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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.

Membership and Website Submissions:

Membership is free when you sign up for our discussion group, ENTSTrees, at: http://groups.google.com/group/entstrees?hl=en. Submissions to the ENTS website in terms of information, art, etc., should be made to Edward Frank at: ed_frank@hotmail.com

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COVER: An icy mist surrounds trees along the Wisconsin River at the dam on the Rainbow Flowage. Photo by Don C. Bragg.

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A SPECIAL REPORT ON THE MONROE STATE FOREST, MASSACHUSETTS

Like my father, Bob Leverett is one of many recent retirees that probably stays busier now he's retired than he did in his former career. My father chose to reenter the workforce until bad knees and a heart condition put him back into full retirement—Bob Leverett has not let recent bouts with illness deter him from his volunteer work with ENTS and the state of Massachusetts. Some of this recent effort can be seen in this month's feature article of the Bulletin of the Eastern Native Tree Society. The following report on the Monroe State Forest for the Massachusetts Department of Conservation and Recreation focuses on the special trees and forests of this commonwealth property.

This report is significant for the nature of the description of this forest—a quantitative description of an area under pressure from a variety of users and interest groups. Detailed accounts of the structure nature of contemporary forests, including highly accurate values on details such as large tree size and species composition, are more valuable than many people give them credit for. We take for granted that our premiere forests have been painstakingly detailed in authoritative technical reports, when in reality, this is often not the case. My research work on developing descriptions of historical forest conditions has continuously left me wanting for details not present in the early accounts I must use. Bob's report also allows for the establishment of a set of "baseline" conditions that can be revisited periodically to look for change over time, and whether those alterations arise from human use, climate change, the spread of exotic pests and disease, etc. Now, if we could only cover the rest of North America in this fashion!

Don C. Bragg
Editor-in-Chief

A light dusting of snow gracefully covers a deceptively clear and cold morning on a spruce-fir swamp in northern Wisconsin. Photo by Don C. Bragg.

ANNOUNCEMENTS AND SOCIETY ACTIONS

The ENTS Bookstore

The Eastern Native Tree Society Website features a bookstore, as do many other non-profit organizations. The bookstore may be accessed directly at:

http://www.nativetreesociety.org/bookstore/bookstore1.htm

or through a button link on the ENTS website homepage. The primary purpose of the bookstore is to feature quality books on the subject of trees and forests as recommended by the members and to have those books available for sale through a web based store.

The bookstore is divided into 12 pages of links ordered by category: 1) Featured Items and Great Trees; 2) Field Guides and Regional Guides; 3) Music, Books, and Items by ENTS Members; 4) Magic, Myth, Legend, and Philosophy; 5) Travel and Adventure; 6) Fiction; 7) DVD's and Videos; 8) Photography Guides; 9) Essayists, Poets and Artists; 10) ENTS Document Downloads; 11) Native American Themed Books; 12) Online Downloadable Books on Forests, Trees, and Forestry. Most of these categories are self explanatory. Individual links are shown for each book or item recommended by the membership, and there is a general Amazon Search Box near the top of each page that can be used to search for items not listed. More books and items will continue to be added as new books and items are available and as recommendations are made by the membership. Members are welcome to send me recommendations for items or books to be added to the current bookstore listings.

Many of the books and items in the ENTS Bookstore are available for purchase through Amazon.com, are sold directly by the publishing organization, or are available as free downloads. When a book or item on the Amazon site is viewed through either a direct link found in the bookstore or through the Amazon Search Box on each page of the bookstore, a bit of code is added to the web address so that the link source information can be tracked. If an item is then ordered through one of these links, a nominal referral fee will be paid by Amazon.com to the Eastern Native Tree Society. So far the fees generated by purchases through the bookstore have been small, insufficient to even pay for the hosting fee for the website itself. If the number of members and visitors who purchase items through the ENTS Bookstore increases, the fees generated by those purchases will increase. If you are going to buy something from Amazon.com, please consider purchasing it through the ENTS Bookstore!

June 2010 ENTS/WNTS Joint Meeting in Durango, Colorado Being Planned

From Don Bertolette:

With our very recent move to this BBS, this is an excellent time to follow up on an earlier invitation to the Second Annual WNTS Rendezvous! Held in Durango, Colorado, during the last week in June, it's an opportunity to break out of the winter slows, and get out in some fine big tree country. Last year's Rendezvous featured several field trips to nearby locales with a surprisingly fine array of big trees, several of which were candidates for their species maximums, and for their maximums at highest elevations. One of our forum members, Laura Stransky, has been involved with old-growth forest ecosystems in the San Juan National Forest, and has an excellent grasp of what and where they are. Count on field trips to the forests of southwestern Colorado, this won't be a classroom-bound series of events. So if you've had a hankering for checking out Colorado's mountains, clear air, the fresh scents and sounds of breezes blowing through the pines, firs and spruces, then put aside a week and come join us! The particulars:

When: June 28 through July 1, 2010 (Monday-Thursday)

Where: Durango, Colorado

Lodging: We are reserving a block of rooms at Fort Lewis College dorms, for those who'd like to economize. The rates, depending on accommodation needs run from $16 dollars to $72, for single dorm rooms to suites and apartments. For specifics, visit:

http://www.fortlewis.edu/visitors_parents/conferences_summer_programs/facil.aspx

For camping opportunities, visit: http://www.fs.fed.us/r2/sanjuan/

For those who wish more commercial lodging, an internet search will yield a broad selection (but don't delay too long, as summer is finally nearing!). Visit: http://www.durango.com

Local Attractions: The Great Sand Dunes National Park and Sangre De Cristos Mountains…the Durango-Silverton Scenic Railway…Rocky Mountain bristlecone pines…Mesa Verde National Park…Hovenweep National Monument…the red rock country of southwestern Utah…camp in La Plata Canyon…hike the Continental Divide at Wolf Creek Pass…

REPORT ON MONROE STATE FOREST, MASSACHUSETTS

Robert T. Leverett

Founder and Executive Director, Eastern Native Tree Society

INTRODUCTION

This report has been prepared for the Massachusetts Department of Conservation and Recreation (DCR) pursuant to the forest research program of Friends of Mohawk Trail State Forest (FMTSF) and the Eastern Native Tree Society (ENTS). Past FMTSF reports have concentrated on Mohawk Trail State Forest and old-growth reserves located on DCR properties. This is the first report devoted exclusively to Monroe State Forest. It is intended to present a summary accounting of the research accomplished to date by FMTSF and ENTS in Monroe. Observations and data cover a period of approximately 25 years.

We have prepared this report specifically for DCR as a public service to the people of the Commonwealth of Massachusetts and has been provided to Harvard Forest for their archives. Since specific trees in Monroe are discussed, we will not reveal their exact locations to protect their safety.

This report concentrates on the exceptional trees and site-based aggregations of trees in Monroe. By exceptional, we mean trees that meet certain dimensional and/or age thresholds, both individually and collectively. This information has historical and ecological value. It also can serve as a source of pride for Bay State citizens.

What can FMTSF and ENTS provide in the way of information that does not already exist? The answer to that question is simple, if not surprising. Virtually all the numeric information in this report exists nowhere else, except for data on areas of old-growth forest. This may seem odd. After all, DCR has access to botanists, geologists, wildlife biologists, foresters, etc. who know a lot about the fauna, flora, and geological features of Monroe State Forest, and to an extent, its forest history. The Natural Heritage and Endangered Species Program maintains an extensive database that includes data on Monroe. The Natural Heritage database includes qualitative and quantitative descriptions and community data. The Bureau of Forestry manages the Continuous Forest Inventory (CFI). Both sources of data are continuously updated. However, the Natural Heritage database does not track specific trees. There is another source of individual tree information, the champion tree database. It does track individual trees, but accuracy is a problem with the measurements in that database for reasons not relevant to this report.

We should say a little more about CFI. That program does collect data on individual trees, but mainly as anonymous members of transects. The purpose of CFI is growth analysis—in the aggregate. CFI is comprised of numerous randomly located forest transects. All trees in a transect contribute to a pool of data. Data are collected on composition, condition, radius, tree height, and age structure to a degree. Comparisons between sampling periods provide us with information on how fast a forest is growing in an aggregate sense. But CFI misses a lot, because it is not designed to highlight the special features of a location such as Monroe State Forest along the lines of investigation that are covered in this report. The specifics are lost in the aggregations, and CFI does not seek to determine absolute maximum species dimensions or the conditions where they occur. CFI does not seek to locate growth hot spots or tell much about the plant community around the transects. CFI tells us little about how much old-growth exists in Monroe or where it is. It is valid to conclude that CFI is not intended to explore special forest features like the maximum size of each species. CFI is a very limited economic tool, not an ecological one. The task of statistically describing Monroe's forests and outstanding trees is a job remaining to be done.

We will conclude this section with a description of the approach employed in preparing the report. The writing style purposely interweaves anecdote, qualitative descriptions, and photographs with hard numeric information, as well as profiles of individual trees. The objective is to both showcase and document trees and special forest sites for the record. If the principal value of Monroe State Forest is to be understood by both resource specialists and the general public, Monroe's forest communities and individually outstanding trees cannot be seen merely as numerical novelties or as props in a hiking experience. They deserve to be recognized and appreciated as individuals.

MONROE'S FORESTS—A GENERAL PERSPECTIVE

At the landscape level view, the forest types of Monroe include the northern hardwood-hemlock association with small areas of almost pure hemlock, and south-facing areas dominated by northern red oak with a scattering of other species. In other places, black birch mix with the oak and hemlock. In some spots, the birches prefer the company of hemlocks. Red spruce occurs in the coldness of the ravines and once covered 2,719 ft Spruce Mountain, the high point of Monroe. In still other areas, old-field successional species appear in abundance. Old-field successional patches of eastern white pine, white birch, and bigtooth aspen identify the hillside pastures of the past and areas that were burned off on occasion. A high presence of white birch is often associated with burned areas. There are also patches dominated by white ash in the ravines and toe slopes, growing in places that are recovering from past logging operations. The abundance of white ash is usually the key to

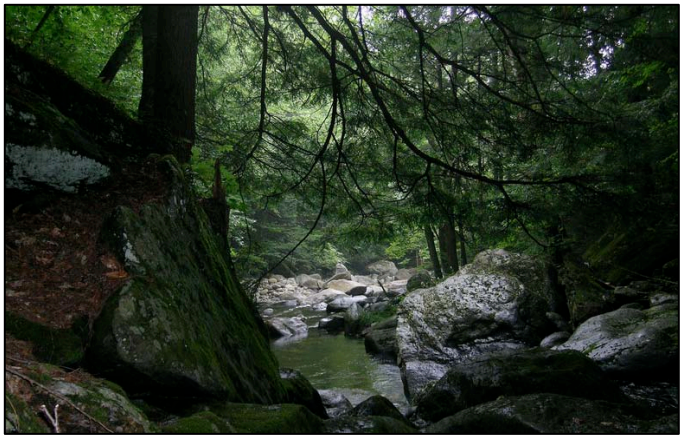
prior human-initiated disturbances.

The forests of Monroe are not all natural. There are 1930s red pine plantations in parts of the uplands. Red pine and Norway spruce were the prevalent plantation species of the WPA era in Massachusetts. These artificial plantations don't cover a lot of acreage, and in time will pass, returning to native species. Their existence is testament to the devastating impact of the white pine weevil and blister rust that greatly reduced the value of the eastern white pine for lumber and motivated lumbermen to seek replacement species.

How species diverse are the forests of Monroe? We have not identified all the tree species, but we are fairly sure that the number lies somewhere between 27 and 32. On north-facing slopes, it is not uncommon to encounter 15 or 16 species on a fairly limited acreage. This number and density compares favorably with other upland Berkshire forests, but is not as high as the forests in the broad river valleys like the Connecticut and Housatonic. Nonetheless, Monroe's level of species richness holds one's botanical interest, especially when combined with an abundance of spring ephemeral wild flowers and moss gardens that cover the boulder fields. There are typically from 8 to 12 species of ferns in such places.

