Bulletin of the Eastern Native Tree Society

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Mission Statement:

The Eastern Native Tree Society (ENTS) is a cyberspace interest group devoted to the celebration of trees of eastern North America through art, poetry, music, mythology, science, medicine, and woodcrafts. ENTS is also intended as an archive for information on specific trees and stands of trees, and ENTS will store data on accurately measured trees for historical documentation, scientific research, and to resolve big tree disputes.

Current ENTS Officers:

The Grand Ent—Lord of the Rings, Brother Dave "Stellata" Stahle
President—Will Blozan
Vice President—Lee Frelich
Executive Director—Robert T. Leverett
Webmaster—Ed Frank

Editorial Board, *Bulletin of the Eastern Native Tree Society*:

Membership and Website Submissions:

Official membership in ENTS is FREE and automatic. Simply sign up for membership in our discussion list, ENTSTrees at: http://lists.topica.com or send an e-mail to ENTSTrees-subscribe@topica.com. Submissions to the ENTS website in terms of information, art, etc. should be made to Ed Frank at: ed_frank@hotmail.com.

The *Bulletin of the Eastern Native Tree Society* is provided as a free download in Adobe© PDF format through the ENTS website. The Eastern Native Tree Society and the *Bulletin of the Eastern Native Tree Society* editorial staff are solely responsible for its content.

COVER: Shrouded in fog and tinted with fall colors, this scene is from the Levi Wilcoxon Demonstration Forest near Hamburg, Arkansas, a small remnant of old-growth pine and hardwoods. Photo by Don C. Bragg.

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INTRODUCING THE *BULLETIN OF THE EASTERN NATIVE TREE SOCIETY*

Don C. Bragg

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Conventional wisdom holds that an organization has really "come of age" when it can offer its membership something a little more tangible than just a sense of belonging. In a sense, the *Bulletin of the Eastern Native Tree Society* has been months in preparation, with many dedicated individuals working hard to create a visual representation of the Eastern Native Tree Society. In reality, this journal has been years in the works, dating back to the earliest moments of the organization as its purpose crystallized from the efforts and interests of its founding members.

So what is the vision for the *Bulletin*? I suppose if you were to ask a dozen ENTS members, you would get a dozen different responses. Perhaps the best way to understand the *Bulletin* is to know the organization and its goals. ENTS was formed not that many years ago to celebrate the forests and trees of eastern North America through a variety of formats. Additionally, the founders intended ENTS to serve as a repository for highly accurate information on large tree dimensions.

ENTS is comprised of a small but dedicated core of devoted tree measurers from many different fields—some scientific, some not. We have writers and weather forecasters, arborists and computer instructors, professors and students, people of all walks of life and all levels of interest. Although centered around some core principles, the *Bulletin* will reflect the diverse interests of ENTS membership. To this end, a wide range of materials can be submitted for consideration for publication in the *Bulletin*—simply follow the instructions for authors posted in this and future issues. In addition to more technical materials like trip reports and peer-reviewed scientific articles, the editorial board would like to encourage members to submit poetry, pictures, stories, editorials, observations, and other original creations that correspond to the interests of the society.

In many ways, the diversity of material on the ENTS website and the Internet discussion group will be mirrored in the nature of the *Bulletin*. This open and free collection of ideas and passion for the forest has always formed the basis of the organization. The *Bulletin* will serve as a clearinghouse of information in a standardized, distributable, and free format. We hope that our contributions to science are matched by our contributions to art and literature and help to advance the shared goals of the ENTS.

In short, the *Bulletin of the Eastern Native Tree Society* was created to help the membership broaden their horizons, and to help society in general develop a deeper appreciation for the trees and forests we all hold dear. We look forward to serving you, and start sending in those materials!

A remnant grove of ancient baldcypress and tupelo gum in the White River National Wildlife Refuge of eastern Arkansas.

Photo by Don C. Bragg.

ANNOUNCEMENTS AND SOCIETY ACTIONS

ENTS Rendezvous/Forest Summit
Holyoke, Massachusetts
October 27-29, 2006

From October 27-29, 2006 ENTS will hold its annual Fall Rendezvous in western Massachusetts. Friday evening from 6:30 p.m. to 9:30 p.m. will be devoted to lectures at Holyoke Community College, Holyoke, Massachusetts, as part of the broader Forest Summit Lecture Series sponsored by the college, ENTS, and Friends of Mohawk Trail State Forest. The agenda is tentative at this point, but will include lectures on old growth forests, big tree measuring and modeling, and the accomplishments of the ENTS during the year.

Saturday will be devoted to a tree-measuring workshop at the Mohawk Trail State Forest in Charlemont, Massachusetts. ENTS president Will Blozan will climb one of the tall white pines and conduct a tape drop to determine its height precisely. A variety of trigonometry-based methods will then be used from the ground for comparison purposes. Through these workshops, ENTS not only compares measurement methods and evaluates measuring equipment, but works on perfecting standard measurement protocols. The tree chosen for climbing is still tentative, but will likely be the Mirror Tree, which has a trigonometry-based, measured height of 152.6 feet and a circumference of 10.8 feet at breast height. The Mirror Tree is easily accessible, but presents technical challenges to measurers due to poor concurrent visibility of both the crown and the base. Usually the trees chosen for measurement are clearly visible. The climb will also allow us to obtain accurate girth measurements from aloft to use in testing different methods of trunk and limb volume modeling.

In the evening, ENTS will feature a concert of classical music devoted primarily to the theme of nature. The concert will be held at the United Federated Church of Charlemont and will feature Smith College Professor of Music Monica Jakuc on piano and Dr. Lee Frelich of the University of Minnesota on the violin (as well as other performances—the talent program is still being developed). There will be poetry readings by Ed Frank and possibly participation by other ENTS members who are writers.

On Sunday, Will Blozan will do a climb of the Bryant Pine at the William Cullen Bryant Homestead in Cummington, Massachusetts. The event is intended partly as a fundraiser for the Trustees of Reservation, the oldest broad-based conservation organization in Massachusetts and one of the oldest in the United States. The Bryant Pine will be modeled for volume at this event.

More details will follow.

Some of the participants of the 2004 ENTS Rendezvous/Forest Summit. Photo by Ed Frank.

TREE MEASURING GUIDELINES OF THE EASTERN NATIVE TREE SOCIETY

Will Blozan

President, Eastern Native Tree Society

ABSTRACT—
This paper describes the ENTS protocols for measuring champion-sized trees, including illustrations intended to ensure the accuracy and repeatability of measurements. These techniques are the standard for data collection within ENTS-based research and the default standards for publication of articles in the *Bulletin of the Eastern Native Tree Society*.

INTRODUCTION

The Eastern Native Tree Society (ENTS) is a diverse, non-profit group of ecologists, educators, naturalists, and world-renowned canopy researchers dedicated to a better understanding of our Eastern forests. Accuracy is the goal of our mission, and ENTS has developed some research techniques unmatched by any other institution. Champion trees are a spin-off of our research, and this article describes our measuring guidelines.

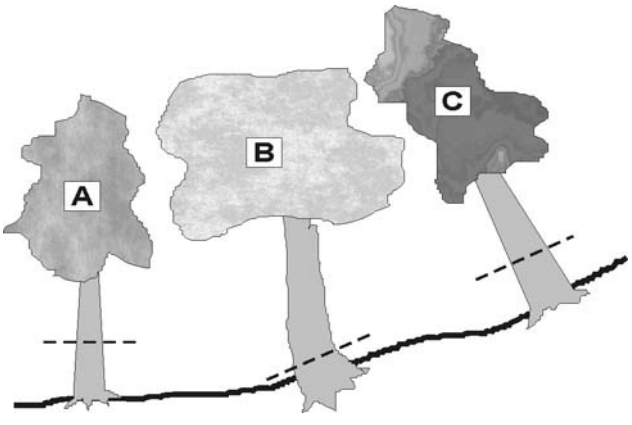
The Eastern Native Tree Society has developed and tested standardized techniques for tree measurements. The ENTS techniques generally follow champion tree guidelines, and the results of ENTS-measured trees can be submitted to most champion tree lists with no conversions. The most significant difference between ENTS-measured trees and those measured via conventional forestry methods is a much higher standard of accuracy. In fact, the "ENTS method" of laser-based tree height measurements is so accurate that it is being employed in height growth monitoring projects by several universities and premier forest ecologists. Perhaps the most important value of the ENTS method is that it is repeatable, a basic premise of any scientific project. Users of the method, with a few minutes of training, can produce measured results within 1% or less of a seasoned ENTS researcher. Seasoned ENTS researchers can measure a tree from the ground to within inches of a direct tape drop. This process takes but a few minutes for most trees.

This article will discuss the basic premises and assumptions of how to measure a tree (sometimes with several ways to do it), starting with the easiest dimensions to obtain—girth and crown spread.

GIRTH

Girth is a dimension taken at a point 4.5 ft breast height (BH) above average soil level (Figure 1, case A). This measurement is called circumference at breast height (CBH). If a burl or other atypical growth formation is encountered at this point, the least distorted girth below this point is used (Figure 1, case B); otherwise above BH. When a tree is growing on a slope, the girth is taken at a point that is the average of the highest point and the lowest point the tree trunk appears to contact the soil (mid-slope—Figure 1, case C). This mid-slope rule follows the American Forests guidelines for measuring champion trees. In all cases the girth is taken perpendicular to the axis of the trunk at BH, not parallel to the soil. Measured girth is the best approximation of size, since it is a real number, not a calculation based on fictional premises.

Figure 1. Girth measurement locations



When most people ask how big a tree is, they want to know the diameter, not the girth. Diameter is useful to calculate because it is readily understood

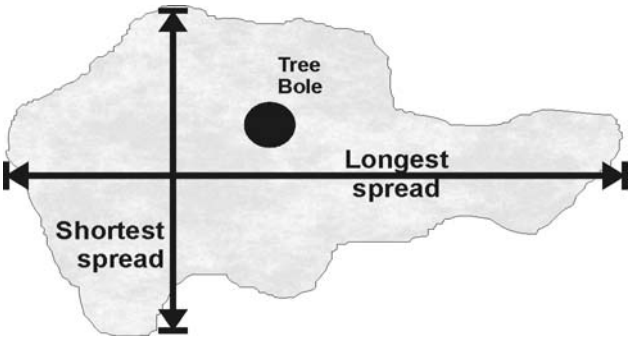
by most people. It also seems to be one of the most overstated dimensions other than height, with many "5 to 6-ft diameter" trees actually closer to 3 to 4 ft in diameter. Lack of an accurate reference is often to blame, as is in the case of overstated heights.

CROWN SPREAD DETERMINATION

Average Crown Spread

Average crown spread is obtained by measuring the longest and shortest extent of the crown and averaging the figures. Crown spread is taken independent of trunk position. I measure to the tips of the limbs, not to "notches" in the crown shape. Try to measure crown widths perpendicularly.

Figure 2. Measuring crown spread



Average crown spread = (longest + shortest)/2

When measuring crown spread on steep slopes (> 15 degrees), it is important to correct the slope distance to horizontal distance to avoid exaggeration. This can easily be accomplished by taking the cosine function of the angle of the slope in degrees and multiplying it by the slope distance.

Spoke Method for Crown Spread

Another method to determine crown area is the "Spoke Method," where ten or more measurements are taken from the midpoint of the trunk to the outer extremities of the crown. These are averaged and the result is the average crown spread.

Average crown spread = 2 (SUM/n)

The Spoke Method is the preferred technique of canopy researchers and is probably the most accurate, and can be used to quantify crown area. On large trees it can be accomplished quickly with a laser rangefinder. The increased accuracy is largely overkill for champion tree registers, and slope correction can get tedious to say the least!

