



# Lessons from an ice storm

Widespread tree destruction highlights the importance of proper selection and maintenance

BY ERIC HAMMOND

**T**HE NORTHERN WILLAMETTE VALLEY in Oregon was hit by a once-in-a-generation ice storm on February 12 and 13 of this year. In the small town of Silverton, where the valley meets the Cascade Range foothills, freezing rain fell for more than 30 hours.

Trees and their branches were coated with thick ice.

It was beautiful, but the impact was terrifying and severe. Even before nightfall the first day, large branches started to break, and shortly after dusk, whole trees began to collapse. Thousands of trees in Silverton were shattered. Before the storm was over, more electrical customers in Oregon were without power than in any previous outage event.

The storm ended as we awoke the next morning to find a catastrophic scene outside our front doors. More than 1.5 inches of ice covered everything. Within only a few blocks of my home, dozens of ancient Oregon white oaks (*Quercus garryana*) were ripped from the ground or broken. More than 60 were affected citywide.

Silverton's urban tree canopy had been defined by these trees. This storm was a change event. Cultivated trees fared far worse than the oaks, but they did much less damage because they were many decades younger.

## The impact on the industry

The day after the storm, I was beginning to recognize damage trends. I wondered how broad the trends were and what it might mean beyond a bump in tree sales for the industry.

It was easy to walk down a block from my house and see all the birch (*Betula* spp.) trees destroyed. Other blocks held only

ruined Callery pear (*Pyrus calleryana*) or red maple (*Acer rubrum*). This is a trend that will continue for years as some of the damaged trees decline or become infested with bronze birch borer.

It was evident that some of the trees broke under the ice because they had canopy faults prior to the storm. Others presented susceptible form or brittle wood.

Trees are planted everywhere in the landscape, so a large number of tree owners are the lay public. They may not know what trees to plant, or how to care for them. They might not understand good pruning practice. That puts them at a disadvantage when it comes to managing these trees and preventing these problems.

Our industry is a partnership between producers, sellers, specifiers, and plant care providers. Each must perform their role well for the whole to succeed. Each must educate their customers, or they endanger gains made across the industry.

There are businesses taking advantage of the reputation of the industry. They operate outside normal best practices. When standard practices aren't followed, they wreck the good standing of the whole industry. Consumers, with their busy, stressed-out lives, don't perceive the separation. The ice storm points this out with clarity.

Sometimes, in worst-case scenarios, our industry is linked to broad classes of tree failure. Our promotion of Callery pear trees is one example. Recently, I and more than 184,000 others were mesmerized by a short social media video about it. The video lambasted the industry for selling this "stinky and repulsive" tree.

All aspects of the industry — propagators, growers, retailers, designers, and plant care professionals — have lessons to >>

## Lessons from an ice storm

**Previous page:** Ice from a February winter storm takes a Japanese maple down to the ground in Silverton, Oregon .  
Tree branches and leaders were snapped in half (top and bottom) from the weight of trees. PHOTOS BY ERIC HAMMOND

learn from this ice storm. The public has much to learn too, and the industry needs to be there to support them.

### An assessment of the damage

In search of lessons to learn from the ice storm and its damage, I took to the streets with a notebook. We were still in the aftermath of the storm, so I had no power, no cell service and no internet. I kept warm by walking over 25 miles of Silverton's streets, covering most of the town.

I surveyed the damage to cultivated trees. I couldn't look up methodology because of ongoing service outages. Time was critical for gathering data, because cleanup was progressing, and damage was being cleared away every passing day.

I surveyed only planted, cultivated trees, both native and non-native, that I could see from the sidewalk or street. (The only exception to this rule were Oregon white oaks growing in Silverton younger than about 75 years.) Shrubs, wild feral trees, and topped trees were not surveyed.

I classified each tree as "destroyed," "moderate" or "fine," based on the evident damage level.

**Destroyed** — Destroyed trees collapsed under the ice or had large parts of their canopy ripped away. Some were



dead or looked like they would die soon. Trees in this category were missing 50% of their tree canopy or more. They needed significant corrective action to avoid having permanent and significant structural faults. Because most homeowners can't or don't do the kind of pruning required by this level of damage, I considered these trees ruined. Future decay will be a real problem in these trees if they are not removed.

**Moderate** — If the tree appeared able to recover from the damage and maintain or regain a safe tree form with modest cor-

rective pruning — the kind of pruning a novice could do — the tree was classified as moderately damaged. These trees lost less than 50% of their canopy. Of course, in the weeks since the storm, many trees with moderate damage were ruined when homeowners, with no understanding of tree physiology or correct pruning technique, attempted to "fix" them. Vast numbers of trees I classified as moderately damaged could now be rightly classified as destroyed.

**Fine** — Trees in the fine category might have had broken limbs, but those comprised less than 30% of the total canopy, and never the leader of an excurrent tree. (Trees with a single dominant leader, such as a Douglas fir, *Pseudotsuga menziesii*, have excurrent habit.) These trees, without any pruning, were ready to continue growing and appeared unlikely to become dangerous. They manifested few structural faults and little decay will occur because of the storm.

### Grouping by genus and species

As I assessed each tree, I grouped them by genus, and sometimes went as far as species when I was confident of the identity.

All species of *Betula* were lumped as birch. I am more comfortable with maple identification from sidewalk distance and split them into species. Flowering dogwoods (*Cornus florida*, *C. kousa* and their hybrids) were all grouped together because they look too similar from 75 feet away.



