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 **Spring 2011**
The Last of the Giants
Documenting and saving the largest eastern hemlocks
Story & photos by Will Blozan

The Beginning



The Caldwell Giant was one of the largest hemlocks found by Blozan and his team. Despite its massive size, the tree could not claim a champion crown; it had been killed by woolly adelgid before it was discovered.

While attending Warren Wilson College in western North Carolina, I would regularly stop by the campus library to see if the latest issue of *American Forests* magazine had arrived. At that time, a National Champion tree was featured in each issue. As an arborist and environmental studies major, I was tremendously interested in how big eastern trees could get. Stories of huge tulip trees, oaks, and willows, and the breadth of the *National Register of Big Trees*, led me to think that all the champs had been found. Still, I tried my hand at breaking a record by climbing a huge shingle oak and dropping a tape to determine the height. It was 18 big tree points shy of the record, but the fever had struck. I was obsessed with big trees!

In 1993 I began working for the National Park Service in Great Smoky Mountains National Park, North Carolina and Tennessee, affectionately known as the Smokies. I was assigned to the Old-Growth Project, mapping unlogged forests of oak and hemlock. Our task was to delineate these forests and prepare for future management. Work with the hemlocks involved preparing for the arrival of the dreaded hemlock woolly adelgid (HWA). In the early 1950s HWA was accidentally introduced from Japan on nursery stock sent to Richmond, Virginia. By the 1990s it had already destroyed hemlocks up north and was expected to arrive in the Smokies in the early 2000s.

The Passion

The Old-Growth Project exposed me to numerous big, ancient specimens of many species. I took measurements, consulted the *National Register*, and discovered that I had found some champions! My first champ was a red maple that measured a whopping seven feet in diameter. I quickly discovered 21 more champs, including a huge eastern hemlock in one of the mapped groves. After completing the Old-Growth Project, I cofounded the Eastern Native Tree Society (ENTS), an internet-based group dedicated to the appreciation and measurement of eastern trees. Since 1996 we have developed highly accurate measuring techniques and built a database of over 10,000 accurately measured trees, many of them described on the extensive website (www.nativetreesociety.org). Knowing that the arrival of HWA was imminent, we started applying these techniques to the great hemlocks of the Smokies.

The Nightmare

In the back of my mind lurked the inevitable day when I would hear that HWA had arrived in “my” woods. In a wilderness area in South Carolina on December 3, 2001, I was climbing a tree that I hoped would break the world height record for eastern hemlock. While descending the 167.7-foot East Fork Spire (which turned out to be eight inches shy of a new record), I brushed up against a branch and noticed a woolly fluff on my jacket. The hemlock woolly adelgid had arrived in my woods. I received word a few months later that HWA had been officially discovered in the Smokies. By 2004 the East Fork Spire was dead. By 2005 virtually all of the groves I had mapped in the Old-Growth Project were infested. By 2007 they were essentially dead. Those lush, deep green cathedrals of ancient hemlocks—some with trees over 500 years old—were now sun-baked stands of gray skeletons. The results of centuries of undisturbed growth were erased in a mere four years, and my own forest legacy was disappearing.



The hemlock woolly adelgid has brought an entire species to its knees. Credit: CONNECTICUT AGRICULTURAL EXPERIMENT STATION

Despite their numbers, the hemlocks had no dying voice. I felt compelled to tell their story, and became an attendee or guest lecturer at every event possible to spread the word. My work was featured in numerous articles and even on television, but I still wanted more for the hemlocks.

The Project

The ENTS takes great pride in finding and documenting the maximum height of eastern trees. For the hemlocks, it would be only a few years until all in my area were dead. It became my mission to prevent the eastern hemlock from dying without proper acknowledgment and accurate documentation.

Thus was born the Tsuga Search Project, sponsored by Appalachian Arborists, the National Park Service, and ENTS. “Tsuga” (soo-gah) is the Latin genus of hemlock. This project had several lofty goals. We wanted to know how tall hemlocks could grow, how much wood they could amass, and where they achieved their maxima. We also wanted a clear picture of what the forest was like around the superlative trees—in other words, to take an “ecological snapshot” of the species and its habitat before it disappeared. We wanted to leave a legacy for the future, but were running out of time.