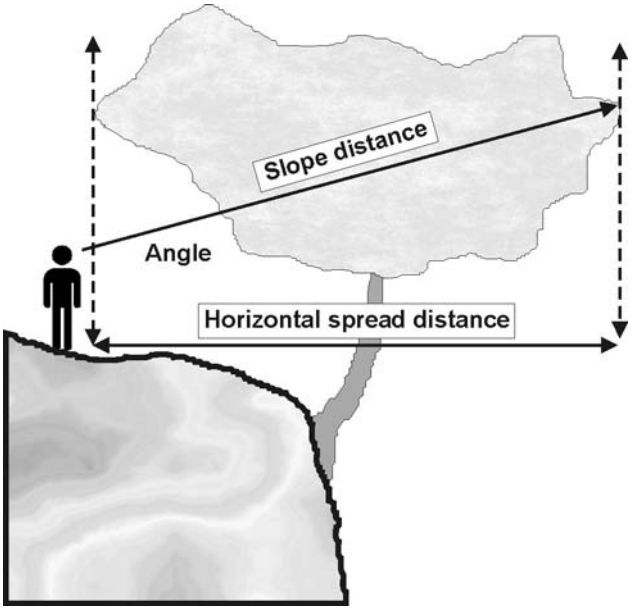
Lasered Crown Spreads

The use of a laser rangefinder can really speed things up when measuring crown spread. The laser can also be used to measure crown spread on tree canopies over an obstacle such as those described below. As in measuring tree height, several points on the tree can be "explored" to find the furthest point. Simply use the following formula:

Crown spread = Slope Distance × cos(A1)

In the illustration below (Figure 3), the observer is directly under the opposing crown edge, but multiple triangles can be used or combined with ground-based measurements to get the full spread.

Figure 3. Measuring challenging crown spreads with a laser rangefinder



HEIGHT

Getting an accurate tree height is the nemesis of many potential tree hunters, and the leading source of point errors on champion tree lists. Although the techniques are very simple, employing them accurately is another story, which will be dealt with later in this section. Tree heights are typically remotely obtained using a clinometer or transit for angles and a measuring tape or infrared laser rangefinder for distance. By using simple trigonometry and laws of similar triangles and right triangles, the true height of a tree can be easily obtained. In all cases, the height obtained is the vertical distance between the top and base, not trunk length. Leaning trees and hardwoods have longer

trunk and branch systems than indicated by vertical height, but this measurement is beyond the scope of my efforts (or the champion tree lists).

Non-Laser Techniques (Cross-Triangulation)

Huh? NEWS FLASH! The top of a tree is almost never directly over the base. This assumption is the fatal flaw of conventional forestry height measuring techniques. We all have been taught to measure out 100 ft from the base of the tree, take an angle reading with a clinometer, and multiply the result by 100 to get the tree height. Some forestry clinometers are calibrated in "chains" (1 chain = 66 ft), and work similarly. These techniques do work, but only on trees that satisfy the following conditions:

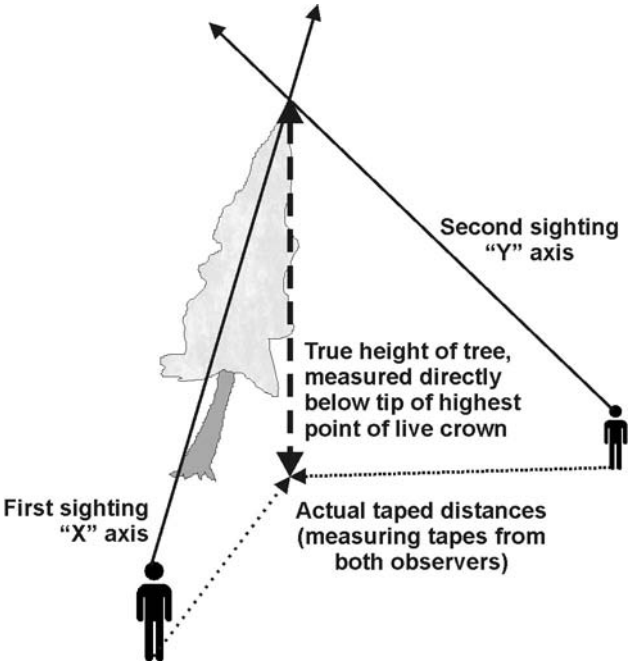
- the highest point of the tree is directly over the base of the tree;
- the highest point of the tree is clearly visible;
- the tree is growing on level ground; and
- the tree does not lean.

How often does this happen? Not very! Aside from perhaps a Norway spruce growing in a level parking lot, most trees do not ordinarily satisfy all of the above conditions. Older trees and trees in old-growth forests do not typically grow straight or have a well-defined top when viewed from our limiting terrestrial level. I have climbed many tall conifers and performed tape drops (vertical) from the highest point to the ground. The tape has never come down on the base. Ten feet or more is a common displacement from vertical on large conifers. Hardwoods can be much more. In fact, live oaks and other wide-spreading trees can have tops many feet from their base. Consider the following photo of the Middleton Oak in Charleston, South Carolina.

Where do you begin? Is what appears to be the highest point really the tallest part of the tree? A huge tree like the Middleton Oak is a challenge to measure, and lots of time will be spent chasing false leads and finding nested tops. For example, the highest point of the tree above is actually a small triangle shape "peeking" though the window of sky formed under what appears to be the highest part in the photo. It is fully 35 ft off the base and on the other side of the tree!

Okay, back to cross-triangulation. Cross-triangulation is essentially the process to map a point on the tree (the top) in three dimensions. Once we know where the top is, we can then properly measure its position relative to the ground (height). In a two-dimensional photo (like that of the Middleton Oak), there is no way of knowing for sure which part of the tree is far back and which is closest.

Figure 4. Cross-triangulating a leaning tree



In cross-triangulation, you pick a target point. Dangling your clinometer (or plumb-bob) by the lanyard, you transpose the point to the ground (a helper is useful). Mark this point with a stick or other object. Go ahead and measure the angle to the top while you are there. This is the point in one dimension that the top intersects the ground, and is in a sense the "X" axis. Then, observing the same point with your eyes, go 90 degrees to either side and transpose the top to the ground again. This is the "Y" position on the "X" axis that the top resides. Move the stick to that position, staying 90 degrees (perpendicular) to the line of sight. It is often helpful

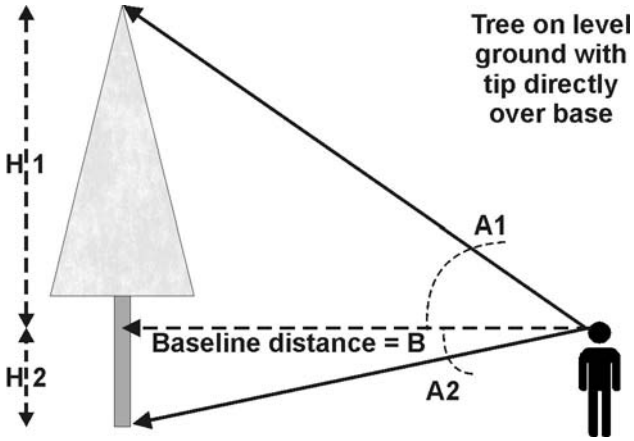
to lay the measuring tape out on the first sighting so that you can more easily find the 90-degree mark, and when you move the stick to the "Y" position you can modify the distance and calculate the height. The stick's position is the adjusted baseline.

On some trees, cross-triangulation is a very difficult and time-intensive procedure to accomplish, and if you are going to measure a lot of trees or trees in a forested setting, I encourage you to skip this method, buy a laser rangefinder, and go to the section on the ENTS Method. Regardless, cross-triangulation is good to know, as it illustrates the fallacy and pitfalls of conventional techniques, and when your laser battery dies or you forget your equipment, you can fall back on it. When properly applied, the results of cross-triangulation are extremely accurate. Its biggest drawback is TIME!

Note: *I must point out that within the Eastern Native Tree Society and many universities, cross-triangulation techniques are no longer being used. This is because once you get familiar with using a laser rangefinder, you basically can't imagine doing it any other way. The technique is so accurate, quick, and foolproof that its introduction into scientific canopy studies was a "no-brainer." Height growth of mere inches can be ascertained with the techniques described after this section on conventional forestry methods.*

The following diagrams explore the formulas and scenarios associated with tape and clinometer measuring techniques, AFTER cross-triangulation has been performed and the highest or targeted point has been identified.

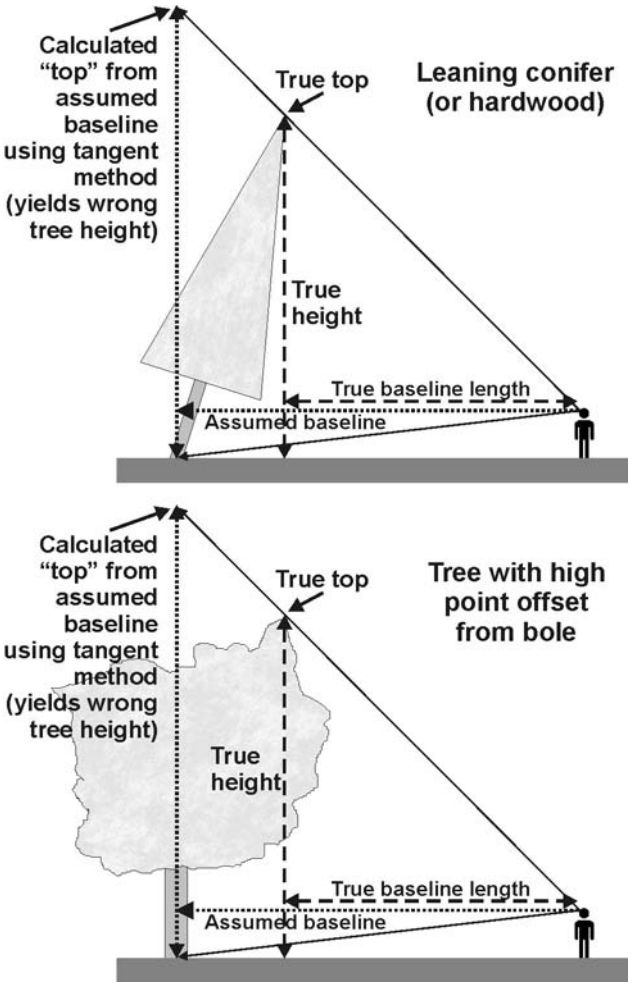
Figure 5. Traditional tangent method for measuring tree heights



Total tree height = H1 + H2, where:
H1 = B × tan(A1) and
H2 = B × tan(A2)

These idealized conditions rarely occur in nature, and situations critical to accuracy are often overlooked or not considered, thus making many claims of tree height inaccurate and unacceptable. See Figure 6 for an illustration of the two most common sources of tree height error.

Figure 6. Common sources of height errors on leaning trees

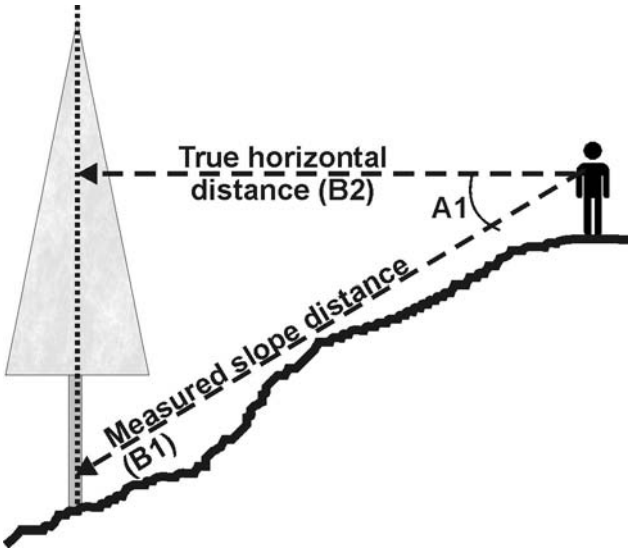


In Figure 6, the tops are leaning or offset towards the observer, and it is necessary to cross-triangulate the actual top projection to the ground (the point directly under the highest point) to use the tangent method. From this point a separate baseline for the top measurement is taken; otherwise the height will be exaggerated (or underestimated on a tree leaning away from the observer). Without correcting for the lean and the true top location, even small trees can yield enough error (i.e. point spread) to keep co-champions away (6 points).

