

# Selective Heading Cuts AFTER Storm Damage

By Guy Meilleur and James Scarlata

December 5, 2002, was a day that will live forever in tree infamy in Raleigh, North Carolina.

An inch and a quarter of ice put a crushing load on the area's arboreal resources. Huge limbs dangled like Damocletian swords, grotesque ornaments greeting their owners. Contractors were told that in the course of cleaning out broken branches they had to cut all the stubs back to a substantial lateral. This practice is called "natural target pruning" or "making Shigo cuts." They were also told, following FEMA guidelines, to remove trees with 50 percent or greater crown loss. It was a Catch-22: by obeying the first rule, contractors would remove much more living crown, meaning that many trees would be removed that could have been restored.

If arborists wanted to facilitate the coexistence of people and trees, they would have had to refer to the ANSI A300 pruning standard (TCIA 2001). Section 4.20 of the standard defines heading as "cutting an older branch or stem back to a stub in order to meet a defined structural objective." Section 5.5.6 states that "heading should be considered an acceptable practice in shrub or specialty pruning to reach a defined objective." Because restoration pruning is a type of specialty pruning, the standards seem to allow leaving stubs in trees for the defined objective of preserving them.

Selective heading cuts are routinely made in vine, shrub, and fruit tree pruning; bonsai; pollarding; and other arboricultural practices. Therefore, how can all selective heading cuts in a big tree be considered improper?

This exceptional storm challenged the simplified rules, which seem based on a *Cliffs Notes* reading of the literature. The original ISA corporate seal carries the motto, "Science, Research, Preservation"—good words to

work by. Preserving trees is the goal; preserving branches is the way to reach that goal. Doing so may mean cleaning the crown of damaged tissue only down to the first good node.

As Alex Shigo writes in *A New Tree Biology*, "Topping is done internodal; proper crown reduction is done at nodes, or [emphasis added] at crotches. So the first separation must be nodes—good, internodes—bad" (1989).

## Nodes As Natural Targets

Cutting to large laterals prevents natural regrowth and takes stored resources away from the tree. Restorative heading cuts are not random or predetermined, like topping cuts, but are selected according to biological criteria. But what is a node, and what does it look like? In *A New Tree Biology Dictionary*, Dr. Shigo defines "node" as "the position on a stem or trunk that was occupied by the terminal bud and its associated buds" (1986). Some nodes contain fully formed buds that have been carried along in the cambium as the branch grew.

These buds are connected to the vascular stream and often anchored by compacted xylem, as shown in *A New Tree Biology* (Shigo 1989, pp. 238–239). Because of their vascular connection, the growth from these buds can be well nourished, and because of the

xylem connection, this growth can be well anchored. This dominant growth contrasts clearly with weak growth newly formed on the surface of the bark from adventitious buds. Some botanists also define these growth points as nodes, but terminal bud locations offer a clearer target.

What do target nodes look like on the outside? A bulge just before a decrease in diameter can indicate reduced branch growth beyond a terminal bud. A cut just outside a bulge will leave a smaller wound and retain more symmetry and structure. Some raised areas may contain dormant buds visible to the naked eye. Some bumps and bulges may be caused by pests; therefore, the surface of the cut should be examined to ensure that is not the case.

Wrinkles on branches can be the same swollen collars that once formed around the base of a lateral branch. If a scar indicates that a lateral branch was shed at such a location, there already might be preformed lateral buds on the outside. They might also already contain what Gilman and Lilly call the "unique chemical barrier called the branch protection zones" (2002).

## Dangerous Drop-Crotching

The process of locating nodes without lateral branches may seem sketchy at first, but consider the alternative. Reducing

damaged branches back to the center of the tree can increase the danger of windthrow. In *The Body Language of Trees*, Mattheck and Breloer caution against removing more weight from the windward, storm-damaged side of the tree. "The crown shape and the wind then combine forces to lift the pruned side of the crown, so reducing the normal stress and indeed perhaps transforming it into tensile stresses (i.e., lift!). When this happens, the effective sliding surface between



**The good, the good enough, and the ugly (left to right). The branch end in the middle is mostly solid wood and shows strong compartmentalization of decay—a foundation sufficiently good for regrowth. The branch end on the right is too ugly and decayed to leave in the tree.**

the root ball and the ground is so severely reduced that the tree blows over far more easily” (1994).

