

The 1998 Ice Storm: VT Assessment and Response

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ABSTRACT

The January 1998 ice storm damaged trees in every county in the state. Damage was mapped on 260,000 hectares (about 20 percent of the forest area) by special aerial surveys. Guidelines based on crown loss were developed for landowners and foresters, recommending which trees to remove. Tapping guidelines for damaged sugarbushes were also developed. A sugarbush damage survey indicated that 14 percent of sugarbushes were damaged. Permanent plots used to collect forest health measurements were revisited and assessed for extent of damage.

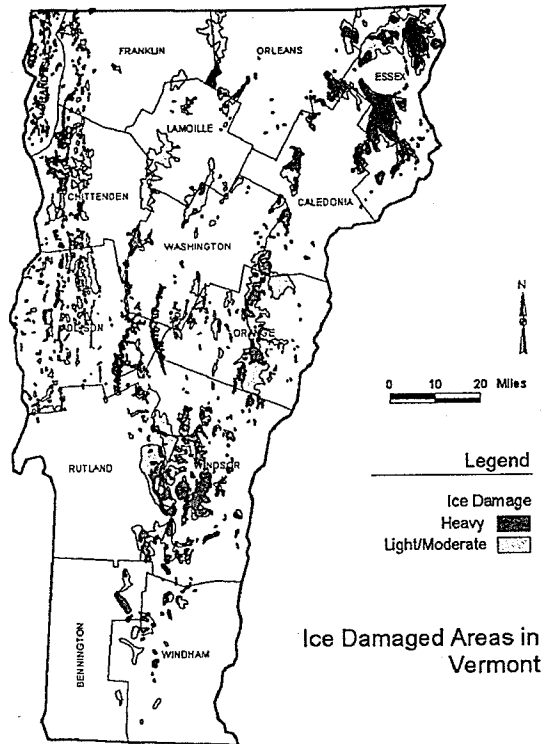
INTRODUCTION

The January 7-9, 1998 ice storm was the worst ever in the experience of many Vermonters, causing severe damage to many trees and resulting in extended power outages. The initial response of the Department of Forests, Parks and Recreation was to provide personnel to help clean streets and provide emergency management needs. Following this, aerial surveys were conducted to determine extent of tree damage, and guidelines for managing damaged forest stands and sugarbushes were developed. Then ground surveys were conducted to determine the severity of damage.

AREA OF ICE DAMAGE

Damage was mapped on 260,000 hectares (about 20 percent of the state's forested area) by special aerial surveys (Figure 1). Initial surveys were conducted in January when many of the trees were encased in ice. This made damage severity very difficult to determine so additional aerial surveys were conducted for some areas after the snow had melted. The Champlain Valley received the most continuous, severe damage. Elsewhere, damage was scattered at higher elevations, generally above 1200 meters in and near the Green Mountains. East-facing slopes tended to have the heaviest ice loading. There was little or no damage in the Taconic Mountains and the Connecticut River Valley.

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Map produced by Forest Health Protection GIS Group, NA S&PF, Durham NH

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Figure 1.--1998 ice damage. Mapped area is 260,000 hectares.

MANAGEMENT GUIDELINES

Within a few weeks after the ice storm, department personnel began receiving many calls from foresters and landowners wanting to know how badly damaged a tree could be and still have a good chance of surviving or retaining economic value. Sugarmakers were asking similar questions about which trees should be tapped for maple syrup production.

Forest Management Guidelines

A search of the literature revealed very little comprehensive information on tree recovery following crown breakage. We did, however, have ten-year data on the fate of several different hardwood species with various levels of crown dieback in 1986 (Kelley et al. 1997). This data showed that most overstory trees with more than 50 percent crown dieback were more likely to die than to recover within a ten-year period. Birches, particularly paper birch, were considered a higher risk because most failed to recover from dieback in excess of 25 percent.

Ice-damaged trees went into the winter of 1997-98 in good condition, with a full complement of roots containing stored food reserves. Knowing that they should respond more vigorously than trees with traditional crown dieback, the data for likely recovery was adjusted upward one category to produce the following management guidelines (Table 1).

