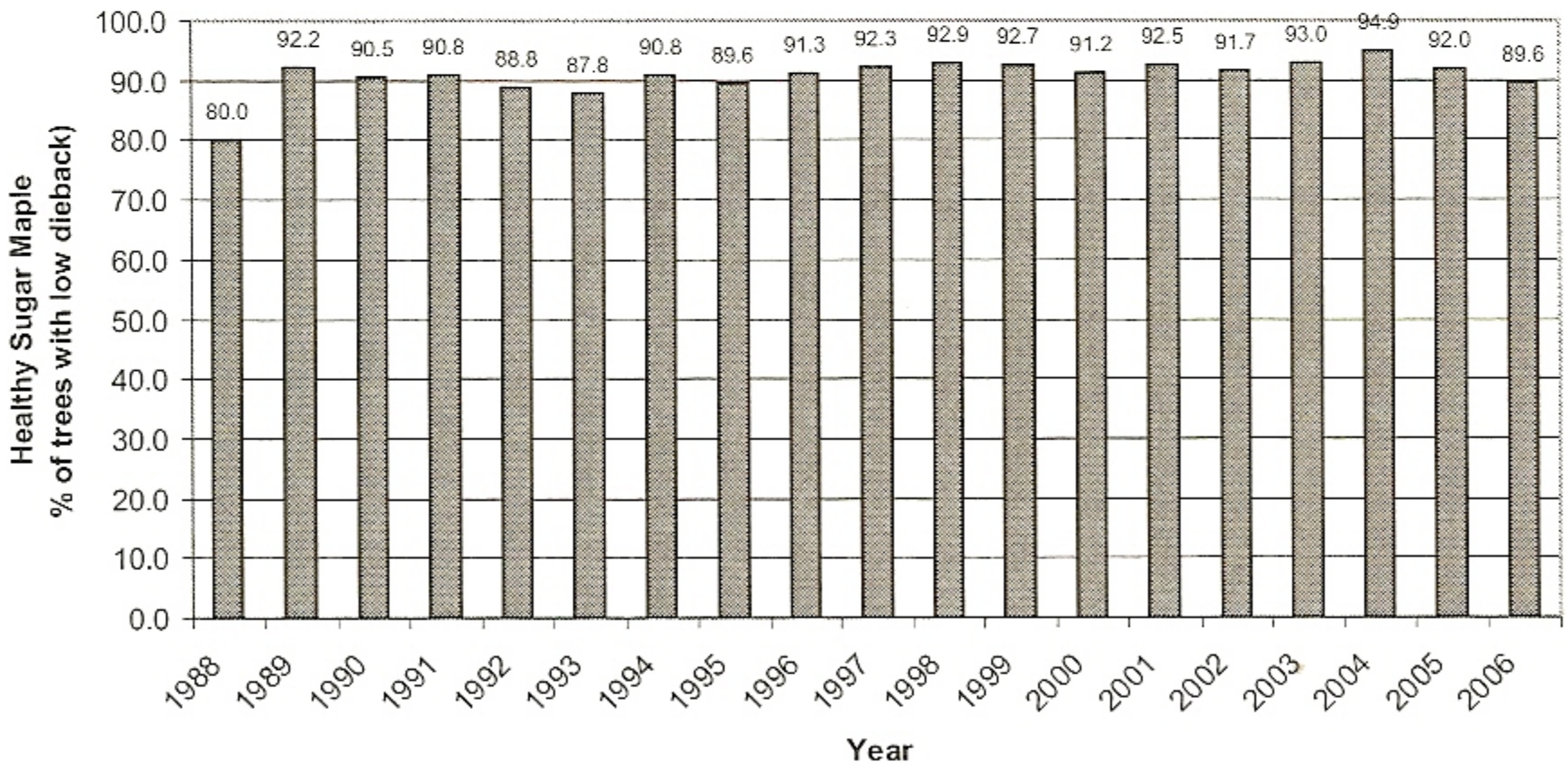


Figure 26. Trend in healthy overstory sugar maple trees on NAMP plots. Health based on trees with less than 15% dieback.

