Long-term Storm Damage

by Jeff Stringer

The initial damage to trees and their value caused by ice and wind storms is obvious and can be significant. However, these storms can also lead to long-term continued reduction in the health and value of trees that survive—loss that may go unnoticed for many years. Understanding how this loss of value occurs is important to those woodland owners who own storm-damaged timber.

Storms, particularly ice or wind storms, can cause significant damage to the tops of trees resulting in two outcomes–either the trees will die immediately or within a period of several years or they will persist to reasonable life spans. However, the trees that live can face a wide range of declines in value based on the type and severity of the injury.

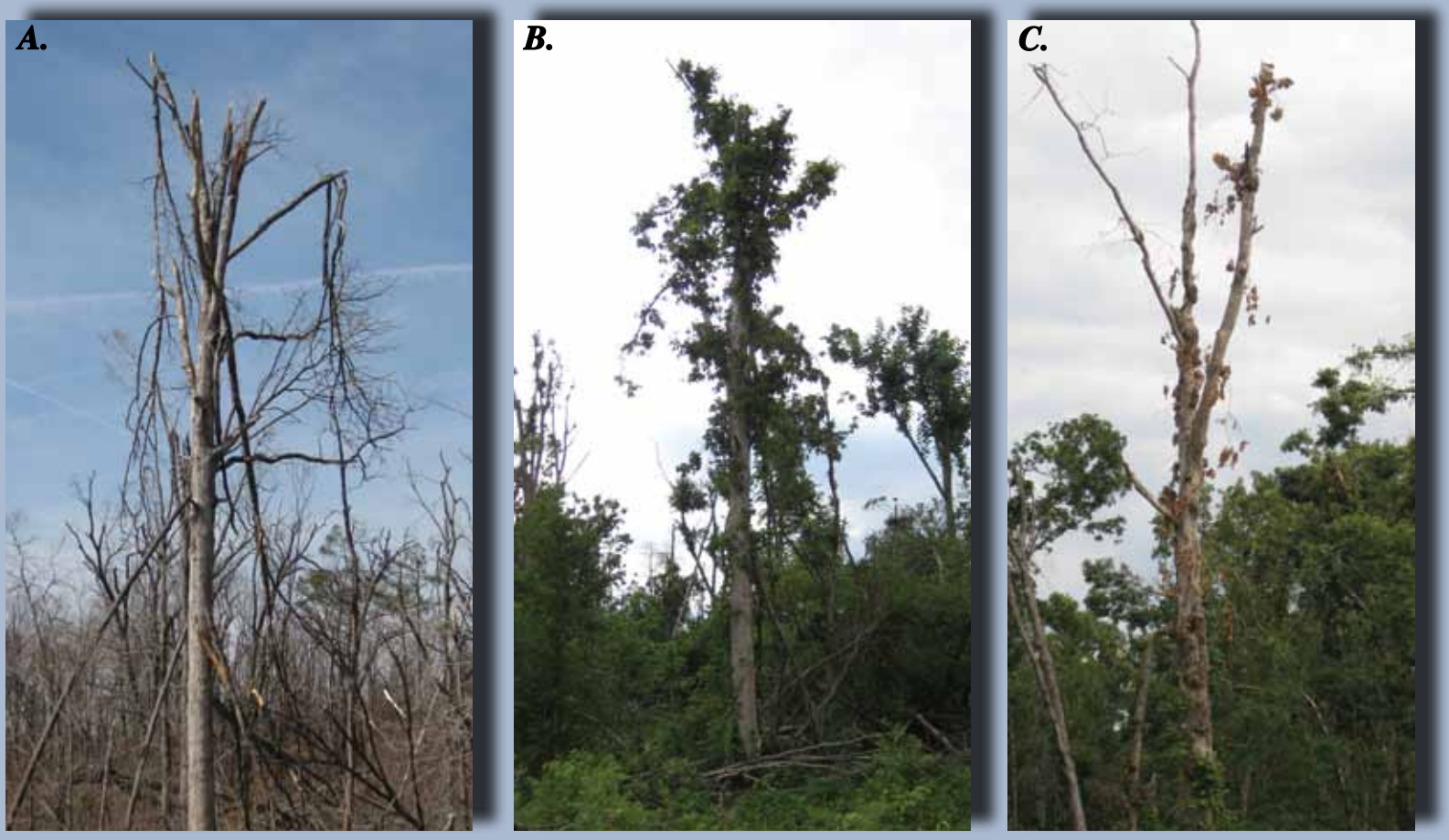
Immediate and Delayed Mortality

Ice and wind can cause trees to be uprooted, broken off, or severely bent. The death of these trees and the loss of value are readily apparent. However, sometimes the damage does not kill the tree immediately but does so over several years. This type of loss typically happens when a significant amount of the crown is lost.

Ice and wind storms create a wide degree of crown loss from almost nothing to 80 or 90 percent of the crown being destroyed. If enough of the top is destroyed, generally more than 50 percent, it may kill the tree over a period of years. This loss of crown can occur from either large branches being torn from the main stem or small and medium-sized branches being lost. The former is the most significant. The exact mortality rate is based upon species, the harshness of the soil it is living in, and weather. In some instances this mortality can occur the first year after the storm, but in many instances it takes a number of years before the tree dies. Some trees species can recover from significant major branch loss while others struggle to do so. Yellow-poplar, for example, is a quick-growing species and maintains its branch growth throughout the summer. This species and others that have a similar growth pattern succumb less. In contrast, oaks grow slower and their branches grow for a few weeks and the buds set, limiting branch growth in a given year. These types of species have a harder time re-establishing their crowns and their mortality rate is higher.