How might we go further in analyzing Monroe's forests? We can divide them roughly into five classifications that are based on past land use, or an absence thereof. We begin with the areas of old-growth. There are definable patches of old-growth forest totaling to between 80 and 100 ac. This acreage can be divided into two classifications: primary old-growth and secondary old-growth. There is evidence that the primary acreage has never seen axe or saw. The primary old-growth, probably not much over 60 ac in Monroe, is what the majority of forest ecologists mean by old-growth. Virtually all of it is in the steepest, least accessible areas of Monroe. The areas of secondary old-growth have seen some past logging, but have reacquired most old-growth characteristics, and make up the remainder of what we are calling old-growth. There are many more acres in Monroe of this class of forest, probably at least 200. A third category consists of mature forest with noticeably big and/or tall trees and some old-growth characteristics. Signs of past logging or land clearing remain visible in this third class, but these forests can be aesthetic. Trees are typically between 75 and 150 years old. A fourth class of forest in Monroe consists of the areas that have been more recently logged. They seldom have much aesthetic appeal. A fifth class consists of artificial plantations. In this report, we limit our attention to the first three classes of forest.

Exploring the most impressive areas of Monroe's woodlands, we must zero in on lower Dunbar, Fife, and Smith Brooks and the connecting ridge facing the Deerfield River between Dunbar and Smith Brooks. Fife, Smith, and Dunbar cascade down from the Berkshire uplands to join the Deerfield River. Fife Brook cuts a narrow, steep gorge and harbors some of the Bay State's best old-growth, however, most of the ravine is in private hands. There is an area on the north side of Fife that contains a patch of exceptional old-growth.



One of the many streams of Monroe State Forest. Photo by Robert T. Leverett.

The terrain around Smith and Dunbar is not as steep as Fife, and their ravines are broader. Fife and Smith are small brooks. Dunbar is larger and the most appealing of the three from a access perspective. As a consequence, we will begin with a description of Dunbar, and the best way to do that is through photography. In the following image, notice the deep woods and stream setting that is rich in large boulders, tumbling waters, tall trees, and seclusion.

Historical references to the region of lower Dunbar Brook call it Dunbar Valley. However, the fast rushing stream creates a landform that is too narrow for what most of us think of as a valley, and not steep-sided enough to be labeled a river gorge. Perhaps "narrow mountain valley" is adequately descriptive.

On the Rowe Quadrangle topographical map, Dunbar Brook begins on a mountainside at about 2,500 ft elevation across the Massachusetts border in Vermont's Green Mountain National Forest. From that source, Dunbar winds its way for several miles to a confluence with the Deerfield River at about 900 ft in elevation. It is a mountain stream all the way, and remote by Massachusetts standards, but it has seen no shortage of human activity. There is even an old grinding wheel lying in lower Dunbar Brook, sign of a fairly intense form of stream corridor usage, but the steep ridge sides speak to areas of very limited colonial and post-colonial logging and clearing activity.

THE AESTHETICS OF DUNBAR BROOK

Despite remnant signs of past disruptive human activity, today, Dunbar's deep forest ambience suggests woodlands of another time and place. The next image provides a window to one of the many charms of Dunbar Brook, its glacial boulders. They define the stream's rugged character as it cleaves through Hoosac Mountain, a setting that appeals to both our primitive senses and artistic inclinations.

As one experiences Dunbar's shapes, textures, and colors, the gestalt is felt at a deep, inner level. One eventually comes to sense the forest as a living organism. To know Dunbar at this level is to intimately connect with its life forms, its rugged character, and its abundance of stately trees.

A window into the forest gestalt—light penetrates through a gap created by a fallen giant. Photo by Robert T. Leverett.

With this introduction to the Dunbar mountain valley, we will now turn to the main theme of the report, a numeric exploration of the forests and trees of the lower Dunbar watershed, including nearby Smith Brook. We have limited the article to these two brooks, and the connecting forest on the Deerfield River, because we have current data on them.

NUMERIC DESCRIPTION OF THE DUNBAR AND SMITH WATERSHEDS' FORESTS AND TREES

Monroe State Forest covers approximately 4,500 ac, or slightly more than 7 square miles. Monroe is large at one scale of thinking and small at another. It is large enough to provide a real measure of seclusion, but by itself, is not large enough to fulfill the ecological functions associated with large forest reserves. Not all of Monroe is interesting from either a forest or big tree perspective. Much of the upland region has received substantial logging in the past, and as a consequence, has little of interest in the way of individual trees to offer us today. The forest gems lie along stream corridors, mostly at lower elevations, and usually in challenging terrain that deterred logging. The largest trees occur mainly along the Dunbar Brook corridor, and on the lower stretches of adjacent Smith and Fife Brooks. The big tree region representing forest classes 1 through 3 covers between 1,000 and 1,500 ac of Monroe.

The upper slopes and tops of the ridges in Monroe typically do not grow big trees. The rule is diameters of 12 to 30 inches, with an occasional larger specimen, and heights of from 75 to 90 ft. These ranges are typical of upland Berkshire forests. In the uplands, one becomes accustomed to canopy trees averaging no more than 20 inches in diameter. This average increases as one descends the ridges into the more topographically rugged, but weather-shielded, zones. In these zones, trees get noticeably bigger and much taller. The continuous availability of water throughout the growing season, deeper soils, and protection within the cove environments, allow trees to reach greater girths and heights, especially heights, than those found on the crests of the ridges where thin soils and high winds reduce growth rates. Consequently, it is the forests along the stream corridors on the lower ridges that will be highlighted through the numeric descriptions that follow.

Within the big tree regions of Monroe, how large is large and what exactly do we mean by large? How often might one encounter a tree with a 10 ft circumference, a tree over 100 ft in height, a tree that is both 10 ft in circumference and 100 ft in height? We have not developed a big tree/tall tree density distribution for the region, but we can say that Dunbar has noticeably larger trees than most other Berkshire forests, both private and public. Still, this doesn't answer the posed question. We will begin with the maximums. They are relatively easy to determine. Establishing the means and medians requires extensive sampling and a lot longer explanations.

Most visitors relate to tree size through trunk circumference or more appropriately girth. The largest girth tree in Monroe State Forest that we have found is a northern red oak that measures 15.0 ft in girth and 89.4 ft in height. It grows near the Smith Brook cove on the ridge facing the Deerfield River. The oak has a large basal swell, so the girth is slightly misleading as an indication of significant size. Nonetheless, it catches the eye and is in an especially scenic setting. The tallest oak we have measured in Monroe is slightly over 120 ft. Since that tree has not been measured in 5 years, it has probably grown at least a couple of feet. Oaks nearby the 120 ft specimen are tall with a few exceeding 115 ft, but conspicuous oaks throughout the Dunbar and Smith Brook watersheds, seem to hit a height barrier between 100 and 110 ft. We can describe the oak canopy as typically reaching to between 90 and 110 ft.

While on the subject of oaks, there is an area of Monroe between Dunbar and Smith Brooks that has a number of red oaks in the 10-ft girth class. They are between 135 and 150 years old. These oaks likely grew back from logging in support of the construction of the Hoosac Tunnel. Most conspicuous northern red oaks in the area have girths in the 6.0 to 9.0-ft range. There are no white oaks in the area.

The single large northern red oak has a competitor. A gargantuan white ash in the Dunbar watershed reaching 14.8 ft in girth is #2 in the girth competition. It is presently 125.8 ft in height and was probably 5 to 10 ft taller as a younger tree. The ash is the largest forest-growth specimen of its specie we know of in Massachusetts.

In terms of girth, an eastern white pine is next on the list at 14.0 ft. At 144.5 ft in height, it achieves a significant combination of dimensions. After the pine, a yellow birch comes in at 13.9 ft in girth and a current height of slightly over 93 ft. At one time it was measured to 98 ft, but has been gradually dying back. It is a very old tree. An eastern white pine comes next with a girth of 13.0 ft and a very impressive height of 156.1 ft. The largest eastern hemlock we have measured in Monroe comes next. It is called the Dunbar Hemlock and is 12.8 ft around and 115.5 ft in height.

With this introduction to Monroe's big trees, we make a general observation. Overall, the eastern white pines are the largest trees in Monroe. Many are between 9 and 11 ft in girth, with the single largest pine, mentioned above, reaching to 14.0 ft around. The long straight trunks of most of the pines allow us to model them for trunk volume. The trunk of the largest, the Grandfather Pine, holds approximately 990 ft^3. There are at least 7 eastern white pines with trunk volumes of 500 ft^3 or more in the Dunbar watershed. There are at least ten more with volumes between 400 and 500 ft^3. There are only three other Massachusetts sites with a higher number of large eastern white pines: Mohawk Trail State Forest, the Bryant Homestead in Cummington, and Ice Glen in Stockbridge. However, all three sites have larger acreages of pines. Monroe is impressive for the density of its big pines.

The numbers presented above may not sound especially impressive to big tree aficionados accustomed to visiting woodland sites with large bottomland trees that commonly exhibit girths in the 8 to 16-ft range. In Massachusetts, the biggest girth trees will usually be in the floodplains of large streams and rivers, along streets and roadways, on the borders of properties, along old rock walls, and in city parks. The girths of the Dunbar trees will not seem large to tree enthusiasts accustomed to famous big tree sites farther south, such as the Great Smoky Mountains National Park. However, thinking locally, we should keep in mind that on most woodlots in Massachusetts, a forest-grown tree that is 7 ft in circumference appears fairly large. Within the forest interior, woodlot trees are usually spindly. So, using interior forests for comparison, Dunbar's trees stand out. Size must always be kept in context.

If girths are impressive in Dunbar, tree heights are even more impressive within in the Dunbar Brook corridor. Hundred foot tall trees of a half dozen species are common. For visitors looking aloft, there is a height hierarchy in Dunbar. Not surprisingly, the white pines are the tallest trees with most mature pines reaching to between 120 and 135 ft and a scattering of pines over 140 ft. White ash comes next—many white ash reach to between 110 and 125 ft with a few close to or slightly surpassing 130 ft. Third place isn't as firmly established. Mature hemlocks reach to between 95 and 115 ft with a few over 120, and at least one over 125 ft. Mature sugar maples are commonly 95 to 115 ft with a few over 120 and at least one only inches shy of 125 ft. The next tallest species may come as a surprise. Mature bigtooth aspens reach to between 95 and 105 ft with a few even taller and one to 125 ft. American beech and basswood compete with one another with a few black cherries rivaling the beech and basswood. Even yellow birch, a species not noted for height has no trouble reaching 90 ft in Dunbar. A scattering of red spruce reach heights between 90 and 100 ft, and one spruce makes 110 ft.

Without extensive sampling, it is difficult to compute average canopy heights for the conspicuous tall tree areas of Dunbar. It is safe to conclude that 100+ ft tall trees are common and in places the canopy average will exceed 100 ft.

With these preliminary descriptions to set the stage, let's turn to a series of big tree tables that will better summarize tree dimensions.

TREE DIMENSION TABLES

The following tables highlight many of the most outstanding trees growing in the Dunbar and Smith Brook watersheds. The first table contains 15 species of trees with either one or two specimens listed per species. For 10 of the 15 species, the individually tallest and largest girth members are listed as separate trees, i.e. the maximum girths and heights for these 10 species occur for different trees. In the other five cases, one category, height or girth, has not been sufficiently sampled to include two specimens.

Table 1. Outstanding trees on the Dunbar and Smith Brook watersheds of Monroe State Park, Massachusetts.

Species	Height (ft)	Girth (ft)	Drainage
American basswood	110.8	5.7	Dunbar
American beech	116.3	7.2	Smith
American beech	96.0	8.3	Dunbar
Bigtooth aspen	100.4	7.9	Dunbar
Bigtooth aspen	125.1	6.8	Dunbar
Black birch	95.0	5.8	Smith
Black cherry	113.0	8.8	Dunbar
Black cherry	84.5	10.4	Dunbar
Eastern hemlock	115.5	12.8	Dunbar
Eastern hemlock	125.5	8.9	Dunbar
Eastern hophornbeam	78.1	2.8	Deerfield
Northern red oak	89.7	15.0	Deerfield
Northern red oak	120.5	8.8	Deerfield
Red maple	110.0	6.4	Dunbar
Red maple	102.0	7.8	Dunbar
Red spruce	110.1	6.4	Dunbar
Red spruce	93.3	7.4	Parsonage
Sugar maple	103.5	10.8	Dunbar
Sugar maple	124.7	7.4	Dunbar
White ash	125.8	14.8	Dunbar
White ash	134.8	8.0	Smith
White birch	93.3	6.2	Dunbar
Eastern white pine	144.4	14.0	Dunbar
Eastern white pine	156.1	13.0	Dunbar
Yellow birch	98.1	13.9	Dunbar
Yellow birch	100.5	8.1	Dunbar

Table 2 shows 16 of the largest and tallest eastern white pines in Monroe State Forest measured to date (the eastern white pine is also the premier species for Mohawk Trail State Forest). The growth achievement of the pines in these two state parks, plus a few other regional areas, makes a good case for the Deerfield River corridor as one of the truly prime eastern white pine habitats in New England.