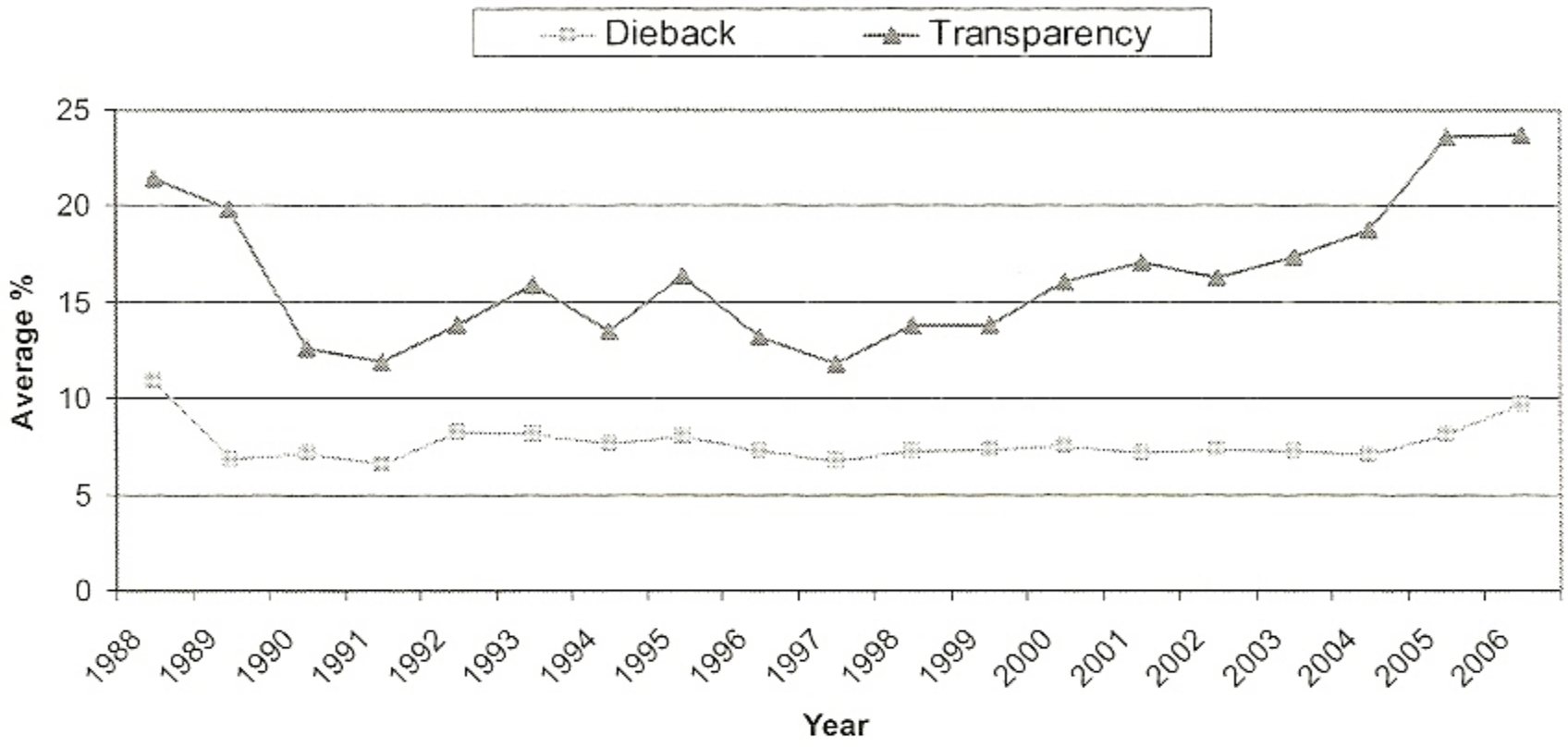


Figure 27. Trend in overstory sugar maple condition from 1988 to 2005.