Figure 1 on the next page shows the progression of damage to trees were greater than 50 percent of the crown was damaged during an ice storm. In this case large branches were torn from oak trees leaving little potential for crown regrowth that eventually led to their demise.

Photo courtesy: Jeff Stringer



Photos courtesy: Jeff Stringer

Figure 1. Trees with severe loss of greater than 50 percent of their live crown, (A) directly after damage, (B) during the first growing season, (C) trees dying in that stand two years later.

Rot and Decline

Often, damage is not significant enough to result in mortality, but can lead to long-term timber-value loss. This type of loss is most noticeable when ice and wind storms result in main branches being torn from the tree (Figure 2). If this damage results in less than 50 percent of the crown being lost, the tree may live. Unfortunately, this initial and obvious damage is not the end of the story. The exposed wood, resulting from the loss of the large branches, allows heart-rot fungi to invade the tree. "Heart rot" is a term used to describe the internal rotting of wood from fungi that destroy the heartwood or inner portion of the stem and branches of a tree. Heart-rot fungi are a part of nature and are everywhere, and once a tree is damaged and wood is exposed, little can be done to stop the fungi entering the tree. These large openings in the bark, particularly where a large branch has been torn away, can result in the exposure of heartwood. Heartwood, in many species, is the inner darker wood core that is surrounded by a ring of lighter-colored sapwood (Figure 3 see page 4). Sapwood (an outer layer of wood directly under the bark), contains living cells that can help thwart or compartmentalize heart-rot fungi. However the heartwood is dead, meaning no living wood cells are present in the heartwood. When a branch is large enough, it contains heartwood, and when it tears from the main stem, it leaves heartwood exposed to infection by heart-rot fungi. Fungi can easily gain a foothold in the mainstem in this exposed heartwood where the branch was attached.

Once established, the heart-rot fungi can continue to grow and spread, rotting the internal heartwood, resulting in soft and/or hollow trees and branches. This damage physically weakens trees and results in loss of their merchantable value. When damage occurs to the base of a tree, for example as a result of poor logging technique or from wildfire, the damage is easily visible and the rotting of the wood visible as well. The rot starts at the open wound or damage and progresses up the stem, rotting the heartwood. However, when the damage

Photo courtesy: Jeff Stringer

Figure 2. Large branch torn from main stem by ice.

occurs far off the ground, it is not easily visible and the rot resulting from the injury cannot be readily seen from the ground. In this instance, the rot progresses downward in the tree and results in a decrease in the merchantable height of the main stem and ultimately the value of the tree. This loss is typically not witnessed until the tree is felled and bucked (sawed) into logs or pulpwood sticks. If it is significant enough, resulting in more than 50 percent wood loss, the tree can become unmerchantable. The magnitude of long-term damage from this type of injury is species-dependent. Some tree species are not effective in staving off the impacts of heart-rot fungi, while others have the ability to compartmentalize the fungi and limit its spread. However, even these trees have difficulty in stopping the downward progression of heart rot from a large opening on the main stem, caused by the tearing away of a large branch. Figure 4 shows the immediate aftermath of an ice storm where tops of yellow-poplar trees were broken, exposing heartwood. The exposed heartwood allowed heart-rot fungi to enter and rot started moving down the stem. The resulting rot reduced the merchantability of the upper stem by 6 to 10 feet over the next five years. Figure 5 shows the downward progression of rot over five years, resulting in a decrease in merchantable height and, thus, value.

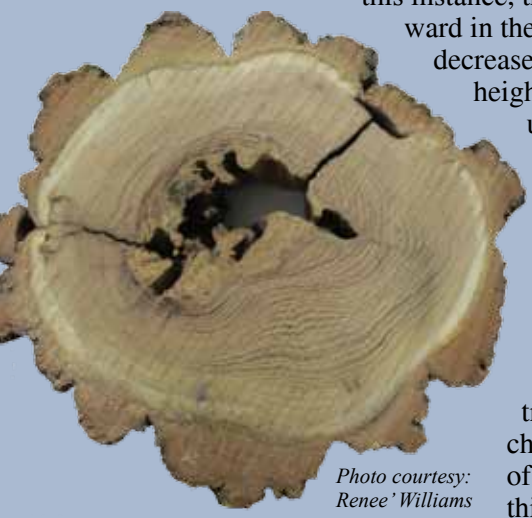


Photo courtesy: Renee' Williams

Figure 3. Cross-section of tree showing narrow band of white sapwood outside of darker heartwood with heart rot present.

Figure 5. Downward progression of rot over four years, decreasing the merchantable height from its original height (yellow marks) to its current height (red marks). This loss of merchantable height represents a loss of volume and value in the tree.

Photo courtesy: Jeff Stringer

Figure 4. Yellow-poplar trees with major branch breakage allowing rot to eventually enter merchantable portion of tree.

About the Author:

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