Additionally, no other species showcases New England's forests better than the eastern white pine. At one time it was the most important timber species in the world, and its history of service to the British Navy in the role of ship masts is legendary.

Table 2. Outstanding eastern white pines documented in Monroe State Park, Massachusetts.

Species	Height (ft)	Girth (ft)	Drainage	Pine name
Eastern white pine	156.1	13.0	Dunbar	Thoreau
Eastern white pine	147.0	12.0	Dunbar	Campground
Eastern white pine	144.5	14.0	Dunbar	Grandfather
Eastern white pine	144.3	9.9	Dunbar	Pederson
Eastern white pine	138.7	10.6	Dunbar	Fireplace
Eastern white pine	136.8	9.9	Dunbar	Trailside
Eastern white pine	135.2	11.3	Dunbar	Terrace
Eastern white pine	130.0	12.2	Dunbar	Sigurd Olson
Eastern white pine	129.5	10.2	Dunbar	Unnamed
Eastern white pine	129.2	10.4	Dunbar	Unnamed
Eastern white pine	127.0	11.2	Dunbar	Unnamed
Eastern white pine	126.2	10.1	Dunbar	Unnamed
Eastern white pine	125.0	12.3	Dunbar	Frelich
Eastern white pine	122.8	10.2	Dunbar	Unnamed
Eastern white pine	122.0	10.8	Dunbar	Unnamed
Eastern white pine	106.0	12.0	Dunbar	Powerline
Eastern white pine	106.0	11.3	Dunbar	Unnamed

For those unfamiliar with the term, the Rucker Height Index (RHI) for a site is the average of the tallest member of each of the ten tallest species (Table 3) and is a measure of site fertility and species growth achievement. RHI must be used carefully when comparing sites of different sizes, species composition, and age structures. However, where a forest being studied is mature, the RHI provides a measure of how well the site grows tall trees.

Tree heights have been determined by using the sine top-sine bottom method developed by the Eastern Native Tree Society. This allows accuracy to be routinely achieved to ± 1.5 ft and often to under a foot. In three cases, the trees were actually climbed and tape drop measured to get a height accurate to within a couple of inches.

Table 3. Rucker Height Index for Monroe State Forest.

Species	Height (ft)	Girth (ft)
Eastern white pine	156.7	13.0
White ash	134.8	8.0
Eastern hemlock	125.5	8.9
Bigtooth aspen	125.1	6.8
Sugar maple	124.7	7.2
Northern red oak	120.5	8.8
American beech	116.3	7.2
Black cherry	113.5	8.8
American basswood	110.8	5.7
Red spruce	110.1	6.4
Rucker Height Index	**123.8**	8.0

Table 4. The Rucker Girth Index (RGI) for the Monroe State Forest trees (the concept for RGI is that same as that for RHI).

Species	Height (ft)	Girth (ft)
Northern red oak	89.4	15.0
White ash	125.8	14.8
Eastern white pine	144.5	14.0
Yellow birch	93.5	13.9
Eastern hemlock	115.5	12.8
Sugar maple	103.5	10.8
Black cherry	84.5	10.4
Red maple	102.0	8.5
American beech	96.0	8.3
Bigtooth aspen	100.4	7.9
Rucker Girth Index	105.5	**11.6**

Table 5 shows the distribution of trees by several important species that we have measured by height class in Monroe State Forest. Altogether, FMTSF and ENTS have measured heights and girths of around 400 trees that are sufficiently large or tall to be conspicuous to a moderately trained eye. In the following table, we show the distribution of 100-ft tall trees that have been measured covering five height classes along with an estimated percentage of coverage for the species. The counts within the taller height classes will be closer to a census. In the case of white pines, we estimate that we have all 150s and 75% of those in the 140-ft class. Counts in the lower classes reflect what we have done to date. The estimates of percentage coverage for the lower classes could be low.

Table 5. Measured tree height distribution for large specimens of important species on the Monroe State Forest.

	---------- Height class (in ft) ----------				
Species	110-119.9	120-129.9	130-139.9	140-149.9	≥150
American beech	4	0	0	0	0
Bigtooth aspen	6	1	0	0	0
Eastern hemlock	7	3	0	0	0
Northern red oak	6	1	0	0	0
Red spruce	2	0	0	0	0
Sugar maple	10	2	0	0	0
White ash	21	10	4	0	0
Eastern white pine	8	7	4	3	1
Totals	64	24	8	3	1

The above statistics tell part, but not all, of the tall tree story of Monroe State Forest. To complete the story, we need comparisons of Monroe's trees to those on other sites. A primary mission of ENTS is to gather the data and make these comparisons. Using the ENTS designed Rucker system of site analysis, Monroe State Forest accounts well for itself at the level of the forest site. There is no strict definition of a site, but where possible, we like it to cover at least 20 ac. The big tree area of Monroe is between 1,000 and 1,500 ac. How well does Monroe compare to other Massachusetts sites? Other New England sites?

The Rucker Height Index for Monroe State Forest is presently the third highest in Massachusetts, behind Mohawk Trail State Forest at 136.6 ft and Ice Glen at 128.2. There are no sites yet identified in Vermont, New Hampshire, or Maine with a Rucker Height Index of 120 or more. The highest we have obtained north of Massachusetts is 116 for a site near Claremont, New Hampshire. To add further context, the highest Rucker Height Index in the Northeast is Cook Forest State Park, Pennsylvania. Cooks RHI stands at 137.4. Outside Cook, Pennsylvania has quite a few sites with RHIs over 120. Farther south, tall tree sites over 120 ft are fairly common, but Pennsylvania and the southern states comprise a more tree-growing-friendly region. For comparison purposes, our zone of interest lies primarily between 41 degrees and 43 degrees latitude north. Above 43, tree heights fall dramatically and below 41 they rise significantly. Within the zone for New England, Monroe State Forest ranks #3. On DCR lands, after Monroe, Robinson State Park comes next at just under 119 ft.

EXCEPTIONAL TREES IN MONROE STATE FOREST

This section highlights a dozen individual trees in Monroe. This attention given to the chosen trees is well beyond what readers typically find in popular hiking and naturalist guides. These sources mention a tree dimension, here or there, usually in passing. But the reader will seldom find an extensive treatment of individual trees. In the judgment of ENTS, this lack of specific tree information reduces the role of the individual trees that visitors see along nature paths as part of public education. Monroe State Forest has what ENTS considers to be seven super trees: two white pines, a white ash, a bigtooth aspen, two hemlocks, and a yellow birch. We will cover each separately.

Henry David Thoreau Pine

Of the seven super trees, in our opinion, the Henry David Thoreau Pine holds the greatest distinction. It is the first living tree of any species in Massachusetts that we accurately confirmed to a height of 150 ft or more. In the early 1990s, Jack Sobon, an architect and timber framer from Windsor, Massachusetts, and I had embarked on a search and confirmation of all white pines in Massachusetts over 140 ft in height. Jack had been searching for big and/or tall trees for many years. He had adopted the use of a transit when he found that use of conventional forestry equipment of the time often led to unacceptably large errors. Consequently, we measured the Thoreau Pine with a transit, and determined it to be 152.3 ft in height. The accuracy of the transit when checked by two different measurements from 45 or more degrees apart is usually within one or two inches of what would be obtained from a tape drop height.

Confirming a legitimate 150-ft eastern white pine was a turning point event in getting a perspective on the trees of Massachusetts. History books spoke of the giant white pines of

the past, referring to trees in New Hampshire well over 200 ft in height. There is no way to know if these accounts are true. But here we had a living tree over 150 ft. We knew that trees in that height range once grew in the Cathedral Pines of Cornwall, Connecticut, but those flagship trees of New England blew down in July 1989. We knew of no other confirmed 150-footers in any part of New England. Now with the Thoreau Pine confirmed at over 150 ft, the Bay State was no longer an also-ran, at least in the tall tree competition.

After the original measurement of the Thoreau Pine, the tree continued gaining height. By the end of the 2004 growing season, it had reached 160.2 ft. How do we know? In October of 2004, arborists Will Blozan and Ed Coyle and forest ecologist Dr. Robert Van Pelt climbed and tape drop measured the Thoreau Pine to 160.2 ft, putting the tree in a very exclusive club—one of only three trees in Massachusetts at the time to have been accurately measured to a height of 160 ft or more. The girth of the Thoreau Pine was then about 12.7 ft. Today, the number of 160-footers in Massachusetts has grown to include nine other trees. A total of 15 have been documented for all New England with the tallest being the Jake Swamp white pine in Mohawk Trail State Forest at 169.3 ft.

The Thoreau Pine, surrounded by Monica Jakuc Leverett, Roland Blaich, and Robert T. Leverett. Photo courtesy of Robert T. Leverett.

The importance of the Thoreau Pine to the 160 Club led us to check its height again in December 2009. The tree has always been difficult to measure from the ground. Andrew Joslin from Jamaica Plain, Massachusetts, and Bart Bouricius, a rainforest canopy researcher, climbed the tree and did a tape drop measurement to verify Thoreau's current height. John Eichholz reestablished the mid-slope position, using Will Blozan's method to get breast high girth measurements. The climb documented the tree's height at 156.1 ft. Thoreau will be climbed again in 2010 to confirm its height at the end of the growing season.

So, the Thoreau Pine is no longer carried as a member of the 160 Club. Perhaps we can give it an emeritus status. However, Thoreau still enters the equally distinguished 13 x 150 Club. Does it have any other superlatives? Using a form factor of 0.4, a height of 156.1 ft, and a girth of 13 ft, the trunk volume of Thoreau computes to 840 ft^3. This volume is consistent with the number Dr. Robert Van Pelt calculated in October of 2004. Van Pelt modeled Thoreau to 816 ft^3 then. A 5.4 ft^3 annual increase is reasonable for a tree the size and age of Thoreau. While this is over 100 ft^3 less than the bulkier Grandfather tree upslope, it is high enough to rank #4 in Massachusetts for the single-trunked eastern white pines that we have volume measured. In pre-colonial times, there would likely have been many white pines with trunk volumes of between 800 and 1,000 ft^3 and a few as high as 1,200. One of the ENTS projects is to locate and model all single-trunked eastern white pines in the East with trunk volumes of 1,000 ft^3 or more and correlate their geographical distribution to climate, soil, and terrain factors.

Grandfather Pine

As exemplary as the Thoreau Pine is, it has a companion. Another giant pine grows upslope about 250 ft from Thoreau—the second super tree of the seven. The following image shows the colossus of Dunbar, as we sometimes call it, the Grandfather Pine. This leviathan stands 144.5 ft tall from base to tip of its crown—tall, but not as tall as Thoreau. However, it reaches >14.0 ft in girth at breast level, and its huge trunk holds approximately 992 ft^3 of wood. The Grandfather Pine sequesters a lot of carbon—it is doing its job for the environment.

Will Blozan climbed and modeled this pine to 979 ft^3 in 2007. The 6.5 ft^3 annual increase tracks visually with what we are seeing. Older trees most noticeably expand their trunks from aloft. Their basal radii can remain almost the same, i.e., annual growth rings can be very narrow at the base, while the wood continues to accumulate on the limbs and upper trunk.

The Grandfather Pine. Photo by Robert T. Leverett.

Dunbar Ash

We leave the Dunbar pines now and turn to other species. The previously mentioned huge white ash in Dunbar (#3 of the 7) is the largest forest-grown white ash we have seen in New England. Open-grown white ash trees can achieve larger girths, but are seldom much over 100 ft in height, and quite often under 100. They achieve significant girths and crowns at the sacrifice of height and symmetry. It is in the forest that the white ash achieves its most pleasing contours. The tree, as it appears here, is 14.8 ft in girth and 125.8 ft tall. At one time, this champion probably reached to between 130 and 135 ft. Time is wearing down its crown. At about 285 years of age, it is hollow inside, and does not have long to live. In a few seasons it will fall and would be forgotten were it not for the many photographs that have been taken of the Dunbar Ash.

Boston University journalism major Julia Darcey admires the famous Dunbar white ash. Photo by Robert T. Leverett.

Before going to #4, we will discuss the role of the white ash in Monroe and Dunbar in particular. There are at least two other white ash trees in Monroe State Forest that reach girths of between 10 and 11 ft, a typical maximum for forest grown ashes in Massachusetts. Other large ash trees reach 9 to 10 ft in girth within the Dunbar watershed. Many are between 7.0 and 8.5 ft in girth. In terms of height, the mature Dunbar ashes often reach into the low 120s. At least one makes 130 ft. These larger, taller Dunbar ashes are typically between 150 and 200 years of age. Most show signs of aging through trunk balding. Interestingly, there is a young grove of ashes in Smith Brook with at least half a dozen trees that exceed 120 ft and two that exceed 130 ft. The taller of the two was 134 ft when last measured five years ago.