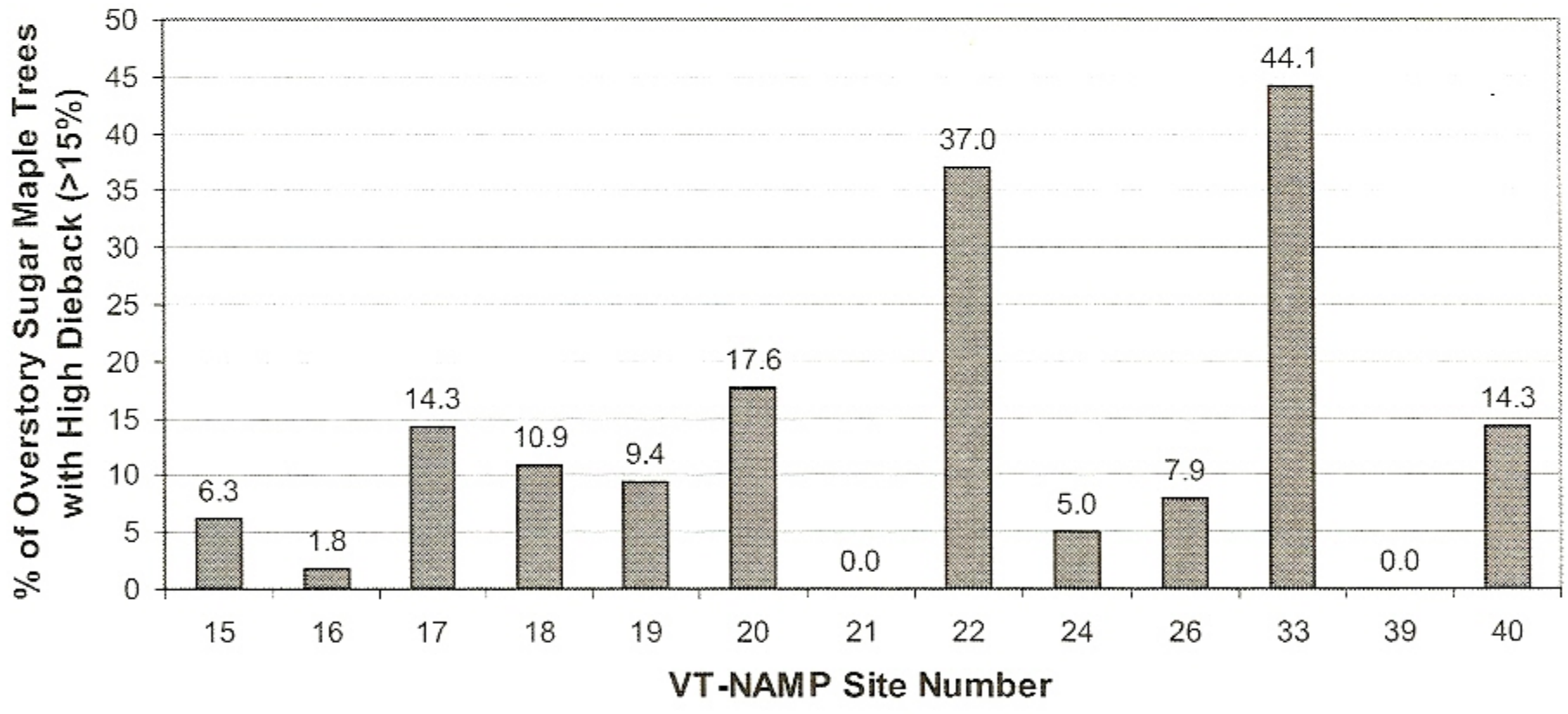


Figure 28. Percent of overstory sugar maple with high dieback following defoliation by forest tent caterpillar in 2006.

URBAN AND COMMUNITY FORESTRY

About the Program
Funded in part by a grant from the USDA Forest Service, Vermont's Urban & Community Forestry Program is designed to help communities plan, plant, and care for their community trees. Since the program's inception in 1991, the program has provided technical and financial assistance to over 150 Vermont communities and more than $965,000 in competitive grants have been awarded to Vermont municipalities and volunteer organizations all over Vermont. Visit the web site at www.Vtcommunityforestry.org.

Financial Support
Trees for Local Communities (TLC) Cost-share Program provides money to Vermont communities for the purpose of developing and implementing local urban and community forestry programs.

Technical Assistance
Consultation and on-site technical assistance is available from the District Urban and Community Foresters in 5 regional offices, the Community Involvement Coordinator, the Program Coordinator and the Forest Health Specialists.

Information & Education
The Town Green newsletter, a quarterly publication, can be found at:
http://www.vtfpr.org/urban/for_urbcomm_towngreen.cfm

Urban Tree Health
Information on each specific pest is located in the appropriate section within this document.

FOREST BIOLOGY LABORATORY

FOREST PROTECTION DIVISION
Department of Forests, Parks and Recreation

The Forest Biology Lab was established in the Environmental Laboratory Building in Waterbury in 1990. Our goal is to approach forest health issues and management through complementary programs in research, public education, and extension activities. We provide diagnostic services, recommendations and advice on appropriate control strategies and materials for pest problems. Factors that affect the health of our forests (eg., weather, insects and disease) are routinely monitored. We maintain a state reference collection, document and analyze insect and disease records, and help evaluate and broaden public awareness of factors that affect forest health.

Diagnostic Work and Inquiries. Providing identifications, advice and information about insects and diseases associated with trees in urban, forest and plantation settings remains a priority at the Forest Biology Lab. This year, we responded to 537 such requests. These inquiries were received from the public (45%), county foresters, other forestry professionals and the green industry (36%), researchers, teachers, students and writers (8%), other labs (5%), media (2%) and miscellaneous other users (4%). Information about insects and diseases diagnosed at the Forest Biology Lab appears in appropriate sections in the body of this report. We received inquiries from all counties in Vermont. The highest number of requests came from people in Washington County (121), while the lowest number came from Essex County (4). Ten per cent of the requests (52) came from states other than Vermont.

Survey and Detection. At the lab, we are responsible for screening the contents of pheromone traps and identifying target and non-target insects captured during monitoring activities. In 2006, surveys continued for forest tent caterpillar and saddled prominent. We also did field surveys for some exotic pests, including *Tetropium fuscum* (the brown spruce longhorn beetle), *Dendrolimus superans* (Siberian moth), and *Sirex noctilio* (the sirex wood wasp). In addition, we did a rearing study to determine the presence of *Agrilus biguttatus* (oak splendor beetle) in white and chestnut oak wood from several sites in Vermont. Results of trapping efforts appear in this report.

