

## Tree Biology and Ice Storm '98

The ice storm of January 1998 damaged forests throughout northern New York and New England. Natural resource managers throughout the region need to know the extent, severity, and consequences of the forest damage. No one knows all of the details of the future effects of the storm. The application of principles of tree biology can help predict some of the storm's consequences.

Tree biology and forest ecology are dynamic. The widespread storm damage is superimposed on existing processes of injury, decay, competition, tree defense and renewal. Determining the consequences of the storm will require ongoing tracking of external indicators of infection and tree response.

Trees introduced from outside of our native range suffer the most damage. Native trees with poor growth form or stem cankers are also the first to be damaged. Under the heaviest ice glazing, healthy native trees with good form are heavily damaged by snapping and toppling. Damage is most severe on exposed trees at the edges of forest clearings and along trails, roadways, and streets. The natural branching pattern of conifers affords more protection than the more spreading branch pattern of hardwoods. Especially prone to breakage are species and individual trees with eccentric crowns or included bark at branch crotches. Stem damage can result from the impact of broken tops and branches from adjoining trees.

Tree damage and survival after a major storm can be related to loss of the live crown:

Tree crown loss, %	Likely results
Greater than 75	Low chance of survival. Surviving trees are likely to become heavily infected.
50-75	Many trees will survive with varying degrees of internal infections and growth suppression. Branch breakage will result in limited infection. Breakage of larger tops and large lower branches will result in more extensive infection Shattered branch bases and torn bark increases the severity of the damage.
Less than 50	High chance of survival. Growth in some trees will slow due to loss of crown. Growth in lightly or undamaged trees on the edges of disturbed areas may increase due to reduced competition.

Tree response and infection processes begin immediately after wounding. However, the discolored and decayed wood that results from these processes can take one to many years to develop.

Depending on the type and amount of damage, surviving trees will develop columns of wound-initiated discoloration (stain). The rate of spread of discoloration depends on many factors. Little additional loss of wood quality is likely over the next year. Compartmentalization tends to limit the diameter of the discolored column to the diameter of the stem or branch at the break. Healthy trees are frequently able to prevent the spread of discoloration and decay out of the branch stub and into the trunk. Over a period of years, decay will slowly develop within these columns.

**What should we watch for?**

Hazard trees and branches need prompt removal. Proper pruning of branches (cuts made immediately outside of the branch collar) will reduce future hazards. Cracked stems and branches are much more dangerous than decayed wood.

Following the removal of hazards, further salvage cutting should not be too hasty. The pressure to make salvage harvests needs to be balanced with the ability to process the wood. Improperly handled logs and lumber will decrease in value more quickly than timber left on the stump.

The sugar in maple sap gathered this season was produced last year. Heavily damaged trees with missing crowns may still produce a crop of sap this year. Observe trees tapped this year for good closure of tapholes, an indicator of tree vitality. Trees tapped in 1998 with poor taphole closure through this growing season may be skipped over for tapping in 1999.

Insect pests such as bark beetles and borers need to be periodically assessed. Especially into the second, third, and following years after the damage. Pest outbreaks could increase the extent of the damage beyond the trees initially affected.

Trees on the edge of new forest openings or gaps may be the most vulnerable to future storms and root rots. Over time, closed wounds on the stem may initiate stem cracks ("frost cracks"). These cracks may produce future hazards.

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