If drop-crotching exposes the remaining branches to more stress and strain, how is the tree safer than if heading cuts had been made? The damping effect of limbs that have been thickened by torque over the years is altered as other branches thicken under the new load. The tree is vulnerable to disintegration as new reaction wood is formed in response to the new stresses. As Karl Niklas notes in the *Tree Structure and Mechanics Conference Proceedings*, “When exposed by the removal of neighboring stems, previously sheltered and mechanically reliable body parts may deform or break even under wind conditions that are ‘normal’” (2002).

Avoiding decay is another good reason to make nodal cuts just below storm-caused wounds. Large wounds on trunks are unlikely to close before they start cracking and become what Schwarze, Engels, and Mattheck refer to in *Fungal Strategies of Wood Decay in Trees* as “motorways for decay-causing fungi and bacteria racing into the heart of the tree” (2000). Our strategy must be to minimize the infection courts we create.

Retaining branches that Nature topped also avoids sun injury, defined by Shigo in *A New Tree Biology Dictionary* as “when trees are suddenly exposed to direct sunlight, . . . the bark cambium is affected and the outer bark plates are flattened” (1986). These injuries are slow to seal because the tree’s interior bark is very thin and the sun dries the tissue at the edge. Big pruning cuts and sun-damaged bark may never seal.

Restore or remove? Where to make the cuts? It depends on

- species—good sprouters and good compartmentalizers
- age and vigor of tree, which affects sprouting potential and wound closure
- size of wound—smaller wounds equal faster closure
- availability of laterals or other obvious nodes with sound wood
- the need to retain a central leader and weight balance



One year after selective heading cuts, the two main leaders reestablish the canopy.

## The Tree’s Response

Retaining stems and scaffolds by making heading cuts can minimize sprouting by leaving, much higher in the tree, a smaller surface from which they will arise. Cutting deeper to a lateral may result in the attempted formation of more leaders growing more vigorously from a larger wound. The greater the dose of pruning, the greater the shift in the auxin and cytokinin balance. A part of the cytokinin effect in relieving apical dominance when applied to the bud may be the stimulation of vascular development connecting the lateral with the main vascular system. In “The Formation and Development of Dormant Buds in Sugar Maple,” Church and Godman observe that “Epicormic sprouting below the live crown increased as additional amounts of the woody crown were removed. . . .” (1966).

When storms upset the balance between roots and canopy, the tree responds by sprouting to restore the balance. The more that is removed from the tree, the greater the imbalance and the reaction. At some point there no longer will be sufficient photosynthesis, and the tree will decline. In *The Practice of Silviculture*, Smith et al. note that “Diameter growth may suffer if the live crown ratio . . . is reduced to 40 percent or less. Reduction in diameter growth slows wound closure” (1996).

Aftercare often is easy, but it is important to communicate to all stakeholders that the restoration process requires additional work to complete. The dominant sprouts can be

trained to become the new branches. On mature oaks, every three to five years seems about right. During each visit, we prune out

- branch sections that have failed to sprout well
- branch sections with rapidly advancing decay
- sprouts that are crowded together and that could therefore develop included bark
- sprouts that are not forming a buttress
- suppressed sprouts that are declining or dead

## On It Grows

Some branches that were headed back after Hurricane Fran in 1996 received subsequent thinnings in 1999 and 2002. They now have three strongly attached, natural-looking branch ends to carry on the growth of the tree. What at first looked like ugly stubs grew into attractive, safe, and symmetrical portions of valuable tree canopy. Some observers initially object to the sight of reduced branches because they are reminded of topping cuts. It may be time for the anti-topping passion to cool a little so that we can consider selective heading cuts without worrying about them looking like topping cuts.

Canopy conservation is the ultimate reason for minimizing crown losses. When nature radically removes portions of a tree’s canopy, it’s up to the arborist to save what’s left. Trees are dynamic systems. The more of the tree we conserve, the more present and future benefits such as clean air and water we will conserve. As measured by American Forests’ CityGreen software, the urban tree canopy delivers high value that should not be removed without a good reason. One mature willow oak (*Quercus phellos*) can recycle more than 200 gallons of water per day. Selective heading cuts on damaged trees benefit the tree, the tree owner, and the community.