Ticks in Vermont. Public awareness of ticks is on the increase. Though we had no formal tick surveillance program in place in 2006, we received 104 requests for tick identifications from the public and from our field staff. Species sent to the Forest Biology Lab included six of the 13 species of ticks known to occur in Vermont, namely the deer tick (59 specimens), the American dog tick (32), the squirrel tick (8), the rabbit tick (3), the woodchuck tick (1), and the lone star tick (1).

In addition to actual specimens, we received reports of "lots of ticks" from several areas, most notably Danville, Richmond and Springfield. Callers from Springfield and Richmond said that they acquired deer ticks on a daily basis, and that they found ticks well into the winter months, a fact that reflects the unusually warm weather toward the end of the year.

Deer ticks may be more prevalent in Vermont now than in past years for a variety of reasons. Though we are of real need of more information in this area, we do know that an array of host and habitat factors play a role in tick presence and abundance. For example, in many areas, deer are more abundant now than at any time in the last 400 years. Increased suburbanization has improved habitat for ticks and brings people in closer contact with forests. Milder winters have made it possible for ticks to thrive, and their hosts (deer, mice, chipmunks) to do especially well. A perception factor probably comes into play as well, with people becoming more aware of ticks because of the publicity about Lyme disease. If you have deer ticks, then there is always the possibility of Lyme disease.

The presence of deer ticks and Lyme disease have been documented in every Vermont county. Preliminary data from the Vermont Department of Health indicate that there were 62 cases of Lyme acquired in Vermont in 2006. In addition, tentative data show 15 imported cases and 28 cases of unknown exposure in 2006.

Forestry Centennial Coming Soon. 2009 marks the 100th anniversary of the Vermont Forestry Division. Preparations are already underway with a lot of interesting activities planned. Stay tuned for further information.

COMMON PESTS OF CHRISTMAS TREES IN VERMONT 2006

REPORTED BY THE

DEPARTMENT OF FORESTS, PARKS AND RECREATION

INTRODUCTION

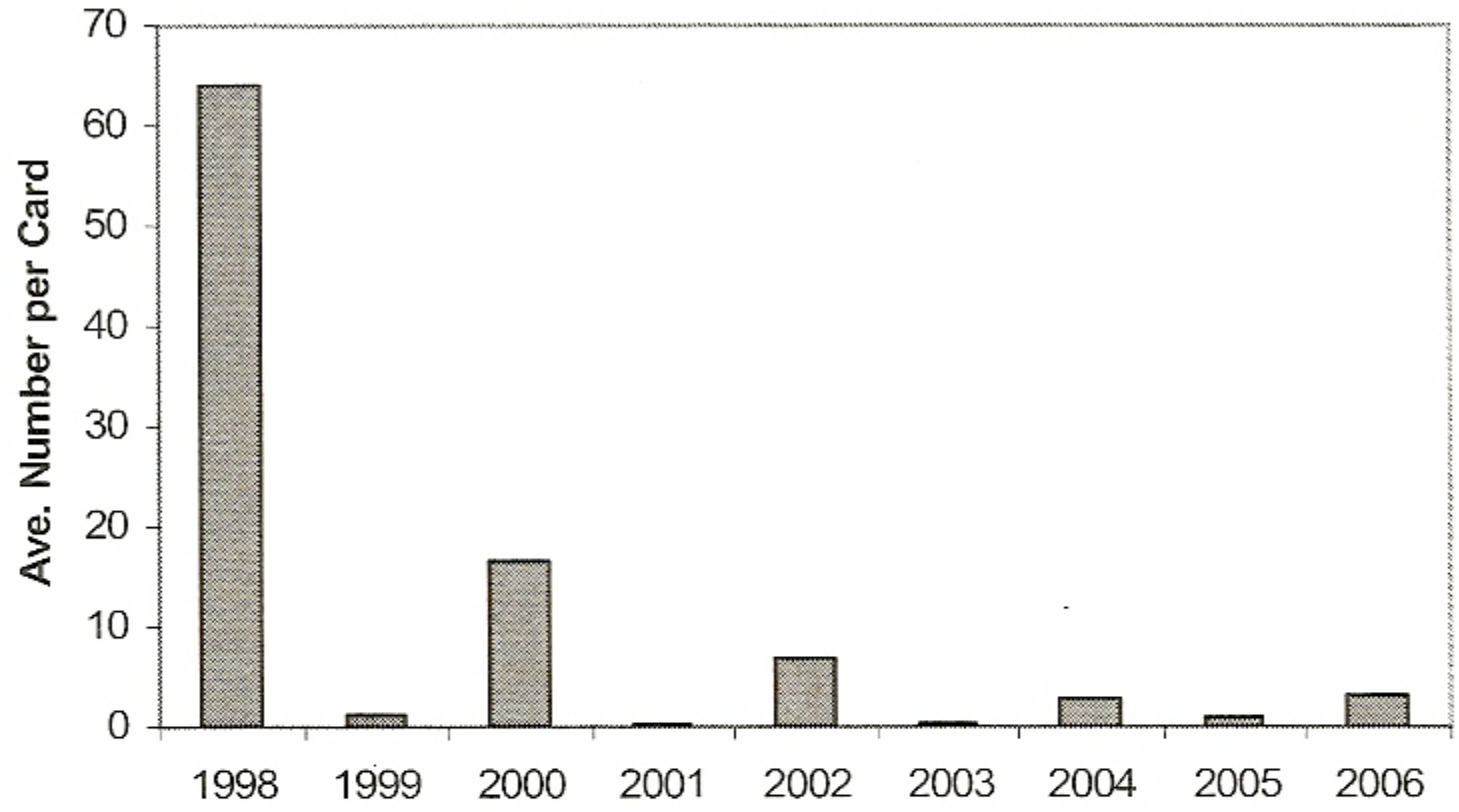
Information in this report is based largely on observations by Forest Resource Protection personnel, including some spot-checks of key plantations. This was again an excellent growing season for Christmas trees, similar to the past two years, and again many growers reported that their trees had few insect and disease problems.