Trees On A Slope

The slope distance of a line between the observer and the tree (B1) is longer than the same horizontal distance (B2) between the same points. Since conventional height calculations are based on the horizontal distance between the observer and the tree, the distance must be corrected to the horizontal equivalent. This is very easy, and even easier to forget to do!

Figure 7. Correcting the baseline for trees growing on a slope



True horizontal distance = B2 = B1 × cos(A1)

Cross-Triangulation Summary

All of the above situations (i.e. a leaning tree and leaning ground) can compound themselves into massive height errors. Such compounded errors can be highly significant on small trees, as well as on trees that don't appear to be leaning much. Naturally, the observer can often position themselves in such a way as to minimize the potential for having to correct for compounding errors. Such tactics include selecting a sighting position perpendicular to the lean and sighting from a point level with the base. Here is an example of a calculation you may need to use to avoid compounding errors:

H1 = tan(A1) × [B1 × cos(A1)]
H2 = tan(A2) × [B2 × cos(A2)]
Total tree height = H1 + H2, where:
H1 = Height above eye
H2 = Height below eye
A1 = Angle to top from observer
A2 = Angle to base from observer
B1 = Slope baseline distance to top
B2 = Slope baseline distance to base

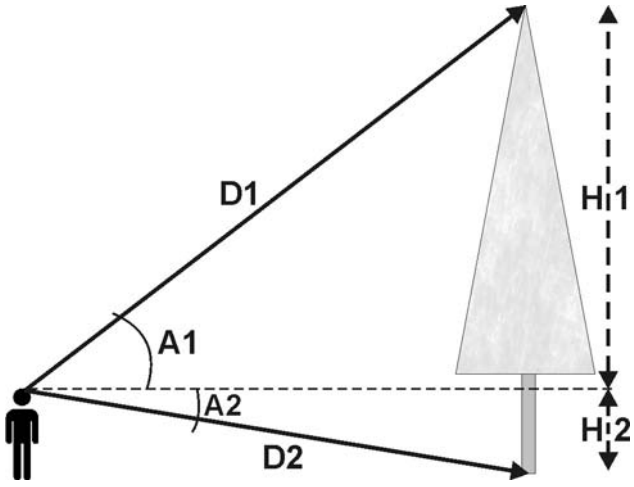
Note: *Absolutely none of the challenges associated with cross-triangulations are an issue when using the ENTS method.*

THE ENTS METHOD

If the above figures and techniques are mind-boggling, then buy a laser and try this! This low-cost method has the advantage of being the quickest, simplest, and most accurate. A clinometer and a laser rangefinder are relatively minor expenses (less than $300) and easily justified by the speed, accuracy, and foremost, the REPEATABILITY of your results!

The laser rangefinder is a device that sends out a pulse of infrared laser light. This light reflects off a target and bounces back to the laser unit. A clock inside times the bounce and calculates the distance based on elapsed time. Since the laser requires a return bounce, this method has the distinct advantage of automatically measuring a physical part of the tree, as opposed to an extrapolation of a part of the tree via cross-triangulation or other conventional methods.

Figure 8. The ENTS Method



H1 = sin(A1) × D1
H2 = sin(A2) × D2
Total tree height = H1 + H2

Only four numbers are needed to complete the tree height calculation, and no tape is necessary, nor is direct contact with the tree. This last bonus can be useful for trees across a river, road, a mean dog lair or other obstacle. When searching for champions, a

quick height reading will tell you if further exploration and contact with the tree, the dog, or its owner are necessary. Since the hypotenuse of the triangle is the baseline and it is measured from a physical part of the tree any lean or slope correction is irrelevant. You are simply creating two right triangles to an imaginary (but fully real) level plane (eye-level or tripod, etc.) that is the base of the top triangle and the top of the lower triangle.

WHAT SHOULD I DO IF…

I can see the base but can't get a laser bounce?

Shoot the distance level on the trunk, and use the tangent of the angle to the base instead of sine (note that this is only useful on shallow angles and non-leaning trunks).

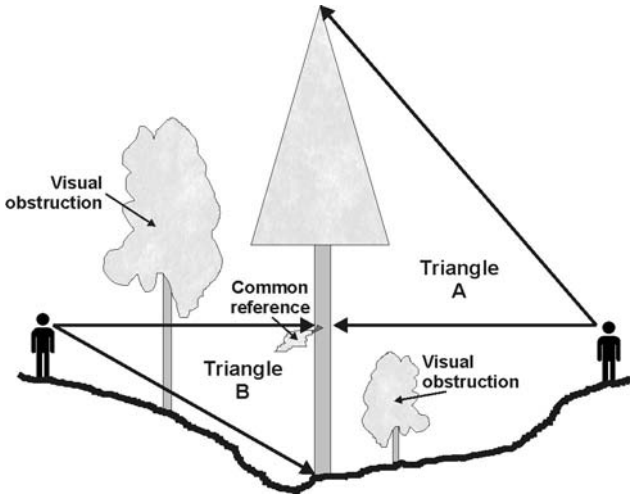
I am not sure I am getting a bounce off a certain part of the tree?

Fire the beam into the sky behind the target. Slowly move the sight towards the target until you get a hit. The laser will not read anything when it "misses."

I have a great shot of the top and base, but from different locations?

Shoot them from the best locations and reference the triangles to a common point easily seen from both sites, i.e. lowest branch, a burl, or bend in the trunk. Create two triangles from the two (or more) locations and add the results.

Figure 9. Using a reference point to create triangles from two positions



I can see the top and/or base but the laser bounces are from branches of other trees?

If practical, back up from the tree far enough that you can put the laser into a filtering mode, such as "rain." This will allow it to ignore the clutter under a certain yardage and give the reading to the tree only. Use a reflector on the base.

I can almost get a laser return through undergrowth, or the distance seems short?

First, verify the distance's plausibility by shooting an unobstructed portion of the trunk close to the base. Place a reflective material (white paper, bicycle reflector) on the trunk to get a strong laser bounce. Reflectors are excellent!

I have an excellent shot just beside the trunk, but not on it?

Have an assistant stand or hold a reflective object perpendicular to the center of the trunk, and level with the base or a known height relative to the trunk.

What are some other advantages to using a laser?

When measuring from a level, common substrate as in a boardwalk in a swamp, a canoe, a field or an observation deck, one base height can be determined and the rest of the tree heights shot at will and added to it. You can measure as many trees as you can see from one point, a useful feature when "exploiting" good vistas from a trail or other prime vantage point in the forest.

If the laser only reads in 0.5 to 1 yard (or meter) increments, how can it be so accurate?

Before you use a new laser, it must be calibrated. To do this, stretch out a long measuring tape flat on the ground. Have an assistant stand at various locations on the tape with a reflective target. Place yourself in a position so the eyepiece of the laser is over the "0" mark on the tape. Alternately, you can do this by yourself by affixing the "0" end to a reflective target and walking down the tape, shooting back at the target and noting your position at click-over. Shoot a known distance; say to 40 yds (or m). Have the assistant move the target closer or away from you until you get to the "click-over," or inflection point of the laser for 40 yds (or m). Note where the target is in relation to the tape. Do this calibration over a wide range of distances to see the variation and correction factor to use (if needed). For example, if the laser reads 40 yds at a distance of 40.6 yds based

on the measuring tape, then you would use that figure when your laser gives the click-over reading for 40 yds. By calibrating your laser, you can actually be mere inches off in the distance-measuring part of the tree height.

How do I explore the crown architecture?

"Skate" the laser over the surface of the crown and in "nested" pockets and places you may not expect a high part to be. The highest point may be well below what appears to be the tallest part. Look for the farthest distance first, then the highest angles with far readings. Once you become familiar with a species and its architecture, you will know how to narrow your search.

What if the tree I am measuring has multiple stems?

Measure the attributes of the target stem only. Do not include the other leaders.

What is a multi-stemmed tree?

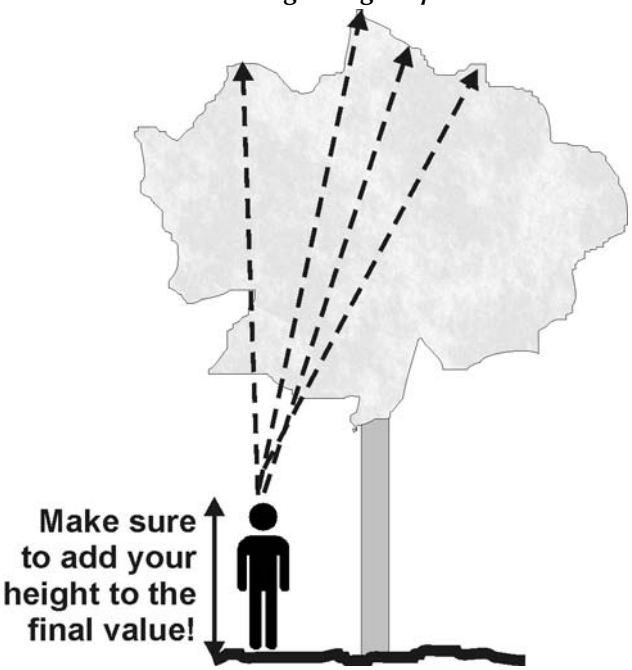
The definition of a multi-stemmed tree can vary from one person to another. I am a purist, so my definition may seem extreme, but we need to start somewhere. To me, the entire point of a champion tree list and the ENTS research is to assess the capabilities of Eastern species. The best way to assess this is to study individual stems or trees of the species. By focusing on individuals, we can accurately assess the potential and find benchmarks for restoration efforts or whatever the goal may be. To me, a champion tree is one that represents the best development of an individual, and therefore I do not include multi-stemmed trees in my research or nominations. Many will argue that a clump of sprouts fused into a huge trunk that originates from one root system is a single tree. I would agree, but it is not a single stem and thus does not represent the potential of an individual. Although the conglomeration may be of identical genetic material or was planted by the owner from a single pot, it is a collective effort, not that of an individual. I know of fused examples of tuliptree, white basswood and eastern hemlock that would redefine the National Champions for the species, but I have not nominated them simply because they are not individual stems.

Some ENTS members use the "slice test." Basically, if the tree was cut at 4.5 ft above the ground, would the tree hold together? I have trouble with this, as a tree that would fail one year would pass the next. I think of it more as a "pith test." If the tree has more than one pith at ground level, it is a multiple-stemmed tree. Note I did not say 4.5 ft above the ground. This is because the 4.5 ft height is a forestry standard, and is a convenient (if somewhat arbitrary) place for most people to measure a tree. Some trees, like flowering dogwood or rhododendrons, may branch well below 4.5 ft but have a single pith at ground level. In the case of such trees, I would measure the narrowest point below the lowest fork. All trees do not conform to our set standards, but we can always set new ones!

What about shooting straight up?

The laser is calibrated in 0.5 to 1 yd increments, and shooting straight up seems to be a logical way to at least approximate a tree's height. This is true, and shooting straight up is in fact a fully legitimate and appropriate method to measure a tree that has a crown conducive to it. Dense conifers and fully leaved hardwoods are impossible to measure this way, but hardwoods in winter are typically fine. Some trees, such as oaks and sycamore, are easy to measure by this method during early leaf-out. Careful exploration of the canopy is necessary to find the highest point. Figures obtained from straight-up shots are usually recorded as "NLT"—"not less than." I use this technique (Figure 10) to help determine if more careful searching is needed, or to find the highest leader for more detailed measurements.

Figure 10. Exploring the crown by shooting straight up



Since a straight line leaning 11 degrees off vertical is still over 98% of vertical length, this technique gives you a full 40-ft circle of exploration on a 100-ft tree from one spot. Figures obtained by shooting straight up are seldom less than one foot different than the two-triangle ENTS technique (also called sine + sine) described above. All you need to do is find the inflection or click-over point, sight the level point on the trunk, and add it to the laser reading.