The 130 ft, young white ash trees along lower Smith Brook make Monroe State Forest only one of four Massachusetts properties with ash trees exceeding 130 ft: Mohawk Trail State Forest, Monroe State Forest, Catamount State Forest, and Laurel Hill Association's Ice Glen. The tallest white ash measured east of the Berkshires is a tree in Robinson State Park, Agawam, MA. Three years ago, that tree was measured to a height of slightly over 127 ft.

As a side point, white ash appears to reach a northeastern height maximum in the Berkshire and Taconic Mountains for latitudes in the range of 40 degrees north and higher. Mohawk Trail State Forest has a 152.3 ft white ash, the tallest accurately measured ash in the Northeast—a remarkable achievement for a tree in Massachusetts. Mohawk has at least 12 ash trees over 140. A single 140-footer grows in Ice Glen. In Pennsylvania and New York, one white ash in each state has been measured to 140 ft. We are sure there are others, but the point is that they are unquestionably few and far between. By contrast, white ashes above 140 ft are more common in the southern Appalachians. The species has been measured to 167 ft in the Great Smoky Mountains National Park, with several others measured to over 150 ft.

Dr. Lee Frelich next to the Parsonage Brook Ash. Photo by Robert T. Leverett.

The Parsonage Brook Ash is 10.5-ft girth white ash is approximately 245 years old and showing its age. Its crown has died back to around 95 ft in height, which is short for the species. The Parsonage Brook Ash was originally dated by Alaska champion tree coordinator and retired forester Don Bertolette and myself.

Bigtooth Aspen

We will now move on to a third species of tree that reaches superlative dimensions in Monroe State Forest. It is a species that causes most tree-savvy visitors to blink—the bigtooth aspen. Dunbar's bigtooths are very impressive. A cluster growing along the nature trail on the south side of Dunbar boasts at least four that exceed 100 ft in height, with the tallest at around 111 ft. The image below shows one of these trees with a girth of 6.7 ft and a height of 104 ft.

A large bigtooth aspen in Monroe State Forest. Photo by Robert T. Leverett.

A bigtooth aspen on the north side of Dunbar reaches the remarkable height of 125.1 ft. It is #4 of our seven special trees. The Dunbar bigtooth is the second tallest of its species known in New England. In fact, at this point it is the second tallest in the Northeast. The tallest bigtooth grows in nearby Mohawk Trail State Forest and is 126.0 ft. (A badly mis-measured bigtooth was once reported in Michigan to be 132 ft in height. It was likely not over 105, judging by the size errors committed by the same measurers for a number of other Michigan trees). Most mature bigtooths in the lower Dunbar watershed are between 90 and 105 ft. In the southern Appalachians, Mecca for tall trees, we seldom measure bigtooths to over 100 ft.

Dunbar Brook Hemlock

One of the standout trees in Dunbar is a huge eastern hemlock (# 5 of the seven). Its dimensions are 12.8 ft in girth and 115.5 ft in height to a broken top. Its original height was probably between 120 and 125 ft. The modeled trunk volume of the tree is an impressive 758 ft^3 (Table 6), making it one of the three largest hemlocks that ENTS has modeled in New England. All three are on DCR properties. The giant hemlock, dated in the early 1990s by Dr. Peter Dunwiddie and myself, is approximately 300 years old. It appears older, but illustrates the point that the largest trees of a species are seldom the oldest.

Table 6. A spreadsheet model of the Dunbar Brook Hemlock created by Will Blozan following his October 2007 climb and modeling of the tree.

				------ Volume ------	
Diameter (inches)	Girth (ft)	Radius (ft)	Height (ft)	Section (ft^3)	Cumul. (ft^3)
0.00	0.00	0.00	115.50	10.42	10.42
20.60	5.39	0.86	102.00	13.70	24.12
25.55	6.69	1.06	97.30	16.57	40.69
27.00	7.07	1.13	92.90	7.17	47.86
28.60	7.49	1.19	91.20	35.86	83.72
31.00	8.12	1.29	83.80	48.66	132.37
33.40	8.74	1.39	75.20	48.00	180.37
35.10	9.19	1.46	67.70	64.72	245.09
36.72	9.61	1.53	58.50	80.80	325.88
37.35	9.78	1.56	47.70	63.15	389.03
37.80	9.90	1.58	39.50	54.42	443.44
39.95	10.46	1.66	32.90	66.30	509.75
38.50	10.08	1.60	25.00	66.87	576.62
38.37	10.05	1.60	16.70	53.54	630.16
39.95	10.46	1.66	10.30	31.85	662.01
42.92	11.24	1.79	6.90	18.18	680.19
45.63	11.95	1.90	5.20	8.32	688.51
47.74	12.50	1.99	4.50	28.62	717.13
54.62	14.30	2.28	2.50	40.68	757.81
54.62	14.30	2.28	0.00		

500-year old eastern hemlock

We regret that we don't have an image of #6 of the seven, a 500-year old hemlock. However, it is not a conspicuously large tree. It would hardly be noticed by visitors, but it is the second oldest hemlock we have dated in Massachusetts. Its core-height age was 474 years at the time it was dated by Dr. Larry Winship of Hampshire College, about 10 years ago. Adding another 20 years to the base gives us an additional 30 years: its current age is 504 years. This hemlock joins the 500 Year Club.

Dunbar Brook Yellow Birch

Dunbar Brook excels in old yellow birches, so it is appropriate that #7 is a member of that species. One yellow birch stands out from the rest. The following image shows John Knuerr near the base of the largest yellow birch in Monroe State

The Dunbar Brook Yellow Birch and John Knuerr. Photo by Robert T. Leverett.

Forest. It measures 13.9 ft in girth and once stood 98.5 ft in height, fairly tall for a yellow birch. The most recent measurement of 93.1 ft shows that the big birch is losing crown. It has a large split on the uphill side. Crown die back and the split suggest that this magnificent tree will likely not be standing for many more years. Its existence raises a question about the frequency with which yellow birches in the 12-ft and over girth range occur. Our experience is that single trunk specimens are very rare. A more typical large yellow birch is 8.5 to 10.0 ft in girth.

OTHER SPECIES

We would be remiss if we didn't mention other species and trees, e.g. the Dunbar sugar maples. Although we have not found any standing super maples, large, old specimens are well represented in Monroe State Forest. The largest we've seen and measured fell many years ago. Its great trunk, approximately 13 ft around when it went down, is now returning nutrients to the soil. More typically, a big sugar maple in the Dunbar area is between 8 and 10 ft in girth. Tall sugar maples are usually between 95 to 115 ft in height. For comparison purposes, large sugar maples in the Connecticut River Valley are commonly from 9.0 to 12.0 ft in girth and 85 to 105 ft in height.

What about the less abundant canopy species, e.g., black cherry and American basswood? There is a handsome black cherry in a second-growth area of Dunbar. John Eichholz measured this tree on a December 2009 outing and got a girth of 8.8 ft, making the tree one of the half dozen largest forest-grown cherries we have measured in Massachusetts. Both John and I measured its height and agreed on 113.0 ft.

AGES OF MONROE STATE FOREST'S TREES

Outside of quoting a few tree ages, we haven't said much about the overall age structure of Monroe's forests, including that of its priceless old-growth. Based on the work we have done to date, Monroe State Forest has around 60 ac of old-growth. Most of the old-growth is located in the Fife and Dunbar Brook drainages. What does it look like? The Parsonage Brook stand gives us a look at some of the most primeval spots. Examining individual species in the old-growth, the eastern hemlocks are the patriarchs of Monroe's old trees. Eastern hemlocks can reach ages of between 500 and 600 years. They have been aged in this range in a number of locations from the Porcupine Mountains of the Upper Peninsula of Michigan to the Great Smoky Mountains of eastern Tennessee and western North Carolina. Pennsylvania is also a hot spot for old hemlocks.

An old-growth red maple from Monroe State Forest. Photo by Robert T. Leverett.

In Monroe State Forest, we have identified five dispersed locations with advanced age hemlocks. We previously mentioned the hemlock that was dated in Dunbar to 474 years. More typically, old hemlocks in Dunbar are between 250 and 350 years, with a small population exceeding 400. The hemlocks are the elders of the forest, and provide us with a sense of a truly primeval woodland.

While the hemlocks are the oldest species in Monroe, other species like white ash reach close to the maximum ages achieved for their species. The huge Dunbar ash was dated in 1989 to 258 years. If we add 4 years to core height and another 20 years since the tree was cored, the ash is now 282 years old. Don Bertolette and I dated a second white ash 15 years ago to 230 years. It is now 245. Other white ashes in Dunbar have been dated to around 200 years. Sugar maples in Dunbar date from 150 to probably 350 years. Most old ones have decay, so it is not possible to know their full ages. The species can reach ages of 400 years, but not often.

Old yellow birches are usually hollow, but the Dunbar trees are almost certainly over 300 years old. Don Bertolette and I dated a yellow birch that did not look especially old, on Parsonage Brook, to 198 years. I would have guessed 130 at the most. If outward appearances are any clue to ages, and they usually are, there are many 200 to 250 year old yellow birches in Dunbar.

Monroe State Forest features many black birches that are between 150 and 250 years old. There may be older ones, since the black birch reaches greater ages than once believed. The old specimens tend to occur on the slopes with northern red oak and/or eastern hemlock. This species may be the most under studied with respect to age that we have.

Outside the limited old-growth acreage, there is a far larger, but not completely determined, acreage of mature forest between 100 and 200 years old with a sprinkling of trees that are older. It is the second growth forest well on the way to becoming old-growth and is the heir apparent to the class 1 forest. It is within this mature forest that we find the great white pines. The oldest of these field pines, as they are called, has been dated to around 185 years. Some of the Dunbar Brook pines are younger—perhaps 150 years old, but none of the big ones is young. Many are at the stage of development where judging age by eye is risky. One can arrive at age estimates indirectly. Dunbar Valley wasn't settled until around 1790. The oldest white pines probably began growing after that time. The Dunbar forests have seen 220 years of activity by European-Americans.

From an aesthetic viewpoint, it doesn't matter to most visitors what the ages of the pines are. They are the largest and tallest trees in Monroe, and that earns them respect. Thinking like the indigenous peoples who saw the eastern white pine as their symbol of peace, the great white pines connect sky to earth. Although they are not old-growth, the big pines provide plenty of inspiration for poets to wax eloquently about the primeval forest.

HISTORICAL VALUE OF MONROE'S FORESTS

Beyond satisfying our hunger for big and old trees, the distribution of species in Monroe State Forest have important stories to tell. One story is how forests develop when not impacted by human activity: the processes involved, the niches created, and the identities and roles of the species filling those niches. The eastern hemlocks, sugar maples, American beeches, and yellow birches speak to long-term successional processes and the natural forest type for the area. That story relates the natural history of the forest of the upper Deerfield River Valley.

But the tree species of Dunbar also tell us about the human history. We can read the signs left by past land clearings for pasturage, logging operations, and occasional fires. To solve the puzzle, we must understand the strategies different species use to reproduce, colonize, and either persist or yield to other species. As previously mentioned, the period of disturbance by European-Americans spans 220 years. The history of natural disturbances spans millennia. The history of both natural and human-initiated disturbances is written in the species. The white birch, bigtooth aspen, eastern white pine, and relative abundance of white ash bear witness to human activity. Loss of the mature beech speaks to the human introduced Nova Scotia

A white pine along the main Dunbar Brook trail. Photo by Robert T. Leverett.

beech bark disease. Remove people, and in time the abundance of these pioneer species will drop in favor of more permanent residents—the settler species (eastern hemlock, sugar maple, yellow birch, etc). The latter will stay around for centuries and maybe thousands of years so long as the climate doesn't change and people don't return to disturb the forest. The imprints are there to be seen and disentangled by the ecologist. In this sense, the forests of Monroe are living museums and scientific laboratories.

SUMMARY

The lower elevation stream corridors and rugged ridge-side forests of Monroe State Forest are woodland gems. They possess an abundance of big trees and old-growth in a wild woods setting. The aesthetic qualities of Dunbar Brook and its tributaries, of Smith, and of Fife Brooks make these stream corridors and their secluded woodlands worthy of the highest forest protection that we can provide. Monroe's forests also provide us with a window into the past. Species composition and tree ages tell us much about land use and forest regeneration. For more information on the trees of Monroe State Forest, visit the ENTS website at:

www.nativetreesociety.org

and search for keywords on Monroe State Forest, Dunbar, or Smith Brooks.