Table 1. ADVICE FOR LANDOWNERS AND FORESTERS MANAGING STANDS DAMAGED BY THE JANUARY 1998 ICE STORM

The Vermont Department of Forests, Parks and Recreation has developed the following guidelines for forest stands damaged by the recent ice storm. They are based on ten-year crown dieback data from the Vermont Hardwood Tree Health Survey, a research review by US Forest Service researchers and information on tree response to heavy pruning. These guidelines are tempered by the knowledge that in most cases, tree root systems were not injured, and have good reserves of food available for spring growth.

FIRST:

* **Don't Panic** - Stop, think and be patient. Trees went into dormancy in very good health and have excellent recovery potential. **Landowners have at least the upcoming growing season to fully assess damage and determine the need for salvage.**

* **Safety First and Foremost** - Clearing access roads and evaluating forest stands containing hanging limbs and bent trees is dangerous. Use safety precautions at all times.

* **Get Professional Advice** - Landowners should seek advice from a professional forester. Each stand is different. Site quality and other factors must be considered in applying these recommendations. Call your County Forester for details! **Trees with up to 10% crown loss can be managed normally.**

Recommendations Based On Tree Species and Type of Damage*

* If species is:	And crown loss is:	Recommendations is:
red or sugar maple, beech, oak, cottonwood, poplar, ash, conifers others not listed	11-50%	Can retain or thin to leave best trees.
	50-75%	Trees at risk. Can retain these for now, but re-evaluate within 5 years.
	75% +	Remove hardwoods within 5 years. Remove conifers with broken main stems within 1 year.
* paper birch yellow birch	11-25%	Can retain or thin to leave best trees.
	25-50%	Trees at risk. Can retain these for now, but re-evaluate within 5 years.
	50% +	Remove within 5 years.
* If tree (all species) is: Uprooted or on the ground		Salvage within 1 year.

*Internal staining and decay may eventually cause a loss of value in damaged trees. The rate of infection will vary with species and degree of damage, but **this is a very slow process**. Broken main stems or stem forks are the most serious. Discoloration spread downward can range from a few inches per year to a foot or more per year with this type of damage. Large broken branches which have torn the tree's bark are also serious. Infection associated with broken branches should remain mostly within branch wood. This is especially true for otherwise healthy sugar maples.

* **These are Guidelines Only** - They are based on data for upper canopy trees. Young trees tend to be even more resilient. Every site and every tree is different. Standard silvicultural considerations such as spacing, bole condition, presence or absence of suitable replacement trees, site quality, etc., must be kept in mind when evaluating trees.

Tapping Guidelines

A similar format as used for the landowner and forester management guidelines, stressing patience, safety and the need for professional advice, was developed for operators of sugarbushes damaged by the ice storm. Tapping recommendations were based on the following four crown loss categories: (1) less than 10 percent crown loss - OK to tap normally, (2) 11-25 percent crown loss - Tap lightly, reduce number of taps, (3) 26-75 percent crown loss - trees at risk. Consider all factors including desirability to retain tree in the stand. Best not to tap if tree is retained, (4) 76 percent crown loss - Poor chance of tree survival. Tap now and plan to salvage at a later date.

SUGARBUSH DAMAGE

A questionnaire survey was mailed to 2500 sugarmakers seeking information on ice storm damage to sugarbushes. Based on a 26 percent response, 14 percent said that their sugarbush was damaged by the January 1998 ice storm. Of these, 25 percent said the damage was heavy; 31 percent said it was moderate, and 44 percent said it was light. Based on this questionnaire, an estimated 75,000 taps were lost.

DAMAGE TO MONITORING PLOTS

The department maintains 166 permanent monitoring plots that are visited annually or periodically to collect forest health data, including crown evaluations for dieback and transparency. This includes 40 North American Maple Project (NAMPP) plots equally divided between sugarbushes and sugar maple stands, 22 national Forest Health Monitoring (FHM) plots, 19 Vermont Forest Ecosystem Monitoring (VForEM) plots, and 84 Vermont Hardwood Health Survey (VHHS) plots. All plots that were within the footprint of the ice storm, as indicated by the aerial survey map (Figure 1) were visited in the summer of 1998 and evaluated for ice damage. In addition, all the other tree and plot information, that is taken when these plots are normally visited, was collected.