CONCLUSIONS

It is the inaccurate figures and resulting false claims that concern us as much, if not more than, the inability to put an accurately measured tree on any champion tree register. The types of measurement errors discussed here are exceedingly common, and equally overlooked. Many ancient forest trees certainly exceed the false heights of some of the open-grown trees that have been incorrectly measured. This is significant in the sense that it does not give justice to the accurately measured trees and their measurers, but the inaccurate numbers misrepresent the true nature of the species and confound conservation efforts.

Of the several champion trees nominated by other tree hunters that I have remeasured, only three even came close to the true height of the tree. In all other cases, the error on the height alone added enough points to exclude a challenger from co-champion status. Some trees have had height errors exceeding 35% of true height, which in some cases added dozens of points. The height errors were due to the application of inaccurate techniques and unverified assumptions and in all cases, the trees were leaning or had a wide-spreading crown.

For more information, please visit the ENTS website:

http://www.uark.edu/misc/ents/

The Thomasville "Big Oak" tree is a landmark in this part of southern Georgia. Even though the dimensional information was probably not collected using ENTS standards, this live oak is still an impressive tree. Photo by Don C. Bragg.

TAMASSEE KNOB, SOUTH CAROLINA: FEBRUARY 2005

Jess Riddle

Eastern Native Tree Society

A couple of weeks ago I returned to the coves around Tamassee Knob in South Carolina's northwest corner to measure a chestnut oak I had previously spotted, thoroughly measure the largest cove in the area, and to avoid tall-tree withdrawal upon coming back from the Congaree. The chestnut oak grows at the bottom of a south-facing cove that supports the tallest white oaks so far found in the area—three over 130 ft. Unfortunately, Hurricane Francis knocked over the 126.8-ft black oak in this cove. In the large northeast-facing cove, the storm uprooted an 8.2-ft CBH by 139.2-ft tall sweetgum with a huge crown, and snapped the tallest ash I knew of in the cove, a 135.1-ft individual. The ash appeared to have still been growing radially at a rate of three to five millimeters per year.

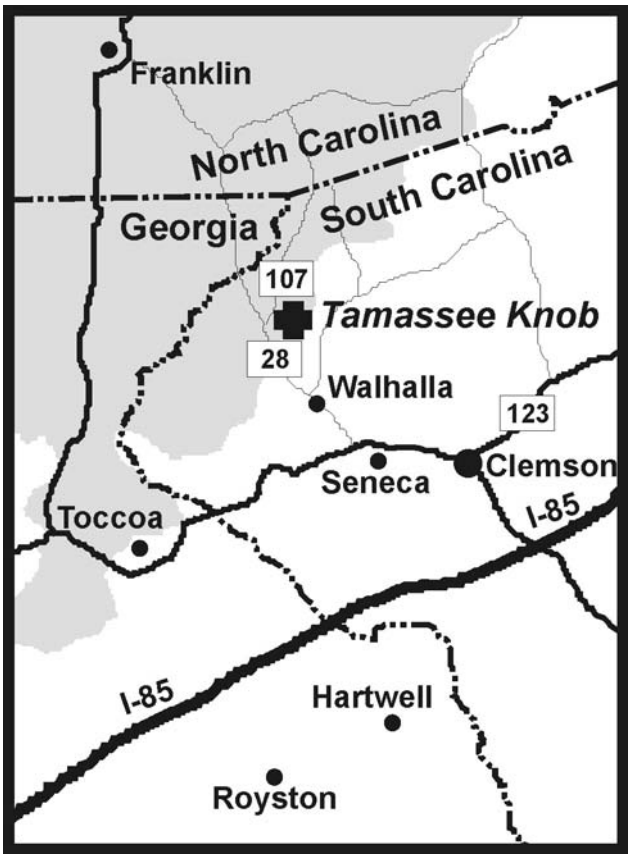
Table 1. South-facing cove at Tamassee Knob, South Carolina.

CBH (ft)	Height (ft)	Species
3.8	93.4	Hickory, Pale
6.1	133.7	Oak, Chestnut
3.8	134.4	Tuliptree

I had not noticed pale hickory before in the area, but they grow scattered along the relatively dry main ridge and spur ridges (Table 1). Surprisingly, the chestnut oak grows right on the drainage surrounded by tuliptrees, including the skinny one (110:1 height-to-diameter ratio) listed above.

Several features commonly associated with fertile habitats converge in the largest cove at Tamassee Knob. The northeast aspect of the cove and the small stream cascading from the adjacent plateau combine to minimize water stress, and the elevation below 1500 ft helps to extend the growing season and avoid ice storms. The steep upper slopes on both sides provide shelter from windstorms, while the benches on the south side and gentle lower slopes provide more stable footing. Additionally, the rich bedrock typical of the steep slopes throughout the area underlies much of the cove, and helps to produce circumneutral soils.

In another month sweet Betsy trilliums will cover the approximately 50 ac of the cove, and the redbuds in the sunnier spots will accentuate them.



General region surrounding the Tamassee Knob.

The redbuds share the understory with wild hydrangea, spicebush, and pawpaw. In parts of the cove, silverbell and yellow buckeye attempt to form a midstory, but neither species reaches the stature they achieve higher in the southern Appalachians. However, tuliptree grows well at the site and forms the largest proportion of the canopy. Ash, probably green, and pignut hickory also constitute large portions of the overstory.

On the drier southeast-facing slope and some of the other upper slopes, white, chestnut, and black oak play a larger role. Basswood and sweetgum are also locally important in the canopy. Some of the overstory trees likely approach 125 years old, and the richness, sheltered nature, and accessibility of the area seem to support the idea that this site was cleared early in the logging of the area. Widely scattered, partially decomposed stumps indicate some more recent thinning of the stand.

Table 2. Large northeast aspect cove at Tamassee Knob, South Carolina.

CBH (ft)	Height (ft)	Species
9.7	115.8	Ash, Green?
7.5	131.0	Ash, Green?
9.2	139.6	Ash, Green?
7.5	122.2	Basswood, White?
7.3	127.2	Basswood, White?
8.2	127.7	Basswood, White?
1.4	NA	Grape
6	142.4	Hickory, Pignut
9.6	149.0	Hickory, Pignut
7.3	159.1	Hickory, Pignut
8.4	~125	Locust, Black
NA	143.9	Locust, Black
8.2	121.4	Oak, Black
NA	~126	Oak, Chestnut
9.2	136.6	Oak, Northern Red
7.9	145.3	Oak, Northern Red
5.1	136.1	Sweetgum
5.6	150.0	Sweetgum
10.8	155.7	Tuliptree
8.1	157.2	Tuliptree
13.0	160.1	Tuliptree
9.2	161.4	Tuliptree
9.3	172.5	Tuliptree
4.7	100.0	Walnut, White

Green ash commonly reach 115 to 125 ft in the cove, but the 139.6 ft is a new height champ for the Brevard Belt (Table 2). The basswood include the second- and third-tallest known in the state. Large lianas, both grape and Virginia creeper, grow in several of the Tamassee coves.

The 9.6-ft CBH by 149-ft tall hickory appears relatively young, and has a massive crown with an 86-ft long spread. Under the new rating system the tree scores 162 (115.5/157, 149/168.2), behind a handful of other pignuts, but has the potential to become massive. The 159.1-ft pignut is the third-tallest known, and is considerably slimmer and younger than the taller trees. The tall black locusts were a nice find since I had been concerned that the other > 140 ft tree in the coves was an anomaly. Several northern red oaks throughout the cove top 130 ft. The 145.3-ft is a new best for Tamassee and the third-tallest known in the state.

The sweetgum is another new record for Tamassee and the tallest known outside of the Congaree. This tree differs in structure dramatically from the Congaree giants. The tall Tamassee tree is far slimmer with a much smaller, more compact crown.

The 13.0-ft CBH by 160-ft tall tuliptree is the second largest tree I've seen in the coves so far. The 161.4-ft tulip tree stands between the tallest tuliptree and the tallest pignut hickory. I had the tree at 164 ft a few years ago, and based on the tree's appearance relative to the adjacent trees, that height seems reasonable. The tallest tuliptree is now the tallest known tree in the state, and the tallest known hardwood in the East outside of the Smokies. The height listed is the average of three measurements ranging from 171.9 ft to 172.9 ft.

The white walnut (or butternut) is also encouraging since I had seen only one other one at the site, but this one is the second-tallest measured so far in the state.

Rucker Index (RI) for the northeast aspect cove = 142.7 ft

172.5 ft Tuliptree
159.1 ft Pignut Hickory
150.0 ft Sweetgum
145.3 ft Northern Red Oak
143.9 ft Black Locust
139.6 ft Green Ash
133.4 ft Shortleaf Pine
129.2 ft Black Oak
127.7 ft White Basswood
~126 ft Chestnut Oak

Tamassee Knob RI = 146.1 ft

Central Brevard Fault Zone RI = 150.6 ft

South Carolina RI = 162.0 ft

SAVAGE GULF, TENNESSEE: JUNE 2005

Michael Davie and Jess Riddle

Eastern Native Tree Society

Jess Riddle and I recently spent three days visiting the Savage Gulf State Natural Area in central Tennessee. It is a part of the South Cumberland State Park system. Savage Gulf is one of the many steep gorges cut by creeks through the sandstone shelf of the Cumberland plateau into siltstone, shale, limestone, and additional sandstone below. The top of the plateau gently undulates between 1800 and 1900-ft elevation, in stark contrast to the steep and rugged terrain of the gulfs. The creeks bottom out in the park very close to 1000 ft in elevation. In some places the walls of the gorge can drop from 1800 to 1000 ft in about 1/2 mile. This topography supports some extremely sheltered cove forests, which apparently can grow pretty tall.

The following is excerpted from Tennessee Natural Research Areas website:
http://www.state.tn.us/environment/nh/natareas/savage/

"Savage Gulf [is] a 15,590-acre natural area located in Grundy County. Carved like a giant crowfoot into the western edge of the Cumberland Plateau, it is one of Tennessee's most scenic wilderness areas. Its sheer sandstone cliffs and rugged canyons provide extraordinary views.

"Big Creek, Collins River and Savage Creeks each tumble down over 5 miles, dropping over 800 ft through narrow gorges, forming the 'Gulfs.'

"While much of the gorge is second growth forest, there is one large section [that] is old growth mixed mesophytic forest…The gorge forests abound with oaks, hickories, maples, yellow poplars, hemlocks, pines and many other tree species. Beneath the forest canopy is a vast array of shrubs, vines, wildflowers, mosses and ferns. Collins Gulf is noted for its spectacular display of spring wildflowers. In the uplands, an old growth shortleaf pine forest is found where red cockaded wood-pecker once nested. Savage Gulf is also on the Departments of Interior's Registry of National Natural Landmarks. The natural area is a part of the South Cumberland Recreation Area."

Tom Simpson standing in a grove of impressive trees in Savage Gulf, Tennessee. Photo by Michael Davie.

On the first day, Tom Simpson, the Regional Urban Forester for East Tennessee, was kind enough to guide us into Savage Gulf. I'd been in contact with him for over a year trying to get access into the restricted area of the park, and finally it all worked out. He brought us into the "Still Hollow" area of Savage Creek, so named because of the remains of

an old still at the edge of the gulf. Savage Creek runs generally from east to west, and Still Hollow is one of many small, mostly dry and unnamed tributaries that descend to Savage Creek, this one on the south side of the gorge. Savage Creek was at this time of year also mostly dry, leaving a corridor strewn with massive boulders where the creek only reaches the surface occasionally.

The Still Hollow area is where Tom had gone in a few years earlier with some other state foresters to measure some trees from the state champion tree list. From the top, we picked our way down the mostly talus-covered slopes that form below the cliffs; these conditions made it hard to walk, but the trees seemed to like it fine. This north-facing part of the gulf supports a very diverse, healthy, and obviously uncut forest. The dominant canopy species in this area are tuliptree and hemlock, with northern red oak (var. *rubra*), cucumber magnolia, white basswood (apparently), also occurring frequently, and shagbark hickories.

Jess Riddle standing next to a 14-ft CBH cucumber magnolia at Savage Gulf, Tennessee. Photo by Michael Davie.