INSECTS

Balsam Gall Midge populations remained extremely low, with little or no damage in most Christmas tree plantations. Damage remained heavy in one Cabot plantation but there were no reports of heavy damage elsewhere. Populations appear to be increasing slightly, as light damage is easier to find, but if they follow past patterns, this insect should not be a problem in most locations for next year.

Balsam Shootboring Sawfly population levels were up from last year, this being an even year. Damage to balsam and Fraser fir Christmas trees was common at up to moderate levels on some individual trees but population levels remain much lower than in 1998 and 2000 when there was much more concern about this insect. Adults caught on 3x5 yellow sticky cards placed in mid-crowns of trees in Lamoille County increased slightly this year but were still at low levels (3.1 per card). Damage was a bit higher than population levels of adults would indicate due to the

prolonged bud development (increasing the egg-laying period) associated with the cool wet spring. This insect is not expected to be a problem in 2007.



Number of Balsam Shootboring Sawfly Adults Caught on 3x5" Yellow Sticky Cards from 1998 to 2006.

Balsam Twig Aphid damage was mostly light but with some moderate damage similar to what was seen in 2005. Expect populations to increase in 2007.

Balsam Woolly Adelgid populations collapsed due to cold winter temperatures in 2004 and 2005 but there appears to be a resurgence of these insects on wild balsam fir trunks in northern Vermont. This insect was not observed on Christmas trees.

Cooley Spruce Gall Adelgid galls on blue spruce were found in only one location this year, in a Brownington plantation. Light populations were commonly seen on the alternate host, Douglas-fir.

Eastern Spruce Gall Adelgid damage to white spruce remains common, at mostly light to moderate levels.

Pine Spittlebugs were much less common this year.

Root Aphids were associated with discoloration and dieback of young fir trees in plantations in Springfield and Essex.

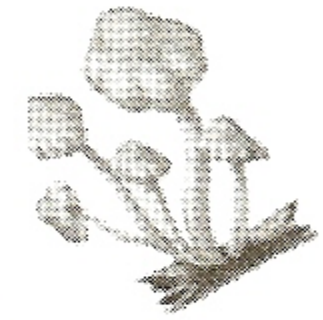
Sawyer Beetle adults were sometimes seen but damage was infrequent.

Spruce Bud Moth damage was common at light levels on blue spruce in widely scattered locations in northern Vermont.

Spruce Spider Mite populations remained mostly low. One plantation in Barton had a trace of damage but it was not observed elsewhere in northern Vermont. In southern Vermont, it remained common at light levels.

White Pine Weevil damage to pine and spruce trees remained common throughout the state area but damage remained mostly at light levels.

DISEASES



Armillaria Root Rot continues to be a problem associated with tree mortality in more and more plantations. This is particularly true for sites that are on their third rotation and plantations where trees are inter-planted near old stumps. Fraser fir is much more susceptible to this root rot than balsam fir, while balsam-Fraser crosses appear to be intermediate in susceptibility. Since many growers are now converting to Fraser fir by planting them between mature balsam Christmas trees, this could be risky in terms of Armillaria developing on the balsam stump and root systems once they are cut and then invading the Frasers.

Brown Spot Needle Blight was widespread and often heavy on white, red and Scots pines this year. Some heavy damage was seen on Scots pine Christmas trees in Bakersfield. Infected needles turn brown from the tips back and develop small black fruiting bodies.