Plot visits revealed that 7 NAMPP plots, 19 VForEM plots, and 17 VHHS plots (18 percent of all plots) were damaged by the ice storm. In addition, the USDA Forest Service maintains about 950 forest inventory analysis (FIA) plots in the state which were last visited in 1996 and 1997. Their crews revisited 126 plots that fell within the ice storm footprint and collected data on the 116 (12 percent) plots that received damage.

SEVERITY OF DAMAGE

Information on tree damage in these plots is currently being analyzed. As one might expect, damage ranged from very light to severe, depending on plot location. In general, pole size trees suffered the most bole breakage, while saplings tended to bend and larger trees tended to lose mostly crown branches.

Dominant and codominant trees had greater crown loss than trees in lower canopy positions. Ice damaged plots had fewer healthy trees in 1998 than when previously evaluated.

Species Affected

Hardwood species received the most damage. A variety of species were damaged, as reflected by data from the Vermont Hardwood Health Survey plots (Figure 2).

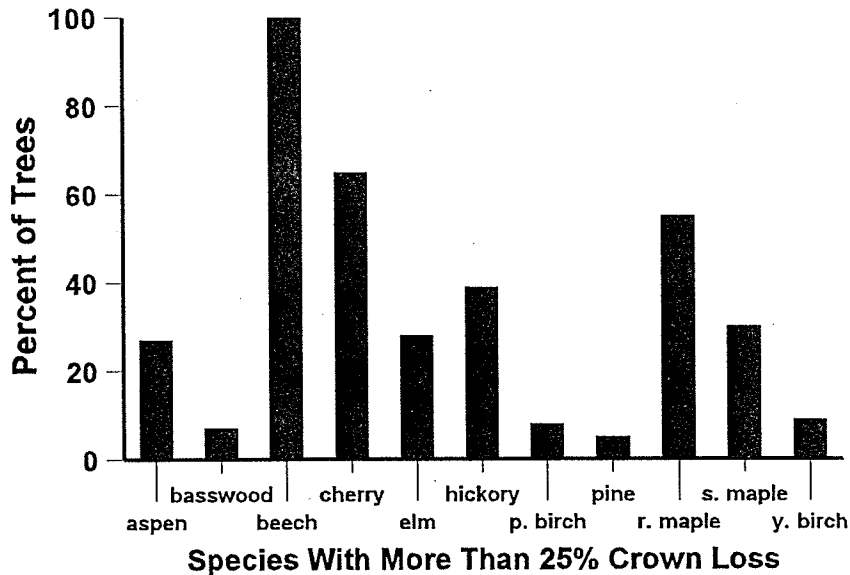


Figure 2.--Upper canopy trees in ice-damaged Vermont hardwood health plots that received significant crown loss, by species.

FUTURE PLANS

Permanent plots will continue to be visited for crown ratings and other forest health measurements. Additional surveys will be conducted for sugarbushes and for urban and roadside trees. Damaged trees are being sawed and the lumber examined before and after kiln drying to determine any hidden losses in value due to the ice storm. Special intensive monitoring plots in heavily damaged and non-damaged areas will be established to better evaluate vegetative changes. This will include crown and canopy photography to document changes over time. Plans are also being made to dissect sugar maple and white ash trees with ice wounds that occurred ten or more years ago, to look at extent of discoloration and decay associated with those wounds.

Evaluating trees with varying amounts of damage over time should provide better answers on survivability and recovery of different tree species and forest stands following a major ice storm. Thus, the next time a major event such as this occurs, there should be better information to provide to foresters, sugarmakers and landowners seeking advice on how to best manage their damaged trees.

LITERATURE CITED

Kelley, R.S., E.L. Smith, S. Cox and B. Frament. 1997. Vermont hardwood tree health in 1996 compared to 1991 and 1986. Dept. Forests, Parks and Recreation, Waterbury, VT. 32pp.