Found during the Tsuga Search Project, and now dead from adelgid infestation, the tree named the Usis Hemlock broke the world record for hemlock height. In this photo, Will Blozan climbs the champion. Credit: JASON CHILDS, APPALACHIAN ARBORISTS. INC

Finding (and Losing) the Giants

What is a superlative hemlock? We knew from past ENTS surveys that hemlocks were rarely found over 160 feet tall. By taking diameters aloft, we could calculate the wood volume in the tree. This had been done for several hemlocks, and we knew 1,200 cubic feet was a really big hemlock. These trees represented many years of searching by ENTS; thus we selected 160 feet tall and 1,200 cubic feet of wood as “superlative.”

Along with Jess Riddle, an accomplished ENTS tree hunter, we began the project with 22 known hemlocks over 160 feet tall. As field surveys progressed, we began to home in on the particular habitat needed for a superlative hemlock. We found that the ideal habitat not only required old trees but also fell into a discreet elevation range and slope aspect. Although we climbed and measured hemlocks in seven

states, the tallest and largest were consistently found in old-growth forests in the near “temperate rainforests” of the southern Appalachians. In fact, all the superlative trees found in the project are within 65 miles of each other in North Carolina, Tennessee, Georgia, and South Carolina.

The lion’s share were found within the Smokies. The park contains nearly 200,000 acres of old-growth forest, 35,000 of which have a significant hemlock component. To date, not a single hemlock located by ENTS outside of the southern Appalachians exceeds 1,000 cubic feet of wood volume or 160 feet tall. In fact, some of the Tsuga Search trees had co-dominant forks that are larger and taller than some state champion hemlocks!

As the project progressed, we sensed there was a “holy grail” to be found in the forests. The number of 160-foot hemlocks soared to near 70 specimens, but none had yet been found to reach 170 feet. Then, one winter day in 2007, Jess discovered it: A slender tree among larger ones managed to hold its head high, and was measured at 171.6 feet from the ground. A climb was immediately arranged to get a more accurate measurement, and the tape confirmed it: 171.7 feet! On this same ridge, two more hemlocks were located and measured at over 170 feet. The second tree climbed reached 172.1 feet. The third, a huge tree we named the Usis Hemlock, soared to 173.1 feet tall, a new world height record!

Usis was later the subject of a documentary film, *The Vanishing Hemlock: A Race Against Time*, to be released later this year. The extraordinary tree was also featured in a three-dimensional crown-mapping project. Though now dead, Usis has been preserved via a complex 3-D mapping system.

Even at 1,533 cubic feet of wood, Usis was not the largest hemlock discovered. Only four hemlocks have been documented over 1,500 cubic feet. The Caldwell Giant, one of the last discovered, was a six-foot-diameter beast that racked up 1,601 cubic feet of wood. At 393 points, it would have been an unbeatable National Champion had HWA not claimed it first.

These giants were breaking records while on their deathbeds. As the Tsuga Search wound down, we focused our remaining time and resources on detailed study of the 15 tallest and 15 largest trees documented. We took “ecological snapshots” of the forest, compiled a huge database, and submitted the final report to the National Park Service. **By 2008, every one of the 75 hemlocks discovered over 160 feet tall was confirmed dead.** As for the largest trees, all were dead . . . except one.

The Story of the Cheoah Hemlock

Today, a single superlative tree survives from the project. It exists only because its owners provided the extensive resources necessary to save it. It stands as a peerless representative of a vanished race of giants.

In 2004 my company was hired by the US Forest Service to release an HWA predator beetle, *Sasajiscymnus tsugae*, as a biological control agent into an old-growth hemlock forest. We climbed the ancient trees and released thousands of little beetles into the canopy to combat the growing HWA infestation. During this climb, one of the USFS employees introduced me to a huge tree downstream that he had named Cheoah. I was floored! I had never seen such a huge hemlock—and I had seen *many* huge hemlocks.



Because the Cheoah hemlock was dying of HWA infestation, it was chosen for a trial in which an insecticide was painted directly onto the bark.