The hickories here are tremendous; in addition to the more common shagbarks, we found pignut, mockernut, and bitternut hickories down in the gorge. Other occasionally occurring overstory species include beech, yellow buckeye, sugar maple, and closer to the stream, ash (predominately green), sweetgum, and sycamore. Immediately below that, mixed overstory, yellow birch and yellowwood grew all over the slope. The understory was blessedly open and mostly rhododendron-free; just a few scattered here and there, mostly either by the creek or below the cliffs. A bit of mountain laurel, umbrella magnolia, striped maple, spicebush (*Lindera*), allspice (*Calycanthus*), witch hazel, loads of pawpaw and hydrangea, and even a bit of mountain maple. Sweet cicely (*Osmorhiza*), blue cohosh, wild ginger, and stinging nettle frequently sprouted up between and on top of the forest floor boulders.

The second day Jess and I hiked a trail across the section of plateau north of Savage Creek. Forests on the plateau were generally shorter and gnarlier than the gorges, of course. We did not measure much of note, but one Virginia pine was 6.9 ft CBH by 106.2 ft tall. An ancient oak forest survives on the mostly flat terrain. White oaks are most abundant, but black oak, chestnut oak, scarlet oak, mockernut hickory, and sand hickory are also common, along with pockets of shortleaf pine. While some areas support a mix of sourwood, American holly, and young white oaks underneath, other portions had a pure red maple understory. There was a lot of blueberry, sparkleberry and azalea in the shrub layer. Adjacent areas of younger forest were either dominated by a mix of shortleaf pine and scarlet oak or nearly pure Virginia pine. Virginia pine with a mountain laurel understory also occurred consistently along the north rim of the gorge.

After checking out the tantalizingly named "big tree spur trail," which did have some large and old trees, we headed for the rim and a path down, thinking possibly we could follow Jumping Water Branch down. We were stopped when the creek dropped over a cliff, surprise, surprise! Getting down is not easy anywhere there, but on the north side it seemed even harder, with pretty consistent cliffs most of the way down the gulf. One spot on the west side of the branch looked deceptively easy to go down, but when we got there and realized it was even more steep, Jess looked more closely at the map and noted how 100 ft of contour lines got sucked into one line. He suggested a ridge on the other side of the cove

that looked at least possible. Looking across and at the map I thought he might be insane but didn't say so, instead saying "I guess we can try." He was right, though it was about as steep as anywhere I've been and still involved weaving around a few small cliffs and holding tightly to some small trees.

The southwest-facing cove of Jumping Water Branch also had some tall trees, but the composition was different, seeming less moist but still rich. More ash, white oak, a mockernut hickory in the cove, and walnut joined the tuliptrees and hemlocks. We traveled down the east side of the cove and over a ridge heading upstream on the north and dryer side of Savage Creek, where we started seeing some chinkapin oaks. Jess had found one by poking across the creek the day before, and it wasn't an anomaly. We crossed back over to the south side and explored more of the territory there, until rain chased us under a cliff. Jess had spotted a huge northern red oak, and when the rain was gone we went back down and got at least one pretty good shot on it. Tree measuring in general was very difficult with high tree density and full crowns of leaves, as well as the topography limiting where one might measure from. When I got stung by a yellow jacket, I had to cut the day a little short; I was a little too worried about a reaction so far in the middle of nowhere, and thunder was still rolling nearby. Hence, we have only scratched the surface; a winter trip is a must.

The last day there we went down into Big Creek Gulf. Big Creek Gulf meanders from the west-southwest to the north-northwest. The forest we saw was mostly very different, due mostly to the gulf there being so much wider, and the more southerly aspect of the slope we traveled on. The fact that it had been logged had probably changed the composition a bit as well. White oak was one of the most dominant trees, but there were more sweetgum, chestnut oak, mockernut hickory, slippery and winged elms, patches of butternut, and tons more *Stewartia* in the understory. We took the trail to Ranger Creek Falls, where the slight flow of the creek drops into a small pool and disappears. It would be interesting and perhaps more fulfilling to explore the more sheltered areas of this gulf. Heights in the areas of Big Creek Gulf were not extremely tall, but regeneration and density was impressive.

Table 1. Savage Gulf, Tennessee.

Species	CBH (ft)	Height (ft)
Ash, Green	NA	116.3
Basswood, ?	NA	124.5
Buckeye, Yellow	14.1	127.5
Cherry, Black	NA	119.2
Hemlock, Eastern	NA	139.2
Hickory, Mockernut?	6.4	147.5
Hickory, Pignut	8.7	162.3
Hickory, Shagbark	9.1	140.1
Hickory, Shagbark	8.8	146.8
Hickory, Shagbark	9.0	150.3
Magnolia, Cucumber	14.0	~125
Magnolia, Cucumber	11.1	133.6
Oak, Chinquapin	5.6	117.2
Oak, Northern Red	NA	122.3
Oak, Northern Red	11.2	131.9
Oak, Northern Red	11.9	144.6
Oak, Northern Red	14.3	150.1
Oak, Scarlet	NA	122.5
Oak, White	NA	130+
Sweetgum	~7	~147
Sycamore	9.4	129.9
Tuliptree	7.7	150.8
Tuliptree	NA	158.7
Tuliptree	NA	160.0
Walnut, Black	10.0	127.3
Initial Rucker index: 145.0		

The white oak is at least 130 ft and is probably a good bit taller. I got the 130-ft height shooting up from three different places while not getting too close to the top. There was absolutely no good place to measure that tree except possibly from atop the cliff above it. The sweetgum is, I think, 147.2-ft, but I had no paper to write on and was too far to yell numbers to Tom or Jess at the time. It's over 147, anyway. Like quite a few of these trees, might be a little taller also. I think we probably saw taller basswoods, but never got a good shot.

I think Jess and I would both agree Savage Gulf is one of a small group of the premier forest sites of the eastern US, and we still have much territory to cover. The uncut and more sheltered areas of Savage Creek most certainly harbor some other impressive (and possibly record-breaking) trees. Most all of the trees here were in a relatively small area of the gorge.

LEVI WILCOXON DEMONSTRATION FOREST, ARKANSAS: FEBRUARY 2006

Don C. Bragg

Research Forester, USDA Forest Service, Southern Research Station,
P.O. Box 3516 UAM, Monticello, AR 71656

I have recently completed a resurvey of the Levi Wilcoxon Demonstration Forest (LWDF) just south of Hamburg in Ashley County, Arkansas. Some of you may recall that I presented some information on the LWDF when I first joined, and at that time I promised to do a fuller assessment using the sine method to meet ENTS standards. A lot of water passed under the bridge since then, but I had an opportunity to revisit this stand.

The LWDF is located in the Upper West Gulf Coastal Plain of southern Arkansas, not far from the Mississippi Embayment (also known as the "Delta"). The LWDF is located on a formation called the "Prairie Terrace," or sediments deposited by an ancestral version of the major rivers (including the Mississippi, Missouri, and Arkansas) that flowed in this region at some point in the distant past. The low, rolling hills are interspersed with flatter, Holocene period floodplains of the many small streams that drain the area. A layer of loess covers much of the area, although not nearly as deep as across the Mississippi River. Another interesting feature of this landform is the "pimple" or "prairie" mounds that dot the surface. These low, circular mounds are though to have a natural (non-human) biotic origin, but little about them is known.

The upland forests of the region are largely pine or some mix of pine-oak-gum-hickory, and are relatively diverse. Loblolly pine is the most dominant species, having been heavily planted and managed for decades. Shortleaf pine is common, although not in nearly the quantities found historically. Various oak species are found throughout the area, especially southern red oak, white oak, post oak, water oak, and willow oak. Sweetgum and blackgum are very common, as are numerous other hardwoods like elm, maple, and dogwood.

The following individuals were measured with our Impulse 200LR. I measured the sine and tangent heights at exactly the same points, so this is further evidence of the value of the sine method. The American Forests Bigness Index (AFBI) was calculated using their averaged value for crown width (Table 1).

Table 1. Big tree information from the LWDF in southeastern Arkansas.

Species	CBH (ft)	HT (ft)	AvgCW (ft)	AF BI
Loblolly pine	10.7	138.3	47.7	279
Loblolly pine	10.5	126.8	67.1	269
Loblolly pine	11.2	122.2	53.7	270
Loblolly pine	14.6	116.9	57.0	306
Loblolly pine	11.0	116.8	55.1	263
Post oak	8.4	99.7	42.5	211
Post oak	8.4	91.4	60.0	207
Shortleaf pine	9.4	136.1	49.8	261
Shortleaf pine	9.0	131.4	37.2	249
Shortleaf pine	7.7	129.6	37.4	232
Shortleaf pine	6.6	124.2	28.7	210
Shortleaf pine	8.6	121.1	45.4	236
Shortleaf pine	8.1	112.7	38.9	219
S. red oak	10.1	102.8	80.2	244
Sweetgum	7.9	120.7	50.0	227
Sweetgum	8.4	98.9	52.2	213
Water oak	7.4	102.3	36.8	200
White oak	9.6	110.0	76.7	244
White oak	11.8	109.2	68.5	268
White oak	7.7	106.5	54.5	213
White oak	8.4	104.9	73.8	224
White oak	9.6	100.7	63.5	231
Winged elm	4.8	90.4	46.7	160
Rucker Index (8 spp):			112.5	

AvgCW = average crown width sensu *American Forests.*

I could have picked up a few other subordinate hardwood species to calculate a 10-species Rucker

Index, but that didn't seem most appropriate. This stand was reserved as an example of the virgin pine forests in the late 1930s, and was probably typical of the last few parcels of old-growth pine-dominated forests remaining in the region, but is not likely an example of the most productive sites of the area. Over the decades, pine regeneration has ceased, and the stand is slowly converting to mixed hardwoods.

The 14.6-ft CBH loblolly pine is known as the "Morris Pine," and I have sent the ENTS website pictures of this tree before. The biggest pine I have seen mentioned in the GLO land survey notes for the Ashley County area was given as 18.8-ft CBH, and I think 14 to 16-ft CBH pines were pretty common in the area. I strongly suspect that loblolly (and perhaps even shortleaf) pine may have exceeded 150 ft tall in the presettlement forests, and perhaps loblolly approached 170 ft in some of the richer minor bottoms it grows the quickest in, but we have no real way to show that now, given that virtually all old-growth pines have been logged from the area. I think that 140 ft is probably about the upper end of the pine height potential in the LWDF, given the frequency of ice storms and damaging winds this stand receives.

Few hardwoods of large size are found in this stand, as it was primarily pine when it was reserved. There are some impressive forest-grown white and post oaks, but sweetgum appears to be the only hardwood challenging the pines for supercanopy positions. The winged elm was an impressive individual for this species, which is usually just a small understory tree.

Finally, the Walsh Pine, the 136.1-ft Arkansas state champion shortleaf pine, saw its crown reduced somewhat from storms in recent years, but is still vigorously healthy. I was recently on the American Forests website, and looked up shortleaf pine. Lo and behold, the two co-champion shortleaf pines scored 240 and 245 points. When I nominated the Walsh Pine several years ago, it scored more than that, but I was told that a different shortleaf pine had been nominated that outscored the Walsh Pine, and therefore the LWDF didn't have a national champion. Imagine my surprise when I saw the 2004—2005 register online with these trees!

We carefully remeasured the Walsh Pine using the sine method (it shrunk in height from 143-ft to 136.1-ft), and although a branch broke that narrowed its crown slightly, the Walsh Pine still scored 261 points! Turns out that there is another shortleaf in the LWDF that scored 249 points, also outscoring the current co-champs! I have resubmitted the Walsh Pine as national champion, and it is currently under consideration.

The Levi Wilcoxon Demonstration Forest near Hamburg, Arkansas in March of 2006.

Most of the pines in this photograph are loblolly, with some shortleaf. Overstory dominant pines are 100 to 200 years old.

Photo by Don C. Bragg.