We will conclude this essay with three images. The first (top of this page) shows a beautiful eastern white pine along the main Dunbar Brook trail. The pine is 9.9 ft in girth and 136.8 ft tall. Its crown is healthy and broad. In time the Trailside Pine, as we have named it, may join the 150 Club and rival the Thoreau Pine. But whether it reaches the dimensions of the Thoreau Pine or not, its presence adds measurably to the big tree ambience one experiences along the nature trail.

The next image (next page) shows Dr. Lee Frelich beside an eastern white pine named in his honor. This large pine stands 125.0 ft tall and has a girth of 12.3 ft. Its age is probably between 160 and 200 years. Its trunk volume is estimated to be around 620 ft^3. With its imposing image, we conclude the numeric description of the inspiring woodlands of Monroe State Forest.

Left: Dr. Lee Frelich standing next to his namesake pine in the Monroe State Forest. Photo by Robert T. Leverett.

The final image (bottom of page) is included to provide a deep woods sense of Dunbar Brook, and highlight the role of the yellow birch in molding the look and feel of the best of the Massachusetts Berkshire forests. Monroe represents a priceless naturally heritage, a heritage that we almost completely destroyed. We have a second chance in Monroe. We are entrusted with this heritage and it is dependent on us for its full protection.

LITERATURE CITED

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Below: A symbol of the treasure of the Monroe State Forest—a priceless natural heritage. Photo by Robert T. Leverett.

USING LIDAR TO LOCATE EXCEPTIONALLY TALL TREES IN WESTERN NORTH CAROLINA

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INTRODUCTION

Light ranging and detection (LiDAR) technology is a remote sensing technology deployed on aircraft in conjunction with precise altimeter and GPS equipment. The LiDAR scanner emits waves of laser beams that are reflected off surfaces such as vegetation, buildings and the ground. The time and intensity between a light wave's departure and reflection back to the aircraft is used to create data points that describe the position of objects in the path of the light beam.

LiDAR has been employed since the 1960s to measure geographic features and since the early 1990s to describe tree height, canopy structure, vegetation density, basal area, biomass and other physical characteristics of forests (Clark et al. 2004, Harding et al. 2001, Lefsky et al. 1999a,b; Lim et al. 2003, Weishampel et al. 2000). In this study, raw LiDAR data were converted into a canopy height model that was used to find some of the most concentrated groves of tall trees in a western North Carolina watershed.

METHODS

Background

In December of 2008, the Cheoah Ranger District of Nantahala National Forest alerted North Carolina conservation organizations of its intent to conduct an Environmental Assessment of a logging project in the Santeetlah Creek watershed in Graham County, NC. In order to advise the Forest Service on the Project, the lead author and Hugh Irwin made several reconnaissance trips to the area. On one trip, a previously undocumented 20 ft (6.1 m) circumference tuliptree (*Liriodendron tulipifera*) was discovered in an old-growth remnant on Wright Creek (Kelly 2009).

Simultaneously, Don Bertolette and Paul Jost had been expounding on the utility of LiDAR in locating tall trees on the ENTS discussion group. Paul coordinated with Josh Kelly to ground-truth the canopy height model he created from raw LiDAR data. Josh was duly impressed and he and Hugh Irwin advised Jennifer Hushaw in a summer internship that created a canopy model of the entire Santeetlah Creek drainage.

Study Area

The Santeetlah Creek watershed is a fourth order watershed in the Unicoi Mountains of Graham County, NC (see Fig 1). Its headwaters begin on Huckleberry Knob, elevation 5429 ft (1655 m), and it drains into Santeetlah Reservoir at 1940 ft (591 m) elevation. Included in the watershed is the well known Joyce Kilmer Memorial Forest, which is named for a poet slain in WWI and is famous for a grove of tuliptrees. The Unicoi Mountains are composed of ancient metasedimentary rock of the Ocoee Super Group (NC Geologic Survey 1985). In the Santeetlah watershed, Copper Hill Formation and Slate of Copper Hill Formation are the most common rock types. The Santeetlah watershed is among the wettest locations in Eastern North America, with interpolated rainfall up to 94 in/yr (240 cm/yr) at the highest elevations. The portions of the Santeetlah watershed with the least rainfall average more than 63 in/yr (160 cm/yr) of precipitation (Prism Explorer).

Fusion© software (version 2.70) was used to filter and compile raw LiDAR data in tiles 1/16th of the size of a USGS 7.5' Quadrangle. The data were downloaded from:

http://lidar.cr.usgs.gov/

in .las file format and imported into Fusion. A bare earth model of ground points at 9-ft cell size was created and subtracted from first returns in the LiDAR dataset to create a canopy height model that was clipped to the boundaries of the fourth order watershed. The resulting canopy height model was converted to an ASCII file and imported into ArcGIS as a raster file and layered onto a topographic map. The canopy height model was displayed as a color ramp with color breaks at equal intervals of height between 0 and 200 ft (61 m). The model was then inspected for areas of potential old-growth, past logging activity and exceptionally tall trees.

A point shapefile of tall trees was created using the canopy height model and converted into GPS waypoints to aid in locating individual trees. Outings were made in May and

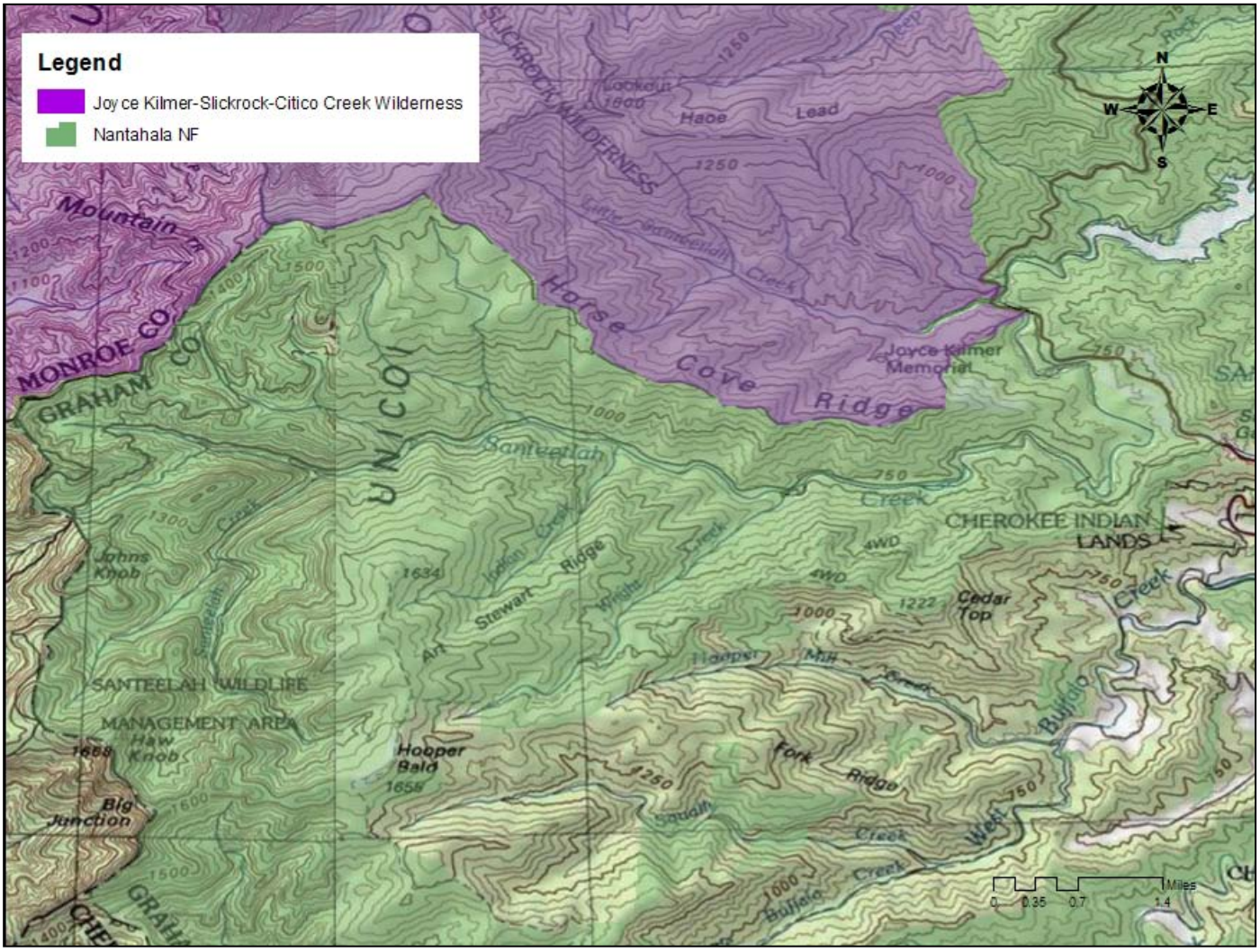

Figure 1. The Santeetlah Creek watershed.

August of 2009 and January of 2010 to ground truth the accuracy and precision of the LiDAR derived canopy height model. Trees were measured using the laser and sine method (Blozan 2004, 2008) by Will Blozan, Jess Riddle, Josh Kelly and Hugh Irwin. A waypoint of each tree measured was collected to reference with the LiDAR canopy height model.

RESULTS

The LiDAR derived canopy height model proved to be effective at locating individual tall trees and groves of tall trees. LiDAR tree height measurements of some trees were within a decimeter of actual tree height as measured with the laser and sine method. The greatest errors were an overestimation of 40 ft (12.2 m) and underestimation of 7.6 ft (2.31 m) (Table 1).

Locating individual trees took some geographic savvy, even with GPS units. Typically, GPS units could only be used to navigate to within 20 ft (6.1 m) of target trees and waypoints collected of individual trees were often 20 to 30 ft (6.1 to 9.1 m) from the actual tree when referenced in ArcGIS. It was assumed that the LiDAR data are extremely accurate spatially, therefore determinations of individual tree locations were made viewing trees in relation to known points.

The LiDAR canopy height model led the field team to many exceptional trees including six tuliptrees over 170 ft (51.8 m) tall and one 178.1 ft (54.3 m) tall, and a new height record for black cherry (*Prunus serotina*) at 152.2 ft (46.4 m) tall. There were errors as well. A leaning poplar with a LiDAR height of 175 ft (53.35 m) had a measured height of 135 ft (41.15 m). Eastern white pines (*Pinus strobus*) on steep slopes also led to large errors (see Figure 2).

Of 32 trees measured via LiDAR canopy height model and the laser and sine method, the standard deviation between the trees' actual height (laser and sine height) and LiDAR height was 10.3 ft (3.14 m). The average difference between LiDAR modeled and measured heights was 3.6 ft (1.1 m). LiDAR performed best with trees growing on level terrain and with their highest points directly above the base of the tree. Trees growing on or leaning over steep slopes resulted in the greatest errors with LiDAR.