Cyclaneusma Needlecast of Scots pine remains very common but mostly at light levels.

Dephinella Shoot Blight caused moderate to heavy losses in several balsam fir Christmas tree plantations scattered throughout the state. In some locations, it was not noticed in the past. The

extremely wet spring weather was probably a major factor.

Diplodia (Sphaeropsis) Tip Blight was occasionally this year, at mostly light levels. It was not as noticeable as in 2005.

Fir-Fern Rust was widespread again this year and again caused moderate to heavy damage to some individual trees in some plantations, particularly edge trees that were partially shaded during the day.

Lirula Needlecast was more noticeable than in the past and caused moderate damage to some balsam fir Christmas trees in Craftsbury. Look for long narrow black fruiting bodies down

the midrib of brown previous-year needles.

Lophodermium Needlecast remained common at mostly light levels.

Phytopthora Root Rot continues to be associated with the death of Fraser fir and occasionally balsam fir growing on poorly or somewhat poorly drained sites in more and more locations. It appears that once the organism gets established during wet years, it persists and becomes more of a problem in years with average precipitation.

Rhizosphaera Needle Blight of Fir, caused by *Rhizosphaera pini*, remains at mostly light levels in scattered locations but is becoming increasingly common. Harvesting of crowded trees and low pruning in plantations where this was a problem in the past seems to have helped alleviate the damage.

Rhizosphaera Needlecast of white and blue spruce remains very common, with some heavy damage to blue spruce again this year.

Scleroderris Canker has not been found in any new towns since 1986.

Spruce Needle Rust was observed on individual blue spruce trees in a few scattered locations.

Swiss Needlecast of Douglas-fir remains common at moderate to heavy levels in some plantations in widely scattered locations.

White Pine Blister Rust damage remains common throughout the state and continues to kill white pines at moderate levels in plantations that have had the problem in the past.

White Pine Needle Blight caused scattered light damage to white pine Christmas trees.

Winter Injury was observed but damage was minor.

Woodgate Gall Rust damage to Scots pine is decreasing, as growers remove heavily damaged trees.

Yellow Witches Broom Rust of balsam fir remains common at light to moderate levels.

Heavy Cones were a major issue for most growers this year.

Yellowing of Older Needles was somewhat heavier than normal this fall.

The following pests were not observed on Christmas trees this year.

Insects: Cinara Aphids, Introduced Pine Sawfly, Pine Leaf Adelgid, Pine Needle Midge, Pales Weevil, Pine Root Collar Weevil, Pine Thrips and Yellow-Headed Spruce Sawfly.

Diseases:, Sirococcus Shoot Blight and Rhabdocline Needlecast.

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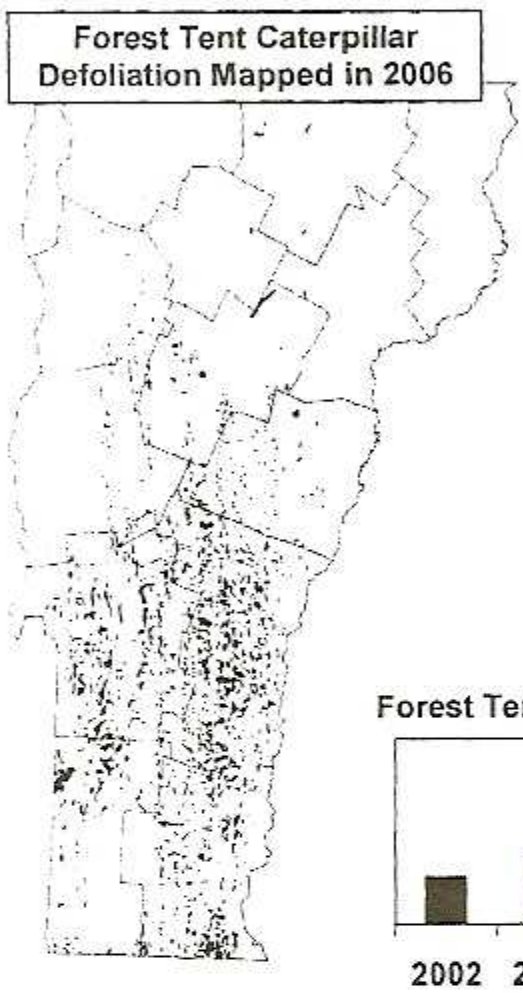
Update on Forest Tent Caterpillar Aerial Spraying and Other Sugar Maple Health Issues

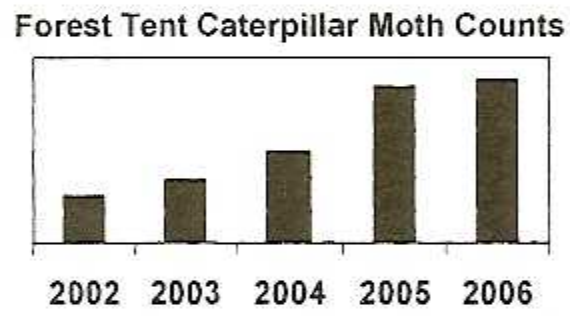
Reported by the State of Vermont Department of Forests, Parks, and Recreation, December, 2006

Vermont sugarbush owners who may be interested in the Forest Tent Caterpillar Aerial Spray Program and/or an Egg Mass Survey should contact the Department of Forests, Parks & Recreation promptly. The deadline to sign up is February 15, 2007.