WEBSTER SPRINGS SYCAMORE

Will Blozan [1], Jess Riddle [2], and Ron Busch [2]

[1] President, Eastern Native Tree Society
[2] Eastern Native Tree Society

I was reading through Colby Rucker's list of big trees by state in preparation for the trip to Pennsylvania for the Cook Forest Rendezvous. I was interested in West Virginia since we have almost no tree data from the entire state, aside from Cathedral State Park. I came across Colby's description of the Webster Springs Sycamore, a massive tree listed as the "largest tree in WV" and the "largest sycamore in the world." Colby also inferred that based on wood volume, it may be "one of the largest trees in the East." Curious, I proposed to my travel mates (Jess Riddle and Ron Busch) that we try to find it and take measurements. On our way back from Cook we found the tree.

We were impressed that there was actually a brochure (titled simply "Big Sycamore") about the tree in the West Virginia Welcome Center off the interstate. The photos were impressive and the directions easy to follow (even though the map indicated that the roads were straight!). Driving though blinding snow and hill after hill of nauseating twists, we arrived at the cute town of Webster Springs, West Virginia. The brochure map gave directions up a dirt road along the Back Fork of the Elk River. The road ended in a turn-around with a suspension bridge over the river and several interpretive signs. The "Sycamore Park" had a pavilion and picnic/BBQ areas and a sign that read:

Total height	139.0 ft
Circumference	24.7 ft
Height to forks	86.5 ft
Approximate age	500 yrs
Hemlock in forks	7.4 ft tall
Crown spread	100.1 ft

Overall, the information was quite accurate, but the epiphytic hemlock was dead. The girth listed above was taken at 4.5-ft upslope, and the midslope girth was substantially bigger. Here are our numbers:

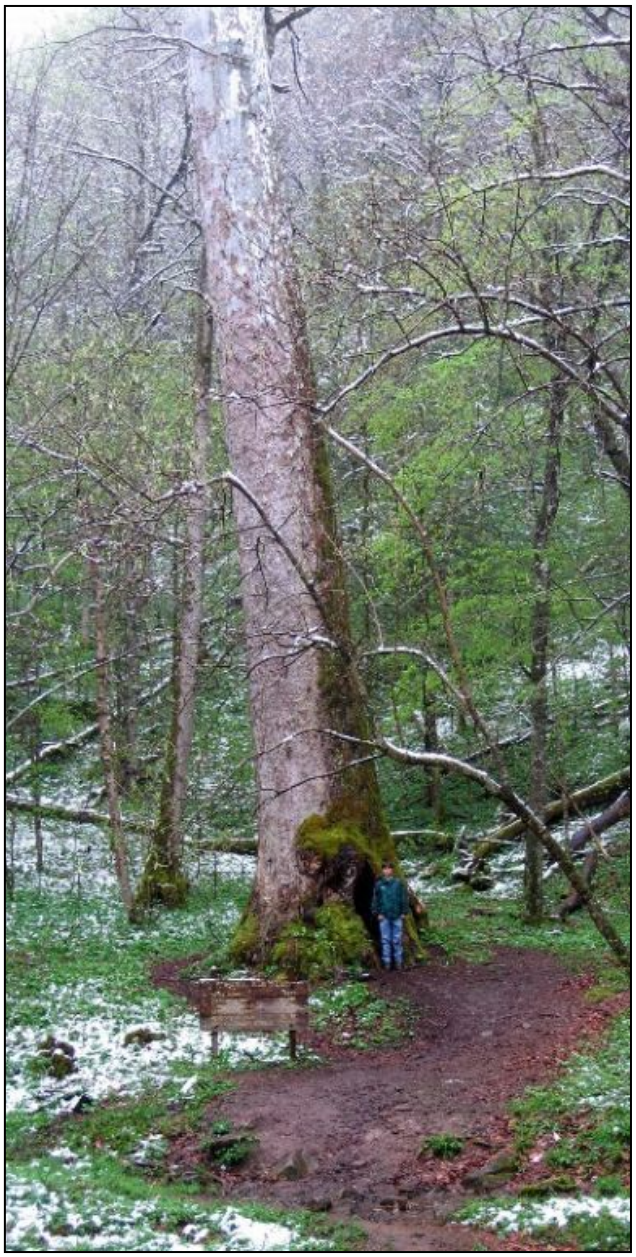
Total height	144.3 ft
Circumference (mid)	28.7 ft (344 in)
Height to forks	78.3 ft
Crown spread	102.0 ft

View looking up the Webster Sycamore, highlighting the lack of a top and handful of live branches in the crown of the tree. Photo by Will Blozan.

These numbers produced an American Forests big tree score of 514 points. This is the first Eastern single-stemmed hardwood ENTS has verified to over 500 big tree points as far as I can recall. I do not know the numbers of some of the Georgia live oaks, though. Only baldcypress (the Senator Cypress, for one) beats it. Perhaps cherrybark oak has a slim chance of reaching 500 points somewhere, but sycamore may be the only Eastern hardwood consistently capable of 500 big tree points.

What was so surprising was that this tree is a forest-grown specimen not in a floodplain forest. In fact, it was in a mountain cove forest at ~1800-ft elevation

in a cove hardwood forest. Red elm, basswood, shagbark hickory, umbrella magnolia, and tuliptree accompany the tree, which is growing out of a rich bed of wildflowers. I suspect the soil is neutral or basic in acidity and may be limestone derived.



Jess Riddle at the base of the Webster Sycamore. Photo by Will Blozan.

We took numerous girth measurements and range-finder girths at various points on the trunk to obtain an estimate of volume. Jess and I estimated on-site that it would be close to 3000 ft^3. We were not far off, as a figure of 3009 ft^3 was obtained by entering the numbers into a spreadsheet. The point on the trunk just below the first limbs was 19.1 ft in girth at a height of 60 ft. The point of breakage (78 ft)—which was a huge portion of the crown—was still over 13 ft in girth. The tree was likely close to 3500 ft^3 before breakage—if the top was intact. Currently, the crown is represented by just four limbs (see photo). Some of these limbs are tentatively attached to decayed wood with no living bark above them. The height of the Webster Sycamore at its prime may have reached 160 ft.

I feel this tree, with its tentative perch and strong lean on a thin shell of wood, should be climbed and mapped before it falls. It is truly a massive specimen—joining the ranks with tuliptree as a forest giant. Will it surpass the volume of the Sunderland Sycamore? Any other big contenders? Sounds like a worthwhile project to me!

Webster Sycamore location:
UTM 17 556093E 4263469N
1800 ft in elevation

Will Blozan in the base of the Webster Sycamore. Photo by Will Blozan.

THE MORRIS PINE

Don C. Bragg

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A picture of the Morris Pine taken in March of 2006. Standing next to the base is Kirby Sneed, a forestry tech with the USDA Forest Service. Photo by Don C. Bragg.

Few trees are more prominent in southeastern Arkansas than the Morris Pine. This ancient loblolly pine (*Pinus taeda*) has been a roadside stop for people for over a half-century. An estimated 300+ years old, the Morris Pine is located on the grounds of the Levi Wilcoxon Demonstration Forest (LWDF) a few miles south of Hamburg, Arkansas.

This pine has been known by several names over the years, including the "Monarch Pine" and the "Mattoon Pine" after Wilbur Mattoon, a noted USDA Forest Service researcher and educator. About 1950, the Crossett Lumber Company, who owned the Morris Pine and the lands surrounding it, decided to name this impressive tree after Louis Morris, a long-time company employee who grew up near the tree (Anonymous 1950).

The Morris Pine is one of the largest and oldest living loblolly pines in this portion of the South. In March of 2006, I remeasured this pine and found it to be 14.6 ft CBH and 117 ft tall, not as big as reported on a sign that hangs on the tree, but a large specimen nevertheless.

The Morris Pine is very easy to locate. The LWDF is located about three miles south of Hamburg on Highway 425. The Morris Pine is located on the west side of Highway 425 about 100 yds south of the intersection of Highway 425 and Highway 52. You will need to park along the road (the highway shoulder is wide enough to accommodate a full-sized vehicle). There is a short trail that leads to the pine, which is visible from the highway.

LITERATURE CITED

Anonymous. 1950. Crossett names giant pine to honor L.L. Morris. Forest Echoes 10(5):2-5.

THE LAST SNOW OF WINTER

A Photographic Essay By

Ed Frank

The last snow of winter is always somewhat of an enigma. It marks in the mind the final transition between winter and the full flush of spring. The question posed with each late-season snowfall is whether this snow really is the last. Sometimes the last snowfall comes early. Spring sneaks upon the world unheralded. It is disappointing that the milestone of the last snowfall may have passed unnoticed. An uneasy, empty feeling, generally unrecognized, of something missing accompanies the passage into spring. Other years, the last snow comes after the spring bloom of flowers and leaves. Bright splashes of color stick up through the covering of snow, proof of the warm and sunny days tantalizing us before the fall.

The last snow of winter fell here two nights ago. A gray and drizzly day led into a cooler night. Flakes and faint flurries of snow began to fall around midnight. After an hour of snowfall I drove home passing country fields on a narrow winding road. The green of the grass could still be seen through the light mantle of snow—a curious mint color.

The next morning found an inch or two of snow had fallen covering the world in purest white. I took a walk with my camera into the whiteness lying beneath a gray sky. I want to describe the scene as silent, because that is the feeling it engendered, but in truth it wasn't silent. There were sounds of my footsteps in the snow. Little birds were chirping and playing in the snow. Perhaps a feeling of stillness would be a better description.

The snow was a light powder. Even the tiniest branches had narrow ridges of snow precariously perched atop them. Hemlock branches sagged with the weight of snow. Here and there brushes of green pine needles poked through balls of snow and laurel leaves covered by snow added a touch of color to the scene. This hint of color only seemed to enhance the monochromatic clarity of the surroundings—white snow—black branches.

All photographs by Ed Frank.

It was an amazing moment. The covering of whiteness painted across the forest, the texture and form of tree branches and bark etched in black, the stillness, the delicate snow ridges perched on every surface. It is an ephemeral moment as well. A bit of wind, a touch of sun, and the snow will fall from its precarious perch. The melting will begin...but for that one moment.

Was this the last snow of the season? I honestly don't know. I do know that in this one snowfall I experienced the transition from one season to the next, so on a personal level this was the last snow of winter.

April 4, 2005

Ed Frank is an associate editor of the Bulletin of the Eastern Native Tree Society *and also serves ENTS as the organization's webmaster.*

THE WONDROUS 3-D FULL-SPECTRUM LASER CLIMBOMETER

Humor By

Pamela Briggs

Since you had to ask, Bob, I'm glad to give you the specs for the 3-D Full-Spectrum Laser Climbometer. It's a wondrous instrument, and will make the joyous calling of tree measuring more pleasurable, exciting, and free of worry than you dared imagine!

MEASUREMENT
The Climbometer automatically measures the height of trees and treelike shrubs with absolute accuracy—in feet (to the nearest thou), in meters (to the nearest micrometer), in bu (to the nearest hu), in ñìr (to the nearest šusi)—or in any measurement system you specify. Choose from multiple language selections, and set the 3-DFSLC to display the data, speak it, or both. It can also display in braille—handy for those furtive nighttime measurements on someone else's land.

It determines crown dimensions, trunk and branch circumference, overall volume, mass (both with and without birds' nests, eggs, bats, pupae, etc.), bark-to-heartwood ratio, thickness of cambium, chemical composition and anomalies, and a wealth of other quantifiable information. It includes a gas chromatograph. It records date, time, temperature, humidity, and barometric pressure. It can give an accurate count of leaves, buds, fruits, and seeds, should you really be into that kind of thing.

Naturally, these measurements vary not only with the seasons, but also with each day's changing climate. Therefore, although the 3-DFSLC's measurement is accurate and indisputable, you will still have good reason to revisit your favorite trees anytime you wish—for additional readings on a particular date, say, or at a certain moon phase. It even detects minute fluctuations in tectonic plates and alerts seismologists if necessary.