Species	dbh (in)	cbh (ft)	dbh (cm)	cbh (m)	Measured Height ft	LiDAR Height ft	Difference	Measured Height m	LiDAR Height m	Difference
Acer sacharum	32.4	8.49	82.4	2.59	130	134	-4	39.6	40.9	-1.3
Aesculus flava	45.1	11.8	114.5	3.6	141	142	-1	43	43.3	-0.3
Carya cordiformis	35.4	9.27	89.9	2.83	150	150	0	45.7	45.7	0
Carya glabra	41.3	10.8	104.8	3.29	144	145	-1	43.9	44.2	-0.3
Carya glabra	37.6	9.83	95.4	3	158	156	2	48.2	47.6	0.6
Fraxinus americana	47.1	12.33	119.6	3.76	130	128	2	39.6	39	0.6
Fraxinus americana	44.6	11.69	113.4	3.56	129	129	0	39.3	39.3	0
Fraxinus americana	37.7	9.87	95.8	3.01	157	161	-4	47.9	49.1	-1.2
Liriodendron tulipifera	59	15.44	149.8	4.71	159	162	-3	48.5	49.4	-0.9
Liriodendron tulipifera	39.3	10.29	99.8	3.13	165	169	-4	50.3	51.5	-1.2
Liriodendron tulipifera	33.6	8.79	85.3	2.68	172	173	-1	52.4	52.7	-0.3
Liriodendron tulipifera	31.1	8.14	79	2.48	178	177	1	54.3	54	0.3
Liriodendron tulipifera	33.2	8.68	84.2	2.65	172	165	7	52.4	50.3	2.1
Liriodendron tulipifera	37.8	9.9	96	3.01	165	178	-13	50.3	54.3	-4
Liriodendron tulipifera	29.4	7.69	74.6	2.34	174	179	-5	53.4	54.6	-1.2
Liriodendron tulipifera	44.1	11.55	112.1	3.52	165	167	-2	50.3	50.9	-0.6
Liriodendron tulipifera	43	11.25	109.1	3.43	175	172	3	53.4	52.4	1
Liriodendron tulipifera	34.4	9	87.3	2.74	170	170	0	51.8	51.8	0
Liriodendron tulipifera	54.3	14.22	138	4.34	139	161	-22	42.4	49.1	-6.7
Liriodendron tulipifera	na	na	na	na	135	175	-40	41.2	53.4	-12.2
Liriodendron tulipifera	78.7	20.59	199.8	6.28	137	154	-17	41.8	47	-5.2
Liriodendron tulipifera	51.6	13.5	131	4.12	149	154	-5	45.4	47	-1.6
Liriodendron tulipifera	55	14.4	139.7	4.39	154	155	-1	47	47.3	-0.3
Lirodendron tulipifera	54.5	14.26	138.4	4.35	166	169	-3	50.6	51.5	-0.9
Magnolia acuminata	28.6	7.48	72.6	2.28	136	135	1	41.5	41.2	0.3
Pinus Strobus	37.2	9.73	94.4	2.97	143	171	-28	43.6	52.1	-8.5
Pinus Strobus	na	na	na	na	150	150	0	45.7	45.7	0
Pinus Strobus	na	na	na	na	153	148	5	46.6	45.1	1.5
Prunus serotina	33.3	8.72	84.6	2.66	152	153	-1	46.3	46.6	-0.3
Quercus rubra	54.1	14.17	137.5	4.32	128	123	5	39	37.5	1.5
Robinia pseudoacacia	17.9	4.69	45.5	1.43	134	132	2	40.9	40.2	0.7
Tilia heterophylla	32.2	8.41	81.6	2.56	140	129	11	42.7	39.3	3.4
						Average	3.6		Average	1.1
						Std Deviation	10.2		Std Deviation	3.1

Figure 2. Screen capture of spreadsheet of height data using LiDAR.

DISCUSSION

The ability of LiDAR to identify exceptionally tall trees in a 20,000 ac (8,094 ha) watershed shows its promise for leading researchers to premiere forest sites (Figure 3). The 20-ft (6.1-m) cell size that LiDAR data for North Carolina was collected at does not guarantee precise measurement of all trees however, it is sufficient for identifying the best growing sites with mature forest and most tall trees. When using LiDAR to identify tall trees it is important to evaluate the terrain the trees inhabit when making judgments about the reliability of the LiDAR model. Trees with broad crowns or leaning trees on steep slopes (Figure 4) or trees on stream banks are most likely to have large errors. Because LiDAR measures vertical height there can be a large vertical displacement between the point below a twig and the actual base of a tree on a steep slope.

Highly reflective surfaces, such as water, the roofs of houses and wet rocks can also lead to LiDAR returns that appear as tall trees, so referencing canopy height models with topographic maps and/or aerial photos is a recommended technique (St-Onge and Achaichia 2001). Underestimations in the North Carolina LiDAR data are attributed at this time to the 20-ft (6.1-m) cell size collected. That resolution does not seem to detect all twigs in a forest canopy and can therefore underestimate the true height of individual trees.

In addition to using LiDAR to locate tall trees, there is great promise for using LiDAR to locate old-growth forests. When comparing known old-growth sites to second-growth in LiDAR, old-growth has a much more textured canopy because of the frequent and often times remarkably evenly spaced tree fall gaps (Figure 5). Finding equations that can predict old-growth forests of various types using LiDAR and other data sources is an important area of scientific inquiry that could further conservation of old-growth forest. Research on using LiDAR in a regression model to remotely identify old-growth is ongoing by Jennifer Hushaw.

Related to the pursuit of old-growth, LiDAR can be used to find exceptionally large trees. The Sag Branch Poplar (Blozan 2002) is easily visible in LiDAR as is a large tree in the Santeetlah area that has not yet been visited (Figure 6).

The proper manipulation of LiDAR data can assist forest researchers and enthusiasts in locating the tallest trees in North Carolina and other regions where data are available. North Carolina ENTS can look forward to years of exploring exceptional forests that were heretofore unknown and increasing our understanding of the patterns of tree growth in our region. I predict that LiDAR will make our outings more efficient and allow us to better answer questions about forest structure and the biotic, abiotic and physiological controls on tree growth.

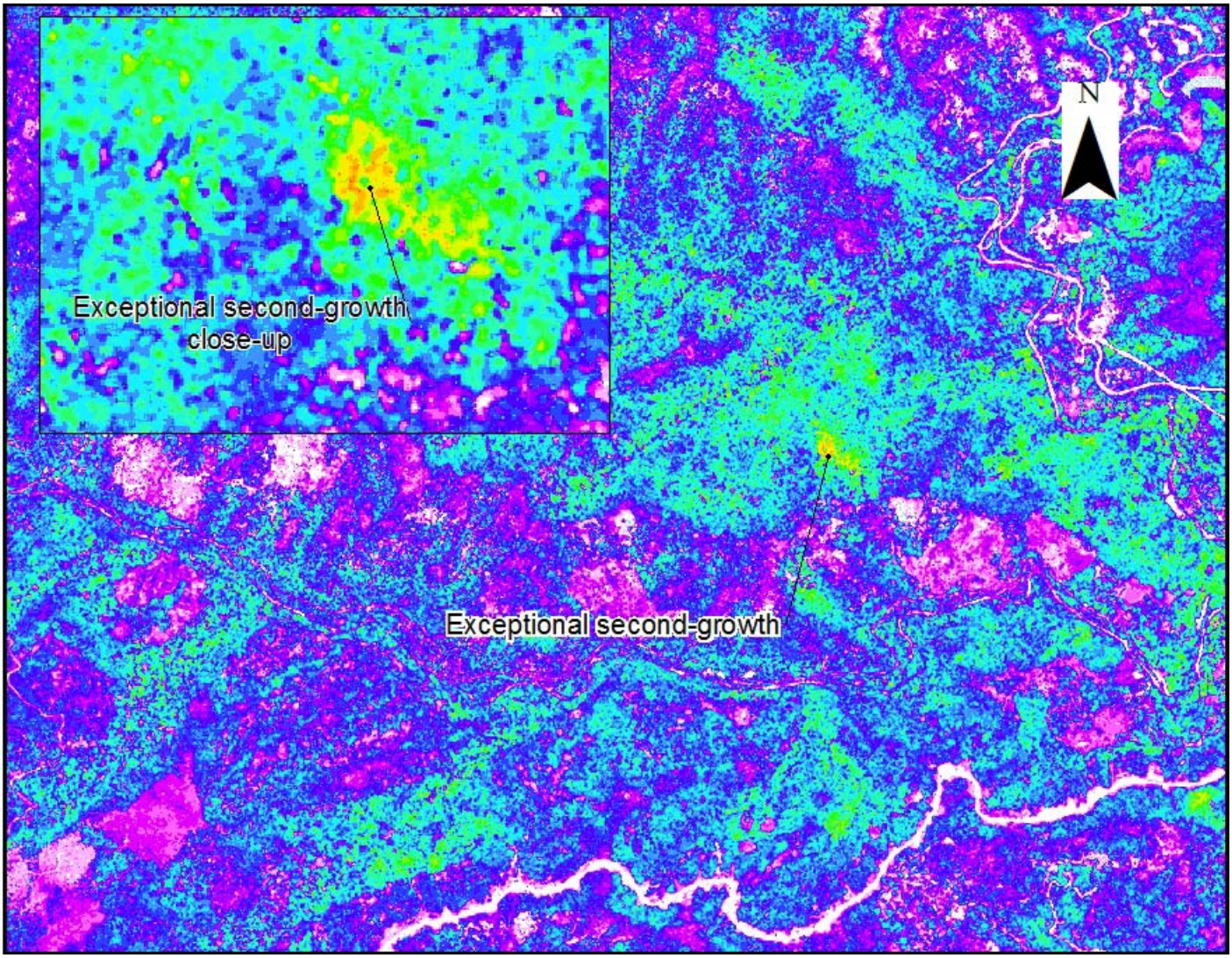

Figure 3. Canopy height model of Santeetlah Creek with a close-up of the area of exceptional second-growth at Joyce Kilmer Memorial Forest.

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Figure 4. **Liriodendron tulipifera** ***with arching crown that led to a 40 ft (12.2 m) error in LiDAR height.***

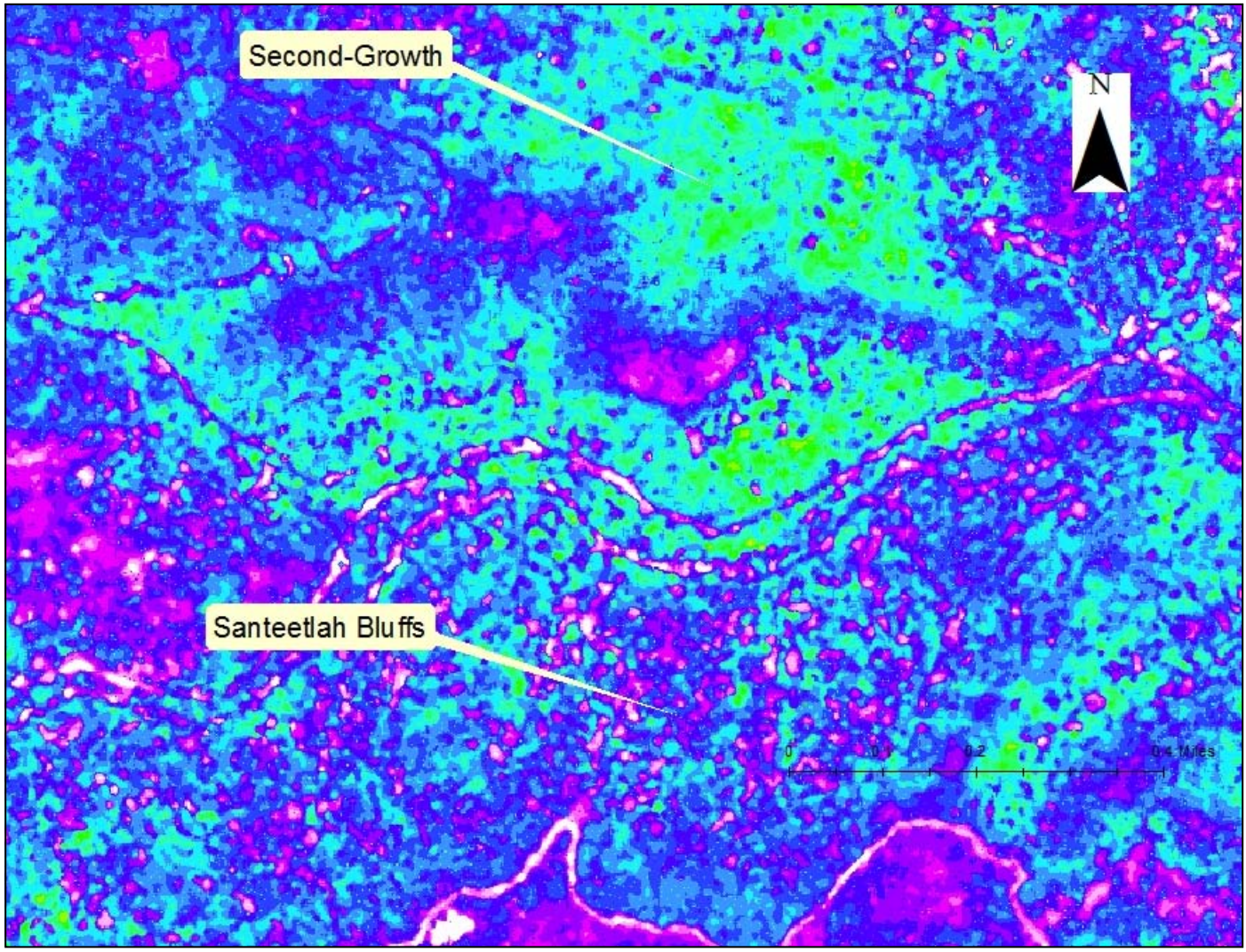
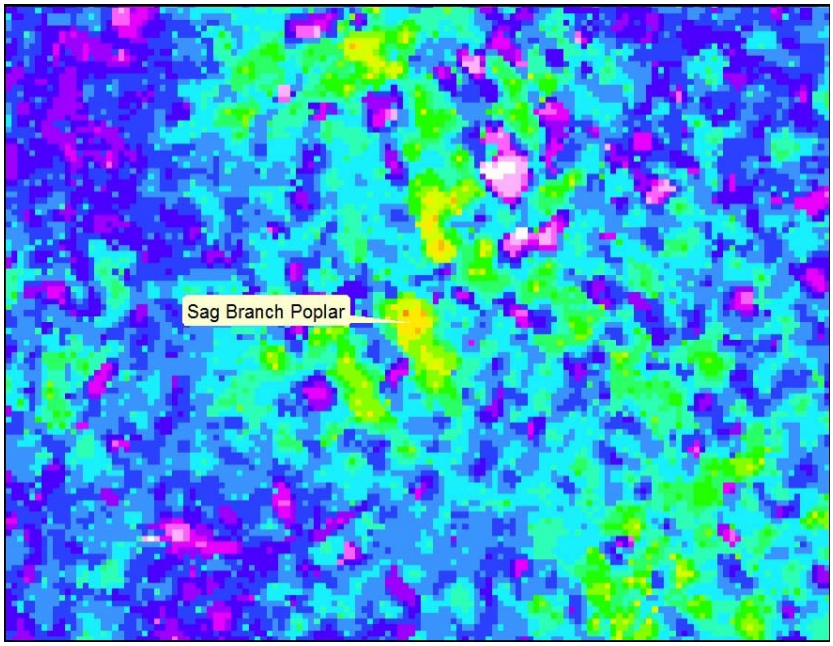


Figure 5 (above). The textured, old-growth forests of the Santeetlah Bluffs contrast dramatically with nearby second growth in a LiDAR derived canopy height model.