Forest Tent Caterpillar populations increased in 2006, with 343,000 acres of defoliation mapped by aerial survey. The damage generally increased from 2005 in southern Vermont and in the central Green Mountains, and decreased in the Champlain Valley.

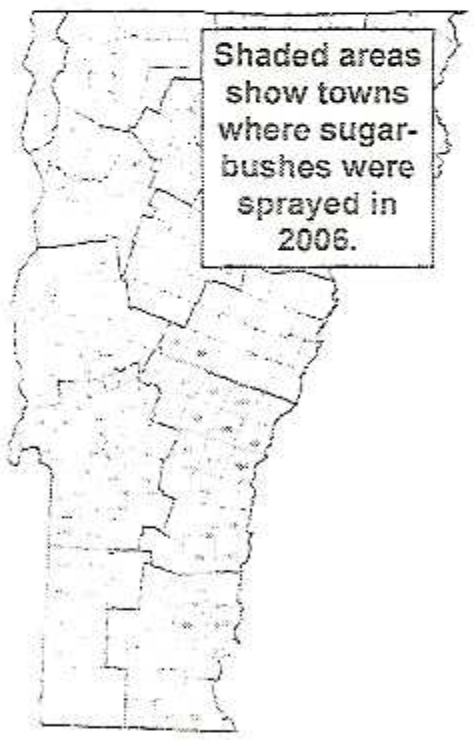
Large numbers of caterpillars died from disease. Many others died in cocoons thanks to parasites, such as the native "friendly flies" that were so common in early summer. Still, the outbreak may continue in 2007. Forest tent caterpillar moth counts are about the same as they were in 2005.



Saddled Prominent populations increased noticeably in the northern Vermont region which has not been affected by forest tent caterpillar. Defoliation was mapped on 1,340 acres in Essex, Orleans, and Caledonia Counties.

Saddled prominent caused a lot of sugar maple dieback in the early 1980s. It does most of its feeding in July. Sampling in the spring can help predict whether or not the insect may be a problem.

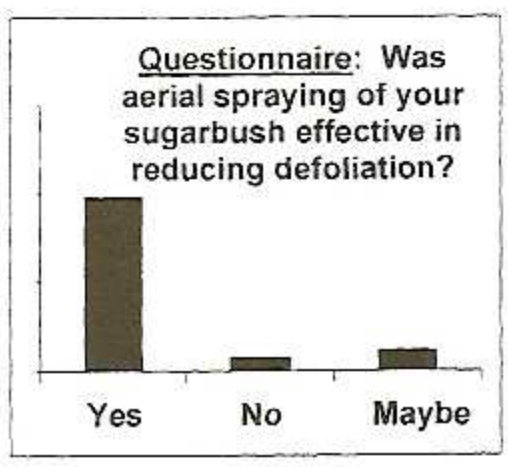
For more information:
www.na.fs.fed.us/spfo/pubs/fidls/saddled/fidl-sp.htm



In winter 2005-06, 209 sugarbushes were surveyed for forest tent caterpillar egg masses. Defoliation was predicted in two-thirds of them.

A total of 5,488 acres, in 168 blocks, were aerially sprayed in late May with the biological insecticide, *B.t.* With 25% of the cost covered by the state and the US Forest Service, landowners paid $18.75 per acre. Because of rain delays, some defoliation had occurred prior to spraying, especially where egg mass numbers were very high. Nonetheless, caterpillars died in all the sprayed areas, and 83% of participants who responded to a questionnaire thought that spraying had reduced defoliation.

To get a preview of 2007 populations, the Department of Forests, Parks & Recreation will be conducting forest tent caterpillar egg mass surveys through mid-winter. If these surveys predict defoliation, we plan to coordinate another aerial spray program for sugarbush landowners who wish to participate. Landowners who prefer to make their own aerial spray arrangements need to obtain a site-specific permit from the Vermont Agency of Agriculture.



Although healthy maples can withstand several years of defoliation, some are declining in sugarbushes which have been defoliated two or three times. Dead trees are showing up in recently thinned sugarbushes, or on ridges, dry slopes or wet areas. Some unthinned trees on good sites have also died. Fortunately, the outbreak has coincided with ample rain…so far.