IDENTIFICATION
The Climbometer records each tree's GPS location and conventional geographical designation, and altitude/distance from mean sea level. It identifies the tree with its Latin name, common local names, and any honorary name you choose to give it. It displays its exact age, and projects its probable lifespan based on the tree's health, percentage and progression of disease and infestation, and the mood swings of the area's deer, bears, beavers, and other fauna. It can also calm and reassure bees, lure away mosquitoes, and placate dogs or other beasts who might be unhappy with your proximity to a particular tree.

Editor's note: The manufacturer of the 3-DFSLC has assured us that the device's laser has been toned down since an early calibration accident melted the aluminum radiator of a 1988 Chevy pick-up.

The 3-DFSLC will, of course, lead you to (and from) a particular tree with its GPS capabilities. But it can also find a tree given the vaguest directions, including "past the old brick factory, then after the Motel 6 billboard, it's about 5 miles beyond the silo."

In its History Mode, it can read a tree's rings, measure the storms and droughts it's weathered, and give that tree's biography, in narrative form or in columns of data. Also, when given any part of a tree—be it a fossilized impression of a leaf, a piece of paper, a hunk of amber, or a chest of drawers—it can identify the trees from which it came, and when and where.

USES OF DATA

The 3-DFLSC can interpret the data in myriad ways. It keeps a running log so any tree's measurements can be compared (to itself or to other trees). You can see average, mean, and median figures at a glance, and convert the information to a bar or pie graph in an instant. It can even show you which trees in what locations are related to one another.

The 3-DFLSC can convert data to music which can be downloaded to hardware, podcast, or printed out as a score. It can also covert data to colors and shapes. A new branch of tree science is possible wherein people will be able to identify a tree by hearing its song or viewing its artistic representation. Naturally, it can upload the data to personal computers and/or the Internet, and format it in a variety of existing data sets such as HTML tables and Excel files, while red-flagging any missing figures or anomalies.

The Climbometer can help you assess tree knowledge in other ways. It can catalog and label physical artifacts, such as leaves, bark, and samples of soil and DNA, and act as archivist at home, office, or on the road, fetching the samples on command.

VISUAL RECORD

You want the visual gestalt? No problem! The Climbometer takes clear 3-D holograms of the tree, and displays them at any size you wish. You can delight your friends with a display of your finds right in your living room—so much more impressive than a video or slide show! You can use tree holograms to dress the set during theatrical performances (giving proper credit in the program, of course), and set and strike them instantly without taxing your stage crew. Or you can sleep underneath the virtual branches of any tree you wish in your own bedroom.

OTHER FEATURES

The 3-DFLSC is smooth, attractive, lightweight, scratchproof, shockproof, waterproof, and can withstand temperatures from absolute zero to the core of the sun. It floats, and contains binoculars, a magnifying glass, and an electron microscope. It also features a sturdy light bulb which can be used to examine the delicate veining of a leaf, or to signal a plane 30,000 feet above. Settings for its casing include Neon Mode (for winter) and Camouflage Mode (for those woodsy quiet times). It can be affixed to any surface, including bark and skin, without damage. It comes when you call it, and with patience can be taught to hover nearby.

Having unobtrusively collected weight data from you and your traveling companions, it can determine who can safely climb which trees, and which branches are best avoided, and give its recommendations with the utmost gentleness and discretion. In an emergency, it can contact the 911 service, relay vital medical information such as heart and respiration rates, and even perform simple first aid. It will track and retrieve lost members of your party, and can summon help with a piercing whistle. It can locate potable water, start a campfire, and brew a lovely willow bark tea.

It can diagnose various tree ills and suggest treatments. It can tell you where trees can best be planted or replanted, and their likelihood of survival. It's useful with felled trees, too—it can evaluate the tree's parts and suggest their best uses!

The Climbometer comes with a full complement of tree lore, mythology, recipes, medicinal, and spiritual uses, and has a LiveUpdate function to gather recently uncovered information. If you wish, as you and your party relax during mealtime, the 3-DFSLC will scamper around and interview the locals. It can coax oral history out of taciturn rural folk like you wouldn't believe.

But wait! There's more!! It can grade maple syrup before it's even been produced. It can evaluate the coming fruit in the springtime. It can tell which trees will have the best colors in autumn, and map and narrate a fall foliage tour. If you haven't guessed by now, the Climbometer's uses are as broad and varied as your imagination.

POWER SUPPLY AND CARE
The 3-DFSLC is solar-powered, and its energy augmented by the Earth's magnetic fields. Maintenance is simple, but vital to the performance of the instrument. It merely requires you to be pure of heart, to respect the natural world and its creatures, and thank each tree as you measure it.

The 3-DFSLC doesn't need a user's manual. Its operation is automatic and intuitive. Just tell it what you need it to do (using one of four input methods, including voice). Also, it will explain any features you want to know about while giving foot, hand, and shoulder massages.

On the rare occasions it needs servicing, it will sense something's wrong before symptoms are apparent. It will inform you tactfully, gently wipe your tears, then tuck itself away into its original packing case and mail itself off to be repaired or replaced. Phone calls, e-mails, and/or handwritten notes describing its recuperation ease the pain of separation.

As for itself, it is not averse to a gentle kiss on its dome each night, and frankly, loves to be tucked in. Also, it's not a bad little conversationalist, and appreciates being included in discussions.

If you need to lie to someone, be sure that the Climbometer is not nearby! The more lies you tell around it, the less accurate its information will be. (It is, however, designed to disregard news broadcasts.) If it does catch you in a lie, it may take long and heartfelt persuasion on your part to explain why the lie was necessary.

TO SUM UP—
It's the instrument of your dreams. The longer you use it, the more you won't know how you ever lived without it. Not available in stores.

February 7, 2006

Pamela Briggs is an Iowa native and writer who has the remarkable good fortune to have only three degrees of separation from Kevin Bacon. Find out more about Pamela on her website:
www.pamelabriggs.com

POETIC CONTRIBUTIONS AND DIGITAL RAMBLINGS

Gnarly crowns abound
Ancient ones in dark glens stand
Mystery beckons
John Knuerr, December 9, 2004

Please submit other poems, stories, anecdotes, digital pictures, etc. to the editor of the *Bulletin of the Eastern Native Tree Society*.

BOOK REVIEWS AND NEW READINGS

This section of the *Bulletin of the Eastern Native Tree Society* will be open to solicited and voluntary contributions from ENTS members regarding book or product reviews, or newly released publications that are of interest to ENTS membership. Please submit materials following the "Instructions for Contributors" to the editor of the *Bulletin of the Eastern Native Tree Society*. For unsolicited materials, the editor will determine if the material is appropriate for the readership.

The editor of the *Bulletin* would like to ask ENTS membership to suggest additional features. Possibilities include a section on letters to the editor or correspondence with other groups/individuals outside of ENTS.

WELCOME TO THE EASTERN NATIVE TREE SOCIETY!

Robert T. Leverett

Founder, Eastern Native Tree Society

I'd like to take this time to welcome everyone to the society and encourage each of you to feel free to participate in our sometimes lively organization. We're all equal in the eyes of the trees. At present, the Eastern Native Tree Society (ENTS) exists primarily as a web-based interest group. There are no dues, nor are we yet an official nonprofit. However, there are times when financial support is needed for a specific project or general mission. In these cases, for contribution purposes, we are able to operate under our fiscal agent status of the Friends of Mohawk Trail State Forest, a 501c3 nonprofit organization.

The easiest way to actively participate in ENTS is to join in our e-mail list hosted at:

www.Topica.com

You can join Topica at no cost and then choose from one or more of their lists, including ENTS. Our current list membership is 130 and we will unquestionably grow as more and more people discover us and our mission. In a nutshell, the ENTSTrees list is the official voice of the Society and the primary method used for all of us to stay in touch as a group. However, the message traffic can get heavy and so some elect to join the list but receive digests of messages. These folks form part of our silent majority. Another way to participate in ENTS is to submit material directly to our web-master for inclusion on our website. But we really want to get to know you directly, and given our wide geographical separation, the e-mail list is the best way to do that.

ENTS was formed as a tree-centric organization. More specifically, ENTS was organized in the mid-1990s to celebrate trees in art, poetry, music, photography, history, mythology, medicine, food, science, aesthetic, sport and the nobler human uses of trees. Its founding members are Will Blozan, David Stahle, Michael Perlman, Matthew Therrell, and myself. Later, Colby Rucker was adopted as an honorary founding member. You will see us use the acronym ENTS and also see the term "Ent." ENTS refers to the Society as a whole; an Ent (adapted from the works of J.R. Tolkien), is a member of ENTS. We often pay tribute to Tolkien and his sensitivity to trees as wise, sentient beings.

Over the years, ENTS has evolved to concentrate on tree measuring—a largely quantitative pursuit that incorporates various tree-related disciplines. In the pursuit of our scientific objectives, a primary goal of ENTS involves the maintenance of a significant big tree/exemplary forest site database that can serve as a research tool and repository of highly accurate tree measurement data. New members soon learn that accuracy is our trademark and it distinguishes us. However, developing the involved data sets that go into the big tree/exemplary site database is outside of the interests of many of our members and that is perfectly okay. We do not forget the roots of our interests and always encourage the broadest participation. We look to the membership to develop new pursuits—and to take ownership for new tree-based interests. We all function sometimes as leaders and sometimes as supporters.

On a day-to-day interactive level, our e-mail list allows us to explore a variety of topics from sharing favorite tree stories to exploring the often conflicting roles of the stakeholders of our forests. On this latter topic, discussions can get a bit spirited (some might consider this an understatement). For example, in the past we spent many days discussing the balance between active forest management, forest preservation, and the state of forest practices. There is always a healthy span of viewpoints and differences of opinion, but we pride our civility and respect for one another. ENTS is apolitical. We always remind ourselves that in terms of opinions expressed, all of us are equal in the eyes of the trees.

I say this fully recognizing that we have a number of distinguished scientists in our organization, including Dr. Lee Frelich, Director of the Center for Hardwood Ecology at the University of Minnesota and Vice President of ENTS; Dr. Don Bragg, research forester with the USDA Forest Service and Editor-in-Chief of our e-journal; Dr. Robert Van Pelt, forest canopy researcher at the University of Washington; Dr. Tom Diggins, ecologist at Youngstown State University, Professor Gary Beluzo, ecologist at Holyoke Community College; and Dr. Roman Dial, forest ecologist at the College of the Pacific in Alaska. Important contributors to our science come from the forest research institutions. They are well represented on the list. For example, the prestigious forest research institution Harvard Forest, which is an affiliate of Harvard University, is well represented on the list through Dr. David Orwig and Dr. John Okeefe. Perhaps most importantly, one of the ENTS founding members is Dr. David Stahle, Director of the Tree-Ring Laboratory at the University of Arkansas (home of our website). Dr. Neil Pederson of the Biology Department of Eastern Kentucky University is another of the scientists that help keep us grounded in ecology.

We also have other scientists in ENTS who contribute to the organization. For example, we have at least one meteorologist to answer questions about climate and weather. A new member to our list will quickly recognize that in addition to scientists, we have a number of members in ENTS who serve in their respective professions with distinction. But perhaps the most visible individuals are the measurers, forming a core group of absolute tree fanatics. To this end, we have coined the term "dendromorphometry" to distinguish our efforts from traditional forest mensuration by our focus on individual trees. Dendromorphometrists regularly feed the ENTS big tree/tall tree database, and we have pioneered tree measurement methods.

A casual visitor to our e-mail list might understandably conclude that tree measuring is all that we do. Will Blozan, the distinguished ENTS president, arborist, and former science technician with the Great Smoky Mountains National Park, is perhaps the foremost among us in this department. Will measures and applies techniques both from the ground and aloft. The late Grand Ent Colby Rucker of Maryland was a prolific tree measurer. Forest ecologist Bob Van Pelt wrote "the" book on measuring and modeling the giant trees of the West Coast. Scientists Bragg, Diggins, and Dial are also keenly interested in measuring. Then there is Dale Luthringer, educational specialist and naturalist at Cook Forest State Park in Pennsylvania. Dale has done for Cook Forest what no previous person or group of people has done. Mathematician John Eichholz helps keep us on a sound theoretical footing. Scott Wade, Pennsylvania's big tree coordinator, provides an indispensable connection between ENTS and state-level champion tree coordinators. The list goes on and on. And you might just encounter my name in the arena of tree measuring from time to time. (I can hear my friends now—"Yeah, right, Bob, like daily!").