Figure 6 (right). The crown of the Sag Branch Poplar visualized in a LiDAR canopy height model.



CEMETERY RUN, MEADVILLE, PENNSYLVANIA: JANUARY TO MARCH, 2009

Dale Luthringer

Environmental Education Specialist, Cook Forest State Park, Cooksburg, Pennsylvania

On multiple trips from January through March of 2009, I embarked on recording an exceptional drainage called Cemetery Run within the Greendale Cemetery, on the extreme eastern edge of Meadville, Crawford County, in northwestern Pennsylvania. It was exceptional in that it was not only a new old-growth find, but this steep multi-spurred drainage harbored some new state and northeastern US tree records.

Here's a couple of background links to the Greendale Cemetery:

http://www.greendalecemetery.org/index.aspx
http://www.greendalecemetery.org/history.aspx

I've attached a map of Meadville and Cemetery Run and an elevation profile of the surveyed area. There is a maintained trail coming in from the western, or cemetery side of the stream that stays on the stream's western side. If you explore the eastern side of the drainage, you will find an old trail that has not been maintained for quite a long time. Here's a link to their cemetery map:

http://www.greendalecemetery.org/map.aspx

and a link to their cemetery picture gallery:

http://www.greendalecemetery.org/photoGallery.aspx

Entrance to the Greendale Cemetery. Photo by Dale Luthringer.

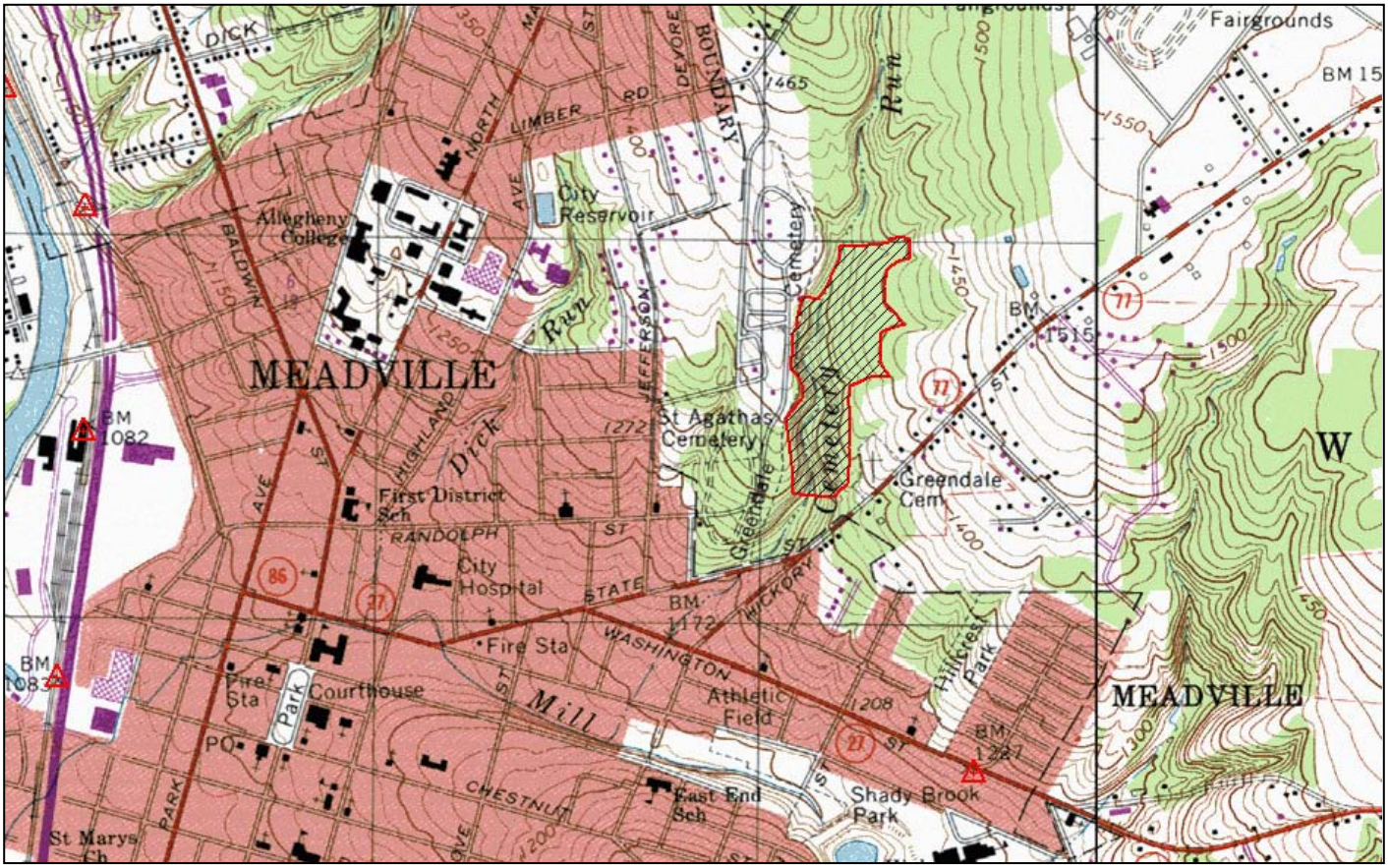
The local history at the cemetery is enough to draw one to the area, but what really caught my eye was the steep drainage due north of Route 77 that I sped past on a previous road trip several years ago. It was quite awhile before I took the opportunity to explore this drainage little further.

I know very little about the land acquisition details around the cemetery, but it appears that virtually the entire ravine system is currently owned by the cemetery. After an intriguing conversation with the current superintendent, James Vogan (29 years of service!), it appears they will never log Cemetery Run, although they've had repeated offers to do so. This is very good news, because a large portion of it is primary and secondary old-growth forest. I'd argue that small portions of it have never been logged. This would most likely be the smaller eastern side drainages including the ridgetop, with some of the valley being selectively logged sometime since the inception of Meadville in the late 1700s.

I was able to catalogue 28.9 ac of old-growth forest, which encompasses virtually all of the eastern side of the ravine's ancient hemlock stand, and a decent portion of the west side of the ravine that butts up against the edge of the cemetery. Mr. Vogan was extremely kind in giving me permission to core some trees.

Here are some of the preliminary results:

Species	Ring Count	Comments
black gum	292	To solid center, 6.5 ft circumference, 4.4 ft up from base 6.5ft CBH x 108.9ft high Lat: 41° 38.857'N Long: 80° 7.924'W
black oak	147	At 7.4 ft circum., 3.7 ft from base 7.3 ft CBH x 84.1 ft high Lat: 41° 38.738'N Long: 80° 7.958'W
chestnut oak	289	To center at 8.3 ft circumference, 5.2 ft up from base 8.3 ft CBH x 99.1+ ft high Lat: 41° 38.647'N Long: 80° 7.985'W
Eastern hemlock	224	To punky center at 7.7 ft circum-ference, 3.7 ft up from base 7.6 ft CBH x 98 ft high Lat: 41° 38.751'N Long: 80° 7.974'W
Eastern hemlock	243	At 9.7 ft circumference, 5.6 ft up from base 10.1 ft CBH x 106.9 ft high Lat: 41° 38.915'N Long: 80° 7.969'W



Cemetery Run, cross-hatched in the center of this map.

So, we easily have three different species that predate the founding of Meadville, with the oldest core from the blackgum going back at least to 1717. Most of the oldest hemlock and oaks were found near or at the ridge top interface. The old blackgum was found near the top of one of the eastern side drainages.

Other probable ancient species observed but not cored (age estimates, in years, are likely on the low end):

Species	Visual age estimate
Blackgum	300
Chestnut oak	300
Eastern hemlock	250
White oak	250
Scarlet oak	200
Cucumbertree	150
Northern red oak	150
Slippery elm	150
Sycamore	150
Tuliptree	150
American beech	125
Eastern white pine	125
Sycamore	125

Here's the site's tree tally:

Species	CBH (ft)	Height (ft)	Comments
American beech	N/A	97.3	
American beech	8.5	>102.1	
American beech	7.7	103.0	
American beech	N/A	109.1	
American beech	6.9	>111.1	
American beech	8.2	>111.1	
American beech	N/A	113.0	
American beech	N/A	114.1	
American beech	7.6	123.1	Lat: 41° 38.880'N Long: 80° 7.990'W
Black cherry	N/A	110.8	
Black cherry	N/A	112.2	
Black cherry	6.5	114.2	
Black cherry	N/A	116.6	
Black cherry	N/A	123.0	
Blackgum	2.6	72.5	
Blackgum	6.5	108.9	292 rings
Blackgum	5.5	112.1	Tallest found in northeast US, Lat: 41° 38.863'N Long: 80° 7.932'W

(continued on next page)

More from Cemetery Run:

Species	CBH (ft)	Height (ft)	Comments
Black oak	4.8	>81.1	
Black oak	7.3	84.1	147 rings
Black oak	6.3	>87.1	
Chestnut oak	10.3	>77.7	Center rot, top gone
Chestnut oak	8.3	>99.1	289 rings
Cucumbertree	7.5	118.2	
Eastern hemlock	7.6	98	224 rings
Eastern hemlock	N/A	105.7	
Eastern hemlock	10.1	106.9	243 rings
Eastern hemlock	7.2	112.8	
Eastern hemlock	N/A	113.4	
Eastern hemlock	11.2	114.7	
Eastern hemlock	10.4	117.1	
Eastern hemlock	10.2	117.1	
Eastern hemlock	7.0	118.1	
Eastern hemlock	N/A	118.7	
Eastern hemlock	8.4	119.6	
Eastern hemlock	6.8	120.6	
Eastern hemlock	N/A	121.6	
Eastern hemlock	N/A	123.2	
Eastern hemlock	N/A	124.2	
Eastern hemlock	N/A	124.7	
Eastern hemlock	8.3	125.9	
Eastern hemlock	7.2	127.6	
Eastern hemlock	N/A	130.4	
Eastern hemlock	N/A	130.4	
Eastern hemlock	7.5	133.3	Lat: 41° 38.810′N Long: 80° 8.040′W
Eastern hemlock	N/A	134.1	
Eastern hemlock	8.8	136.3	Tallest hemlock in western PA west of Cook Forest Lat: 41° 38.800′N Long: 80° 8.036′W
Eastern white pine	N/A	110.2	
Eastern white pine	8.5	112.8	
Eastern white pine	7.5	113.1	
Eastern white pine	6.9	119.1	
Eastern white pine	8.2	>127.1	
Eastern white pine	6.5	129.8	
Eastern white pine	N/A	132.3	
Eastern white pine	9.9	134.6	
Northern red oak	11.7	>90.1	
Northern red oak	N/A	98.3	
Northern red oak	N/A	101.0	
Northern red oak	9.5	104.3	
Northern red oak	11.0	>108.1	
Northern red oak	8.9	>109.4	
Northern red oak	10.9	110.2	
Northern red oak	10.4	>114.1	
Northern red oak	N/A	114.3	
Northern red oak	N/A	114.7	
Northern red oak	6.8	115.6	
Pignut hickory	4.3	109.6	

Pennsylvania yellow birch height champion on Cemetery Run. Photo courtesy of Dale Luthringer.

