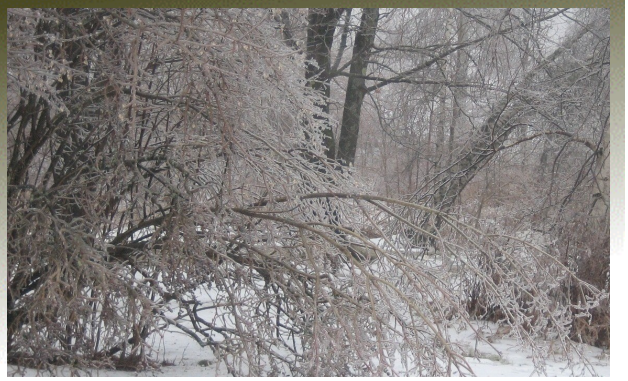
Vermont Forest Health



Recovery of Stands Damaged by Ice Storms: Advice for Landowners and Foresters

VT Department of Forests, Parks, & Recreation
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The following guidelines for hardwood stands damaged during ice storms have been updated based on evaluations of tree recovery following the 1998 ice storm, including ten-year crown dieback data from the Vermont Hardwood Tree Health Survey and 15 years of US Forest Service research.

Ice storms are not uncommon in Vermont and our forests are adapted to survive them. A decade after the 1998 storm, ice-related mortality mostly replaced the mortality level expected during normal stand development.

Maples and ash are more likely than other species to recover from ice damage; paper birch is least likely.

Most injured trees survive. Healthy trees go into winter dormancy with ample food reserves. These carbohydrates will be available in the spring when the tree begins to restore its crown. Slow-growing trees, and those with basal injuries or root rot, are at greater risk.

Species differ. Sugar maple, red maple, and white ash are the most likely to recover from severe damage; paper birch is least likely to survive.

Damaged stands usually recover their ability to produce wood products. Storm-related injuries are compartmentalized, and new wood is produced following a period of slower growth. However, timber production is over for uprooted trees, those with shattered stems, and most trees broken below the live crown.

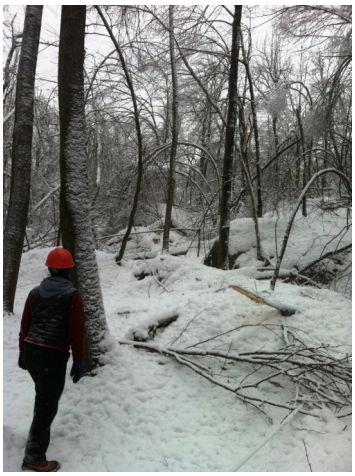
Internal staining and decay may eventually cause a loss of value in damaged trees, but this is generally a slow process. The rate of infection will vary with species and degree of damage. Broken main stems, stem forks, and large broken branches which have torn the tree's bark are the most serious; discoloration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

Our trees are adapted to survive ice damage. The sugar maple on the left lost 90% of its crown in 1998 (top). By 2001 (bottom), crown recovery was underway.

The sugar maple on the right has compart-mentalized a broken top caused by an ice storm ten years before the tree was cut.

Recommendations Based On Tree Species and Type of Damage

Damage	Expected Impact	Recommendation
Paper birch with 11-25% crown loss Other species with 11-50% crown loss	Recovery expected.	Retain, or thin to leave best trees.
Red maple, sugar maple, or ash with >50% crown loss Beech, oak, cottonwood, poplar, yellow birch, conifers or others not listed with 50-75% crown loss	Trees are expected to survive if they don't have logging wounds, root rot, or other pre-existing defects.	Most can be retained, but re-evaluate within 5 years.
Paper birch with >25% crown loss Beech, oak, cottonwood, poplar, yellow birch, conifers or others not listed with >75% crown loss Bole broken below live crown	Trees at risk. Some mortality is expected, especially trees that were growing slowly prior to the storm.	Evaluate for removal. Hardwoods to be removed should be harvested within 5 years; conifers with broken main stems within 1 year.
Any species uprooted or on the ground		Salvage within 1 year.



Safety first and foremost. Hung-up trees and branches, bent trees turning into spring poles, and blocked escape routes increase the hazard when working among ice damaged trees.

Landowners have the upcoming growing season to fully assess damage and determine if salvage is needed. Immediate action is seldom necessary as any additional value loss will be gradual.

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.

For land enrolled in the Use Value Appraisal program, the approved forest management plan or an approved amendment must be followed. The county forester needs to approve any changes before salvage activity begins.

Landowners have the upcoming growing season to evaluate damage and determine if salvage is needed.

With the exception of paper birch, trees with up to 50% crown loss are expected to recover.

For More Information on Tree Recovery from Ice Damage

Kraemer, M.J., and Nyland, R.D. 2010. Hardwood crown injuries and crown rebuilding following ice storm damage: A Literature review. US For. Serv. Gen. Tech. Rpt.: GTR-NRS-60. http://nrs.fs.fed.us/pubs/34892

Shortle, W.C., K.T. Smith, and K.R.Dudzik. 2003. *Tree Survival and Growth Following Ice Storm Injury*. USDA For. Serv. Res. Pap. NE-723. http://www.fs.fed.us/ne/newtown_square/publications/research_papers/pdfs/2003/rpne723.pdf

Turcotte, R.M. et al. 2012 Effects of ice storm damage on hardwood survival and growth in Ohio. North. J. Appl. For. 29(2) 2012. http://www.nrs.fs.fed.us/pubs/jrnl/2012/nrs_2012_turcotte_001.pdf

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