By the time I was done observing all of these trees, I had assessed more than 3,750 trees, held in 145 genera and species.

Some 72 of the species I identified had more than 10 representatives. 28 species were numerous enough to make up more than 1% of the total survey population. The top 13 most-represented trees totaled 2,009 individual trees, 53.7% of all trees identified in my survey, as follows:

- Red maple (*Acer rubrum*): 9.0%
- Birch (*Betula* ssp.): 8.5%
- Japanese maple (*Acer palmatum*): 6.2%
- Callery pear (*Pyrus calleryana*): 5.1%
- Flowering dogwood (*Cornus florida*, kousa, and hybrids): 5.1%
- Douglas fir (*Pseudotsuga menziesii*): 3.5%
- Deciduous flowering cherry (*Prunus* ssp.): 2.9%

- European hornbeam (*Carpinus betulus*): 2.5%,
- Pine (*Pinus* ssp.): 2.4%
- Norway maple (*Acer platanus*): 2.3%
- Sweetgum (*Liquidambar styraciflua*): 2.1%
- Western red cedar (*Thuja plicata*): 2.0%,
- Oregon white oak (*Quercus garryana*): 1.8%.

Some 54% of these, or 1,094 trees in all, had moderate damage or were destroyed. All but two of these species had a percentage in the double digits. Only Douglas fir and western red cedar received almost no damage.

Although Silverton's population of ancient Oregon white oaks did the most severe property damage in the city, Oregon white oaks younger than about 75 years had only moderate damage, and

none were destroyed by the storm.

I analyzed the proportion of each species that received moderate damage or was destroyed, following the model demonstrated by Susan Sisinni, et. al. (1). If the proportion was above 1, more were destroyed than their population represents in the survey; the species is deemed very susceptible to ice damage. If the proportion is below 1, they are considered a more resilient species.

Based on my survey in Silverton, the trees most susceptible to the ice storm damage were birch (7.8 proportion), red maple (6.4), Callery pear (4.7), and sweetgum (1.6). For these, the percentage damaged was much higher than their population percentage would suggest.

Those suffering damage roughly in proportion to their population were European hornbeam (0.9), deciduous >>



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## Lessons from an ice storm

On the road to recovery, trees have been trimmed to recover as well as possible. PHOTO BY ERIC HAMMOND

flowering cherry (0.75), and pine (0.64). Norway maple at 0.6 had low damage proportionate to its population size.

Flowering dogwood (2.2), and Japanese maple (3.2) sustained more damage than I initially suspected. Broken small trees don't garner the same attention a 50-foot shattered birch does, nor can they inflict the same level of damage when they fall.

Three native trees led the way, with very low damage proportion: Douglas fir (0.05), Oregon white oak (0.3), western red cedar (0.0).

Oregon growers are respected for producing stock sold and distributed across the country. A diverse selection is important for their businesses, but that diversity is not well represented in the urban canopy.

The three most common street trees in Silverton — birch, Callery pear, and red maple — represent 27.5% of the urban canopy. The 10-20-30 rule suggests that of the urban canopy, no more than 10% should be a single species, no more than 20% should be the same genus, and no more than 30% should be from the same family.

According to this rule, these three trees have reached their maximum safe use. These three are much more susceptible to ice storm damage than other varieties. They need summer irrigation. Birches are subject to destructive insect attack. These are attributes that make them poor choices for use here, and prove the risk inherent with overuse.

### Tree care for a more resilient forest

Storm damage reveals a tree's legacy of management. It is easy to look at most trees and see when pruning stopped after planting.

The healed scars of formative pruning remain around head height. Above them, it is common to observe included bark, acute crotch angles, crossing branches, and other canopy faults. It demonstrates a leave-it-be approach that is practiced by many tree owners and caretakers.

The consequences of neglect compound over time as trees age. Older, broader trees, and trees with included bark break apart at higher rates.

The opposite is also true. Trees from



some of Oregon's best producers are routinely butchered by unprofessional landscape maintenance crews and homeowners. Whether from ignorance of best practice or malign intent, ugly and dangerous trees result.

Homeowners, confronted with post-storm tree care, experience uncertainty, stress, increased cost, and future risk. It will impact the industry as homeowners recognize this. Reconstructive and formative pruning requires a level of knowledge and commitment beyond normal. It isn't recognized, nor is it affordable by homeowners. Meanwhile, many yard maintenance crews do not practice good pruning, nor do the people that hire them.

After the urban forest canopy lays collapsed on the sidewalk, residents are left to fix these problems on their own. Consulting city street tree lists results in poor guidance in all but the most progressive and well-funded cities.

Landscape designers and plant care professionals have a greater voice in educating consumers, but a large numbers of them do not use these services or — worse at a time like this — can't afford them. Consumers need knowledge about which

trees respond well to restorative pruning and which need removal.

Developers, homebuilders, and landscape installers have a strong influence on the choice of street and shade trees planted at new construction sites. It is formative for a city and region. They need education about best practice and better variety selection from all levels of the horticulture industry.

Education from producers and sellers to all buyers is important, whether homeowners or wholesale purchasers. A more diverse selection of street tree species will help yield a more resilient urban forest. ©

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#### Reference

Susan Sisinni, Wayne C Zippner, Andrew G Pleninger. 1995. Impacts from a major ice storm: street-tree damage in Rochester, New York. *Journal of Arboriculture* 21(3) 156-167.