Table of data continues on next page…

Tallest known slippery elm in the northeastern US from Cemetery Run. Photo courtesy of Dale Luthringer.

More from Cemetery Run:

Species	CBH (ft)	Height (ft)	Comments
Red maple	N/A	95.3	
Red maple	N/A	110.4	
Red maple	8.6	>111.1	
Red maple	7.0	>114.1	
Red maple	9.0	119.5	
Red maple	8.5	123.7	Lat: 41° 38.804′N Long: 80° 8.050′W
Scarlet oak	7.8	87.1	Probably 200+ yrs old; burly knots, staghead branching
Slippery elm	3.1	>66.1	
Slippery elm	8.1	131.5	Tallest in NE US, Lat: 41° 38.654′N Long: 80° 8.030′W
Sugar maple	N/A	116.8	
Sugar maple	6.4	117.8	
Sugar maple	7.2	119.1	
Sycamore	N/A	117.8	
Sycamore	11.2	121.9	
Sycamore	N/A	122.9	
Sycamore	10.2	127.4	
Sycamore	13.3	132.1	Lat: 41° 38.586′N Long: 80° 8.068′W
Tuliptree	N/A	100.3	
Tuliptree	N/A	102.3	
Tuliptree	N/A	110.6	
Tuliptree	N/A	116.1	
Tuliptree	8.4	122.6	
Tuliptree	N/A	125.5	
Tuliptree	N/A	129.5	
Tuliptree	N/A	129.5	
Tuliptree	9.1	133.6	
Tuliptree	N/A	133.8	
Tuliptree	9.6	146.6	Lat: 41° 38.663′N Long: 80° 8.021′W
White ash	N/A	109.8	
White ash	N/A	114.3	
White ash	5.3	116.2	
White ash	N/A	117.8	
White ash	5.7	119.5	
White ash	N/A	121.9	
White ash	6.1	122.3	
White oak	14.3	77.3	‘Gamble Oak’
White oak	N/A	95.8	
White oak	9.2	>96.1	
White oak	8.9	>102.1	
White oak	7.3	112	
Witch hazel	1.4	27.6	
Yellow birch	5.0	108.1	Tallest known in PA, possibly in the NE Lat: 41° 38.621′N Long: 80° 8.019′W

A view of Cemetery Run. Photo by Dale Luthringer.

Cemetery Run Rucker Index (RI_{10}) = 129.23 ft

Species	CBH (ft)	Height (ft)
Tuliptree	9.6	146.6
Eastern hemlock	8.8	136.3
Eastern white pine	9.9	134.6
Sycamore	13.3	132.1
Slippery elm	8.1	131.5
Red maple	8.5	123.7
American beech	7.6	>123.1
Black cherry	N/A	123.0
White ash	6.1	122.3
Sugar maple	7.2	119.1

That puts Cemetery Run as the fifth highest Pennsylvania Rucker Index (height) recorded site.

Here's Pennsylvania's Top 10 Rucker Index sites (in feet):

Cook Forest State Park	137.38
Fairmont Park	132.27
McConnells Mill State Park	130.85
Clarion River	129.72
Cemetery Run-Meadville	129.23
Ridley Creek State Park	128.30
Swarthmore College	127.55
Wintergreen Gorge	127.53
Ricketts Glen State Park	126.29
Valley Forge National Park	123.83

Cemetery Run is a very interesting site. If you happen to be in Meadville, and have an extra hour to spend, take a short drive over to the Greendale Cemetery. You will NOT be disappointed!

THE JENKINS TULIPTREE: APRIL 2010

Don C. Bragg

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

Over the years, the Eastern Native Tree Society has been contacted by many private citizens regarding large trees on their property. The following pictures of a large tuliptree are from such an instance—property owners Heather and Harold Jenkins contacted Will Blozan in April of 2009 about this tree. I, being closer to their home, was then contacted to investigate it further. My travel schedule did not permit me to visit the tree until this month, when a conference in Kentucky allowed me an opportunity to travel past the tree. I arranged to meet Heather near their Jacks Creek, Tennessee home, and she showed me this specimen along the small stream that acts as the town's namesake.

The Jenkins Tuliptree is a large, formerly open-grown tuliptree growing on a small flat along Jacks Creek. As can be seen in these pictures, this robustly healthy individual has considerable volume even though it is not particularly tall. A large number of big branches and a stout, gently tapering main bole constitute the bulk of the volume. Though considerably older than most of the second-growth timber in the adjoining woodlot (visible in the background of the first two pictures), this tree has few other obvious signs of extreme old age. Given its large crown, good site, and lack of competition during most of its life, I believe this individual is probably between 150 and 200 years old, and probably originated after the abandonment of a small cultivated field or pasture along the banks of Jacks Creek, perhaps by an early Euroamerican settler to this portion of western Tennessee, or possibly by one of the Native Americans who populated this region prior to 1820.

Heather Jenkins stands next to the Jenkins Tuliptree along the banks of Jacks Creek in western Tennessee. Photo by Don C. Bragg.

The Jenkins Tuliptree is 6.6 ft in diameter and 107.6 ft tall, with a crown spread of about 105 ft. Photo by Don C. Bragg.

The deeply furrowed bark and large, stout branches strongly suggest this formerly open-grown tuliptree is less than 200 years old. Photo by Don C. Bragg.

THE LAGRONE WATER OAK: APRIL 2010

Don C. Bragg

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

As with the Jenkins Tuliptree in an earlier article, the following water oak was identified to the Eastern Native Tree Society by local citizens (although not the landowners). Curtis and Marie Lagrone, noted amateur archeologists and long-time residents of southeastern Arkansas, contacted me about a whopper of a water oak they had found while taking their grandchildren over to see some livestock. I have gotten to know the Lagrones over the years from our involvement in the Arkansas Archeological Society, so they knew of my interest in trees.

I arranged to meet with the Lagrones just outside of the small city of Dumas, Arkansas, which is an agricultural town in the Mississippi River alluvial valley. They took me along the edge of an old cotton field along the banks of Bayou Bartholomew. The Lagrone Water Oak is one of several large oaks clustered around an old homesite (now long since gone). This water oak is stout but relatively short, having survived many decades of exposure to ice storms, winds, and agricultural treatments. The tree is healthy and shows vigorous growth, suggesting that it is not very old.

A check of the Arkansas champion tree register found that the Lagrone Water Oak is very close to state champion size, so I have submitted its measurements (sine height, of course) to the Arkansas Forestry Commission for further consideration.

Curtis and Marie Lagrone pose in front of the Lagrone Water Oak they located near Dumas, Arkansas. Photo by Don C. Bragg.

Top: The rapidly growing Lagrone Water Oak has virtually overgrown a large piece of metal, probably from the original homesite. Photo by Don C. Bragg.

The Lagrone Water Oak is 6.4 ft in diameter and 81 ft tall, with an average crown spread of 93 ft. Note the large burl on the base of the oak. Photo by Don C. Bragg.

ON THE SHAPE OF THINGS TO COME

Robert T. Leverett

Founder, Eastern Native Tree Society

Recently, we have informed members that in the coming weeks we'll be discussing ways to make the Eastern Native Tree Society (ENTS) more effective in taking ENTS to the next level. I mentioned that the Executive Committee (Will Blozan, Lee Frelich, Ed Frank, and yours truly) have been conversing behind the scenes in preparation to propose and solicit ideas for changes. Although Ed is quite willing to fire the first volley, I suppose that legitimately should fall to Will, Lee, or me. So here goes…

One idea that the "Gang of 4" agree on is the need to strengthen the scientific mission of ENTS. We're about niche science—little science. We make contributions along specific and limited lines. We're not in competition with universities, government agencies, private research institutions, etc. We know our niche, but our methodology needs some tweaking. First, we need to separate science from other ENTS activities, and to do, that we need a separate communications channel for science posts. One reason for needing the separation is to be able to insure the quality of the science is recognized by the outside world. Mixing the scientific extension of our measuring mission with other material dilutes the former. Additionally, it is hard for us to maintain a focus on the former when serious science communications are mixed in with the wide spectrum of topics discussed on this list.

Our first effort relates to the transition from a e-mail-based news group to an online bulletin board (BBS). As the instructions indicate, the science forums are moderated. We absolutely need to do this to get back on track with our science mission, but the forum has off-topic categories where you can post freely when you just want to chat. Ed has done an absolutely outstanding job setting up the BBS. We all owe him. We will be sending e-mails to discuss features of the BBS that may help some of you who worry about BBS forums that have many rules and features. I want to take as much load off of Ed as possible. He needs a rest. So I'll close here by saying that our BBS is well very thought out and will be extremely functional. However, for those accustomed to the Google group, it will initially appear more complicated. Please bear with it though, the effort will be worth the switch.

In the way of history, we discussed establishing a science-tree measuring channel in the past, but suspended discussions when it appeared that some members feared being left out—certainly not our intention. Like the Marines, we will not leave any member behind.

I'm unsure if there needs to also be an artistic channel comparable to the scientific one. If enough members want to push the envelope in the artistic direction, serious efforts would probably need to be separated from the general mix of topics. Not now, but eventually.

Realize that there's a limit on how far we can efficiently extend the strategy of multiple communication channels. Pointing to the need for a science channel and maybe eventually an artistic one is not a backdoor of opening ENTS up to over-specialization. As stated, there's a limit to how many separate channels would benefit us.

Ed also mentioned the possibility of a committee structure to allow for broader participation by members. Our ideas here must be kicked around a bit within the Gang of 4, but the idea has lots of merit. It would make ENTS more participatory and prevent the appearance of ENTS as a two-tiered organization: a small elite core and everybody else. ENTS was never intended to be that way. On the other hand, we never thought very deeply about how an organization of 350+ independent minded folks would need to be handled compared to what we started with—a small core of tree measuring gurus who shaped ENTS through the intensity of their interests and devotion to filling a niche.

I'll conclude by saying that I enjoy the camaraderie on the list and its free-wheeling nature. I trust that is apparent from my posts. I enjoy the free, non-moderated form of the list—except where there is an important scientific or documentation mission (or perhaps artistic) needing to be fulfilled. The mixing of a hardcore science and documentation thread with topics covering literature, cuisine, and movie preferences dilutes the value and relevance of the former. A solution to the loss of our scientific-measuring focus must be found without compromising other values.

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:

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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 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 differing 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 (including year).

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. Do not hyphenate text or use a multi-column format (this will be done in the final printing). 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 use either 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. Diameters 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 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 (United States 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. 15) or Leverett (2006, p. 16-17). Longer quotations (those more than three lines long) should be set aside as a separate, double-indented paragraph. Papers by unknown authors should be cited as Anonymous (1950), unless attributable to a group (e.g., ENTS (2006)).

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:

Kershner, B. and R.T. Leverett. 2004. The Sierra Club guide to the ancient forests of the Northeast. University of California Press, Berkeley, CA. 276 p.

Website:

Blozan, W. 2002. Clingman's Dome, May 14, 2002. ENTS website http://www.uark.edu/misc/ents/fieldtrips/gsmnp/clingmans_dome.htm. Accessed June 13, 2006.

Use the hanging indent feature of your word processor (with a 0.5-in indent). Do not abbreviate any journal titles, book names, or publishers. Use standard abbreviations for states, countries, or federal agencies (e.g., USDA, USDI).

ACCEPTED SUBMISSIONS

Those who have had their submission accepted for publication with the *Bulletin of the Eastern Native Tree Society* will be mailed separate instructions to finalize the publication of their work. For those that have submitted papers, revisions must be addressed to the satisfaction of the editor. The editor reserves the right to accept or reject any paper for any reason deemed appropriate.

Accepted materials will also need to be accompanied by an author contract granting first serial publication rights to the *Bulletin of the Eastern Native Tree Society* and the Eastern Native Tree Society. In addition, if the submission contains copyrighted material, express written permission from the copyright holder must be provided to the editor before publication can proceed. Any delays in receiving these materials (especially the author contract) will delay publication. Failure to resubmit accepted materials with any and all appropriate accompanying permissions and/or forms in a timely fashion may result in the submission being rejected.

A heavy blanket of snow covers Stafford Meadows in Massachusetts' Mohawk Trail State Forest. Photo by Robert T. Leverett.