Management Strategies for Keeping Sugarbushes as Healthy as Possible during the Caterpillar Outbreaks

In selecting a sugarbush management strategy, consider both current tree condition and your ability to tolerate unpredictable future stresses (like drought) which could set decline in motion.

1. Evaluate factors which indicate the risk of tree decline when deciding how critical it is to adjust management practices. Some are listed on the right.

Higher Risk of Tree Decline

Acid soil
Ridgetop, rocky ledge, or wet area
Thinned within the past 4 years
Some defoliated trees have died
Defoliated branches didn't refoliate
Defoliated more than once
Trees have small or yellow leaves

Lower Risk of Tree Decline

Plenty of soil calcium
All tapholes close in 2 years
No increase in dead twigs
Full refoliation after defoliation
Low egg mass counts

2. Assess the likelihood of defoliation by looking for forest tent caterpillar egg masses or signs of saddled prominent. Request a survey or find out how to do it yourself.

3. If you decide the sugarbush can be tapped, minimize wounds by switching to 5/16" spouts while sticking to conservative tapping rates.

4. Be flexible when scheduling timber harvests. If trees have been defoliated, delay thinning 1-3 years to minimize stress and to see which trees remain healthiest.

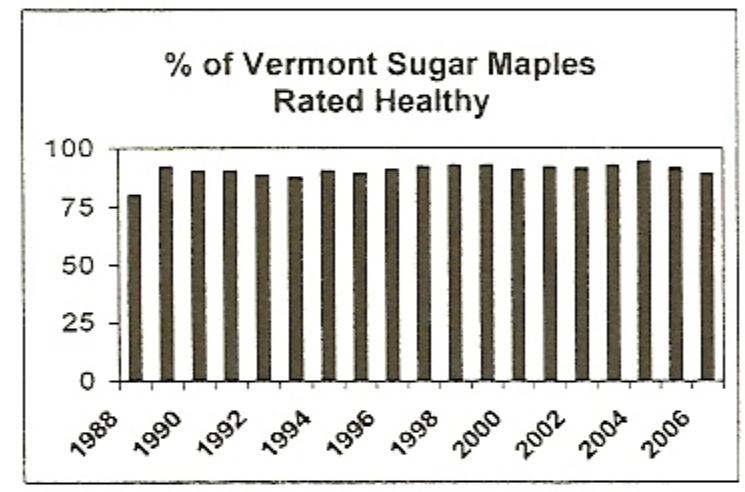
5. Consider aerial spraying in 2007. If you may be interested in participating in the state program, follow-up with the Vermont Department of Forests, Parks, and Recreation as soon as possible. The deadline to sign up is February 15th.

- The spray block must be actively tapped, at least 10 acres and more-or-less rectangular.
- The *B.t.* product, Foray, is a biological insecticide, but not certified organic at this time.
- The cost to landowners will be unknown until details are finalized. The expected range is $15-30/acre. We do not anticipate any cost share.
- Spray blocks need to conform to federal and state public safety and environmental requirements.
- Some defoliation will occur before spraying. Heavier defoliation will occur if spraying is delayed by weather or operational constraints.
- Some trees in the block may be missed by the spray plane.

Other Maple Health News…

Weather Conditions continued to be good for sugar maple in 2006: a mild winter, no late frosts, plenty of rain, and a warm fall. The rain had an upside…it helped trees recover from defoliation.

We continue to rate the **General Condition** of sugar maple by an annual evaluation of 2000 trees. Defoliation by the forest tent caterpillar has adversely affected tree health in some regions. For the first time in a decade, less than 90% of sugar maple trees were healthy on our survey plots.



The foliage of many sugar maple trees turned brown in September because they had been infected with the fungus disease, **Anthracnose**. Leaves were infected during earlier wet weather. Damage was worse on lower branches, near wetlands and low-lying areas. The impact on tree health shouldn't be serious, since the damage occurred so late in the season.

Most **Lecanium Scale** populations crashed. Scattered sugarbushes still had a lot of these insects in 2006, with their honeydew and associated sooty mold. Sugar maple tree recovery seems good in areas with a lot of scale in 2005.

To Contact the Vermont Department of Forests, Parks, and Recreation:

For more information, to request an insect survey, or to sign up for the forest tent caterpillar aerial spray program, get in touch with the Forestry Division's resource protection staff in your area.

Additional information and survey updates will be presented at January's maple schools and on our website, www.vtfpr.org/protection/idfrontpage.cfm.

Windsor & Windham Counties.....	Springfield 802-885-8855
Bennington & Rutland Counties.....	Rutland 802-786-3851
Addison, Chittenden & Grand Isle Counties..	Essex Junction 802-879-6565
Orange & Washington Counties.....	Barre 802-476-0170
Lamoille & Washington Counties.....	Morrisville 802-888-5733
Caledonia, Orleans & Essex Counties.....	St. Johnsbury 802-751-0110