Therefore, think about specifications that require enlarging the holes in damaged tree canopies and risking imbalance, decay, sunscald, and anchorage loss. A “compassionate conservative” approach calls for the arborist to aim for natural targets so that the



tree owner conserves assets. For the cost of three pruning jobs, the expense of removal and replacement can be avoided.

## References

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Photos courtesy of Guy Meilleur.

# TREE INDUSTRY CALENDAR

For the most current list of events, go to [www.isa-arbor.com/calendar/calendar.asp](http://www.isa-arbor.com/calendar/calendar.asp). The on-line calendar also includes a link for organizations to post announcements about their upcoming events on ISA's Web site.

For the most current list of certification exams, go to [www.isa-arbor.com/certification/certification.asp](http://www.isa-arbor.com/certification/certification.asp).

## Chapter Calendar

### September

**15–17 Texans for Trees: ISAT/TUFC Annual Convention.** Round Rock, TX. Sponsored by ISA's Texas Chapter and the Texas Urban Forestry Council. Call Mike Walterscheidt at (512) 281-4833.

**24 Ohio Chapter Southern Education Seminar.** Hamilton County Park District, Sharon Woods, Sharon Centre, Cincinnati, OH. For more information, call Alan Klonowski, (216) 544-4737.

### October

**3–6 Rocky Mountain Chapter/Society of Municipal Arborists Annual Conference.** Denver Marriott Center, Denver, CO. Featured speakers include Mark Buscaino, Scott Cullen, Julian Dunster, SMA President Steve Shurtz, ISA Executive Director Jim Skiera. For more information, call the RMC office at (303) 756-1815 or the SMA office at (706) 769-7412.

### November

**15–16 Pesticide Applicators Workshop.** Sponsored by Rocky Mountain Chapter. Arvada Center, Arvada, CO. For more information, call the RMC office at (303) 756-1815.

### 2005

### February

**12 Ohio Chapter 6th Annual Clays Tournament.** Benefiting the Arbor Fund. Walnut Creek Conservation Club, Sanbury, OH. For more information, call Al Shauck, (216) 854-0508.

**13–14 Ohio Chapter Tree Care Conference and Trade Show.** Columbus Marriott North, Columbus, OH. Includes ISA arborist certification exam preparation workshop. For more information, call the Ohio Chapter office, (216) 544-4737.

## Industry Calendar

### September

**1–2 Nursery, Landscape, and Urban Forestry Field Day and Summer Nursery Tour.** Sponsored by the Virginia Nursery & Landscape Association and Virginia Tech's Hampton Roads Agricultural Research and Extension Center. Hampton Roads AREC, Virginia Beach, VA. Field day September 1; Nursery tour September 2. Activities include demonstrations, speakers, tours, plant ID, silent plant auction, competitions, displays, and exhibits of new equipment, products, and services. Registration information is available from VLNA, (800) 476-0055, [info@vnla.org](mailto:info@vnla.org), or [www.vnla.org/fieldday2004.htm](http://www.vnla.org/fieldday2004.htm).

### October

**19–23 Sixth Canadian Urban Forest Conference.** Theme: Fire, Storms, and Pests—Crises in the Urban Forest. Grand Okanagan Lakefront Resort and Conference Center, Kelowna, BC. Features top speakers from around the world on such topics as fires and storms, plant health care, urban forestry budgets, tree inventories, and more. For further information, call Jeff Monty, conference chair, at (613) 567-5545 or Ian Wilson, program chair, at (250) 862-5580 ext. 572.

**28–30 TCI EXPO—World's Largest Tree Care Trade Show.** Cobo Exhibition Center, Detroit, MI. Hundreds of leading vendors, the latest tools and equipment, and many educational seminars for arborists, pesticide applicators, and managers. Hosted by the Tree Care Industry Association. For more information, please call (800) 733-2622 or visit TCIA on-line at [www.TreeCareIndustry.org](http://www.TreeCareIndustry.org).

**29–31 New Jersey Shade Tree Federation 79th Annual Meeting.** Hilton Philadelphia/Cherry Hill, Cherry Hill, NJ. CEU and pesticide recertification credits available.