The tree, on adjacent Highlands-Cashiers Land Trust property, was not on the climb list for the beetle release. I returned a few weeks later and measured the tree at roughly 158 feet tall and over five feet in diameter. These attributes alone do not make a really big hemlock. What made this tree stand out were the depth of crown and the

massive, slow-tapered trunk. The trunk forked multiple times into an ascending forest of smaller stems. The foliage nearly reached the ground, with cascading branches cloaking the tree in a green coat nearly 150 feet deep. It was literally a tower of green.

This tree became a priority for Tsuga Search documentation. We returned in March 2006 to climb the tree, measure it, and complete vegetation plots. The Cheoah stood at 158.7 feet tall and held 1,564 cubic feet of wood—a new record!

Record-breaker or not, we were saddened to see the tree's decline in health. Over the two previous years, all the branch tips had died, and the foliage was now gray and sparse. Some of the nearby trees were stone-dead; HWA had a firm grip on the forest, and the trees were losing.



The Cheoah hemlock is the sole remaining record-breaking champion from the Tsuga Search Project.

It soon became evident that the beetle release was failing. Like its companions, the great Cheoah was dying. Later in 2006, Cheoah and 12 companions were treated with a systemic insecticide. Alarmingly, the Cheoah showed no new growth in 2007. A highly soluble and quick-acting product, trade-named Safari™, was released in 2007 and held great promise in the preservation of hemlocks. The Cheoah was chosen as a deserving candidate in a trial application in October 2007, but hopes were not high. Even with insecticides, no tree this large had ever survived an HWA attack.

We revisited Cheoah in the spring of 2008, just after bud-break, fully expecting a dead tree. Instead, we gazed upon a tower of lime-green new growth. The tree was responding, but had not completely recovered. Portions of the top were still declining, and if large sections died, catastrophic structural failures could occur in the crown.

We supposed that the insecticide couldn't make it to the top in lethal concentrations through areas of "vascular confusion," including forks, reiterations, and fused structures. These features are all part of the very complex architecture of the tree, but they may have been thwarting modern efforts of preservation.

Undaunted, in the fall of 2010 the Valent Corporation (which distributes Safari™), the Highlands-Cashiers Land Trust, and Appalachian Arborists attempted the first aerial application of Safari™. We were to climb above the vascular confusions and apply the bark-penetrating Safari™ where it was needed: 120 feet up in the top.

The tree was rigged, and three climbers went aloft. Swinging above the tree's forked twists and turns, we applied the insecticide to the trunk with a paintbrush. The application went smoothly, and we now anxiously await the new growth in spring 2011 with hope that the top will once again burst forth in lime-green glory.

A Solo Legacy

The preservation and continued survival of this giant tree illustrates the importance of caring for our national legacy of trees. In the presence of HWA, giants like this will not be seen for centuries, if ever again.

The ecological collapse of the hemlock forests in the southern Appalachians does not have to be mirrored elsewhere. Timely and appropriate management, coupled with dedicated resources, can save vestiges of our hemlock legacy. In the short term, hemlocks can be saved via systemic insecticides, which will buy the trees some time until a large-scale control can be found.

The Cheoah now represents the grandest eastern hemlock we can currently claim exists. For this reason we have humbly and respectfully submitted this iconic tree to the *National Register of Big Trees* to reign during its remaining years as the largest of its species. May it proudly uphold the memories of its fallen companions until once again a worthy contender brings forth the challenge.

Will Blozan is the President of the Eastern Native Tree Society, and of Appalachian Arborists, Inc.



The hemlock woolly adelgid begins as an odd white fluff on the twigs of a healthy hemlock, and quickly transforms entire swaths of forests to skeletons

MORE TO LEARN

Eastern Native Tree Society

Find more information about eastern trees and the Tsuga Search Project, and browse hundreds of trip reports and postings on champion trees.

www.nativetreesociety.org

The Vanishing Hemlock: A Race Against Time

This in-progress documentary, filmed in the Great Smoky Mountains National Park, aims to draw attention to the plight of the hemlocks and the battle against hemlock woolly adelgid. The film will be released in Winter 2011.

www.thevanishinghemlock.com