We are highly pleased to have a number of distinguished foresters on our list who are dedicated to ecologically sound forestry. Some are in government, some are in academia, and some are in private practice. But they are of one mind when it comes to being good forest custodians. Over the years, the Forest Stewards Guild has been well represented on the list, courtesy of Michele Wilson and the late Karl Davies. The Guild and ENTS have held joint events in the past. Beyond the forestry profession, environmental organizations like the Sierra Club and the Massachusetts Audubon Society are well represented in ENTS, and to be expected, we are well represented by academics at all levels.

We are particularly blessed to have several restoration ecologists with us. Don Bertolette is one that works at the Grand Canyon National Park and forms part of an east-west link for ENTS. Don contributes many interesting posts and has formed a western equivalent of ENTS called the Western Native Tree Society. Tamra Raven, past vice pre-

sident of the Council for Women, is likewise a restoration ecologist and has posted from time to time.

Interestingly, we also have members who are or have been affiliated with other organizations that measure trees. The champion tree programs of the states provide most of the examples, but there are others. For instance, we have members like Loona Brogan who established the Vermont Tree Society (VTS). For a time, the late Colby Rucker and I served on a special committee of American Forests to work out better rules governing which trees get into the National Register of Big Trees. Will Fell administers the champion tree program for Georgia. Karen Fedor, a past vice president of American Forests, is a member of ENTS. There is no competition between ENTS and these other organizations. They exist to serve other purposes, and at times, ENTS serves as a behind-the-scenes support for these organizations.

With all the accolades and recognition of the scientific side of ENTS where, a new member might wonder, is the art, the music, the mythology? Do we pursue these other focuses in ENTS? Yes, absolutely! Smith College professor of music Monica Jakuc organizes annual ENTS concerts. Writer Pamela Briggs deals with the mystical side of trees. Several photographers on the list reveal the pleasing symmetry and equally pleasing asymmetry of the objects of our affection. Philosopher John Knuerr questions the human-tree association. And, we have sub-groups in ENTS like the "Tree Amigos" (corny, but a lot of fun). Our periodic rendezvous at great big tree sites like Cook Forest State Park combine science, tree-measuring workshops, music, poetry, and just plain fun.

Let me devote the final word about ENTS to our website now at http://www.uark.edu/misc/ents/. Courtesy of Grand Ent David Stahle, our website has its home at the University of Arkansas' Tree-Ring Laboratory. Our webmaster, geologist Ed Frank, has developed the site over the years to the point that it has no rivals. The organization and great depth of the ENTS website provides those interested with many opportunities for further exploration. The research material available (with ENTS permission) has no equal for the kinds of data presented. We will continue to develop the website and invite all members to make suggestions on its future organization and content.

Please feel absolutely free to contribute along the lines of your specific interests in trees. Welcome aboard!

Bob Leverett

Will Blozan calculating the volume of an ancient baldcypress from Bayou DeView in eastern Arkansas during the 2006 Eastern Old-Growth Forest Conference, co-sponsored by the Eastern Native Tree Society, the University of Arkansas, and the USDA Forest Service.

Photo by Don C. Bragg.

INSTRUCTIONS FOR CONTRIBUTORS

SCOPE OF MATERIAL

The *Bulletin of the Eastern Native Tree Society* accepts solicited and unsolicited submissions of many different types, from quasi-technical field reports to poetry, from peer-reviewed scientific papers to digital photographs of trees and forests. This diverse set of offerings also necessitates that (1) contributors specifically identify what type of submission they are providing; (2) all submissions should follow the standards and guidelines for publication in the *Bulletin*; and (3) the submission must be new and original material or be accompanied by all appropriate permissions by the copyright holder. All authors also agree to bear the responsibility of securing any required permissions, and further certify that they have not engaged in any type of plagiarism or illegal activity regarding the material they are submitting.

SUBMITTING A MANUSCRIPT

As indicated earlier, manuscripts must either be new and original works, or be accompanied by specific written permission of the copyright holder. This includes any figures, tables, text, photographs, or other materials included within a given manuscript, even if most of the material is new and original.

Send all materials and related correspondence to:

Don C. Bragg
Editor-in-Chief, *Bulletin of the ENTS*
USDA Forest Service-SRS
P.O. Box 3516 UAM
Monticello, AR 71656

Depending on the nature of the submission, the material may be delegated to an associate editor for further consideration. The Editor-in-Chief reserves the right to accept or reject any material, regardless of the reason. Submission of material is no guarantee of publication.

All submissions must be made to the Editor-in-Chief in digital format. Manuscripts should be written in Microsoft Word (*.doc), WordPerfect (*.wpd), rich-text format (*.rtf), or ASCII (*.txt) format.

Images can be submitted in any common format like *.jpg, *.bmp, *.tif, *.gif, or *.eps, but not PowerPoint (*.ppt). Images must be of sufficient resolution to be clear and not pixilated if somewhat reduced or enlarged. Make sure pictures are at least 300 dots per inch (dpi) resolution. Pictures can be color, grayscale, or black and white. Photographs or original line drawings must be accompanied by a credit line, and if copyrighted, must also be accompanied by a letter with express written permission to use the image. Likewise, graphs or tables duplicated from published materials must also have expressly written copyright holder permission.

PAPER CONTRIBUTIONS (ALL TYPES)

All manuscripts must follow editorial conventions and styling when submitted. Given that the *Bulletin* is edited, assembled, and distributed by volunteers, the less work needed to get the final product delivered, the better the outcome. Therefore, papers egregiously departing from these formats may be returned for modification before they will be considered for publication.

Title Page

Each manuscript needs a separate title page with the title, author name(s), author affiliation(s), and corresponding author's postal address and e-mail address. Towards the bottom of the page, please include the type of submission (using the categories listed in the table of contents) and the date.

Body of Manuscript

Use papers previously published in the *Bulletin of the Eastern Native Tree Society* as a guide to style formatting. The body of the manuscript will be on a new page. Do not use headers or footers for anything but the page number. Avoid using footnotes or endnotes in the text, and do not use text boxes. Rather, insert text-box material as a table.

All manuscript submissions should be double-spaced, left-justified, with one-inch margins, and with page and line numbers turned on. Page numbers should be centered on the bottom of each new page, and line numbers should be found in the left margin.

Paragraph Styles. Do not indent new paragraphs. Rather, insert a blank line and start the new paragraph. For feature articles (including peer-

reviewed science papers), a brief abstract (100 to 200 words long) must be included at the top of the page. Section headings and subheadings can be used in any type of written submission, and do not have to follow any particular format, so long as they are relatively concise. The following example shows the standard design:

FIRST ORDER HEADING
Second Order Heading
Third Order Heading. The next sentence begins here, and any other levels should be folded into this format.

Science papers are an exception to this format, and must include sections entitled "Introduction," "Methods and Materials," "Results and Discussion," "Conclusions," "Literature Cited," and appendices (if needed) labeled alphabetically. See the ENTS website for a sample layout of a science paper.

Trip reports, descriptions of special big trees or forests, poetry, musings, or other non-technical materials can follow less rigid styling, but will be made by the production editor (if and when accepted for publication) to conform to conventions.

Table and figure formats. Tables can be difficult to insert into journals, so either use the table feature in your word processor, or use tab settings to align columns, but DO NOT use spaces. Each column should have a clear heading, and provide adequate spacing to clearly display information. Do not use extensive formatting within tables, as they will be modified to meet *Bulletin* standards and styles.

All tables, figures, and appendices must be referenced in the text.

Numerical and measurement conventions. You can use either English (e.g., inches, feet, yards, acres, pounds) or metric units (e.g., centimeters, meters, kilometers, hectares, kilograms), so long as they are consistently applied throughout the paper. Dates should be provided in month day, year format (June 1, 2006). Abbreviations for units can and should be used under most circumstances.

For any report on sites, heights must be measured using the methodology developed by ENTS (typically the sine method). Tangent heights can be referenced, especially in terms of historical reports of big trees, but these cannot represent new information. Diameter or circumference should be measured at breast height (4.5 ft above the ground), unless some bole distortion (e.g., a burl, branch, fork, or buttress) interferes with measurement. If this is the case, conventional approaches should be used to ensure that diameter is measured at a representative location.

Taxonomic conventions. Since common names are not necessarily universal, the use of scientific names is strongly encouraged, and may be required by the editor in some circumstances. For species with multiple common names, use the most specific and conventional reference. For instance, call *Acer saccharum* "sugar maple," not "hard maple" or "rock maple," unless a specific reason can be given (e.g., its use in historical context).

For science papers, scientific names MUST be provided at the first text reference, or a list of scientific names corresponding to the common names consistently used in the text can be provided in a table or appendix. For example, red pine (*Pinus resinosa*) is also known as Norway pine. Naming authorities can also be included, but are not required. Be consistent!

Abbreviations. Use standard abbreviations (with no periods) for units of measure throughout the manuscript. If there are questions about which abbreviation is most appropriate, the editor will determine the best one to use. Here are examples of standardized abbreviations:

inch = in	feet = ft
yard = yd	acre = ac
pound = lb	percent = %
centimeter = cm	meter = m
kilometer = km	hectare = ha
kilogram = kg	day = d

Commonly recognized federal agencies like the USDA (U.S. Department of Agriculture) can be abbreviated without definition, but spell out state names unless used in mailing address form. Otherwise, spell out the noun first, then provide an abbreviation in parentheses. For example: The Levi Wilcoxon Demonstration Forest (LWDF) is an old-growth remnant in Ashley County, Arkansas.

Citation formats. Literature cited in the text must meet the following conventions: do not use footnotes or endnotes. When paraphrasing or referencing other works, use the standard name date

protocol in parentheses. For example, if you cite this issue's Founder's Corner, it would be: "…and the ENTS founder welcomed new members (Leverett 2006)." If used specifically in a sentence, the style would be: "Leverett (2006) welcomed new members…" Finally, if there is a direct quotation, insert the page number into the citation: (Leverett 2006, p. 26) or Leverett (2006, p. 27-28). Longer quotations should be set aside as a separate, double-indented paragraph. Papers by unknown authors should be cited as Anonymous (1950).

For citations with multiple authors, give both authors' names for two-author citations, and for citations with more than two, use "et al." after the first author's name. An example of a two-author citation would be "Kershner and Leverett (2004)," and an example of a three- (or more) author citation would be "Bragg et al. (2004)." Multiple citations of the same author and year should use letters to distinguish the exact citation: Leverett 2005a, Leverett 2005b, Leverett 2005c, Bragg et al. 2004a, Bragg et al. 2004b, etc.

Personal communication should be identified in the text, and dated as specifically as possible (not in the Literature Cited section). For example, "…the Great Smoky Mountains contain most of the tallest hardwoods in the United States (W. Blozan, personal communication, March 24, 2006)." Examples of personal communications can include statements directly quoted or paraphrased, e-mail content, or unpublished writings not generally available. Personal communications are not included in the Literature Cited section, but websites and unpublished but accessible manuscripts can be.

Literature Cited. The references used in your work must be included in a section titled "Literature Cited." All citations should be alphabetically organized by author and then sorted by date. The following examples illustrate the most common forms of citation expected in the *Bulletin*:

Journal:

Anonymous. 1950. Crossett names giant pine to honor L.L. Morris. Forest Echoes 10(5):2-5.

Bragg, D.C., M.G. Shelton, and B. Zeide. 2003. Impacts and management implications of ice storms on forests in the southern United States. Forest Ecology and Management 186:99-123.

Bragg, D.C. 2004a. Composition, structure, and dynamics of a pine-hardwood old-growth remnant in southern Arkansas. Journal of the Torrey Botanical Society 131:320-336.

Proceedings:

Leverett, R. 1996. Definitions and history. Pages 3-17 *in* Eastern old-growth forests: prospects for rediscovery and recovery, M.B. Davis, editor. Island Press, Washington, DC.

Book:

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