Pockets Full of Forest

Locating, investigating, and documenting remnants of old growth forests and pockets of otherwise rare or unusual forests in Pennsylvania

By Edward Forrest Frank, January 29, 2010

Introduction

One of the goals of the Eastern Native Tree Society http://www.nativetreesociety.org is to locate and document areas of exemplary forests found in the eastern United States. These include among other aspects remaining tracts of old growth forest and pockets of otherwise unusual forests. This presentation provides some ideas and approaches toward accomplishing this goal. Several sites from Pennsylvania are used as examples, but similar considerations are applicable to small pockets of forest wherever they might be found.

Background

In Pennsylvania in the 1600's the vista from almost any point would have been an endless sea of trees. However during the late 1800's through the early 1900's, the virgin forests here in Pennsylvania and across much of northeastern United States were all but eliminated. Forests were cut for timber, the land was cleared for farming and development, and large areas were disturbed by mining operations. A history of the Moshannon State Forest http://www.dcnr.state.pa.us/Forestry/statefore sts/moshhistory.aspx describes what once was present:

> *"White pine and hemlock stands occupied the shady slopes and moist plateaus in the earliest recorded forests in the region. Many areas were covered with a mixture of beech, yellow poplar, birches, maples, oaks, cherry, hickory and chestnut. Some of the best white pine in the U.S. grew here in the stands that sometimes approached one hundred thousand board feet per acre. According to Conrad Weiser in 1737, "The wood is so thick, that for a mile at a time we could not find a place the size of a hand, where the sunshine would penetrate, even on the clearest day."*

At that time over 90% of the state was forested. Today only about 60% (17 million acres) of Pennsylvania is forested, but very little of it can be considered primary forest or old growth forest. What old growth or primary forest that is still left is typically found in small pockets scattered across the state. To see a broader perspective of the relationship between geography over time and the area of "virgin forest", see maps below:

Maps from the English Wikipedia; Source of 1620, 1850, and 1920 maps: William B. Greeley, The Relation of Geography to Timber Supply, Economic Geography, 1925, vol. 1, p. 1-11. Source of TODAY map: compiled by George Draffan from roadless area map in The Big Outside: A Descriptive Inventory of the Big Wilderness Areas of the United States, by Dave Foreman and Howie Wolke (Harmony Books, 1992).

History of Forest Utilization

The Allegheny National Forest website provides some details on the history of forest utilization in the Allegheny Plateau region http://www.fs.fed.us/r9/forests/allegheny/about/history/ (accessed 11-09-2009). The same story applies as well to most of Pennsylvania and the rest of northeastern United States:

> *"Two hundred years ago, the forest in northwest Pennsylvania was mostly Eastern hemlock and American beech, with white pine along river bottoms and oak on the slopes of river valleys. Black cherry accounted for less than one percent of all trees on the Plateau. This old-growth forest was characterized by large trees and fallen logs… the understory vegetation was dense and richly diverse.*
>
> *European settlers reached this area in the early 1800s. At first, trees were cut mostly to clear land for agriculture and provide timber for cabins and barns. Soon, the first commercial water-powered mills cut small amounts of lumber from selected pine, hemlock and large hardwoods. By 1840, portable*

steam engines made circular sawmills practical, and mills that could process 10,000 board feet of lumber per day were common.

Tanneries that used hemlock bark as their source of tannin for curing leather began to appear in the late 1850s. This infant industry received a great boost by the Civil War demand for harness, military equipment and industrial belting. By the end of the century, the tanning industry was a major forest industry in Pennsylvania using huge quantities of hemlock bark. The logs were removed later and sawn into lumber products.

MODERN LOGGING SCENE

Photo from Shoemaker (1914)

Between 1850 and 1900, American society and technology changed in dramatic ways. People, moving West and in the growing cities in the East, demanded lumber to build homes, stores and furniture. Demand for paper and other wood pulp products increased. An eighty-fold increase in coal production led to the need for more lumber for mine props, timbers, and planks. Band saws came into use after 1880, making possible the construction of huge mills capable of sawing 100,000 feet or more of lumber per day. Railroads provided convenient transportation to consumers and markets. They also opened up extensive and previously inaccessible areas of timber with specialized locomotives such as the Shay which could traverse steep hillsides, uneven tracks and sharp curves. All of these factors supported large sawmill and tannery industries.

A new enterprise, the wood chemical industry, changed the course of forest development. Between 1890 and 1930, wood chemical plants produced charcoal, wood alcohol, acetic acid, acetate of lime and similar products, and provided a market for virtually every size, species and quality of tree growing on the Allegheny Plateau. Harvests during this era were the most complete ever made in the area, clearing nearly every accessible tree of every size.

The once vast forest of the Allegheny Plateau was almost completely removed, leaving barren hillsides as far as the eye could see.

Many large corporate forest landowners in Pennsylvania and other northeastern states simply abandoned the land and moved West in search of new forests. The land left behind often

ended up on delinquent tax rolls, prompting a financial crisis for rural counties. The bare soil and logging slash made floods and wildfires a constant danger.

In 1911, Congress passed the Weeks Act, allowing the federal government to buy land in eastern states for the establishment of National Forests.

The Allegheny National Forest was established in 1923. The land was so depleted that many residents jokingly called it the "Allegheny Brush-patch". Some worried the forest would never recover."

NEW ORDER OF THINGS

Photo from Shoemaker (1914)

Not all of the forest was cut at the same time. By the end of this intense period of logging, many of the forests cut early in the process had since regrown. These same forests were then cut a second, third, or even fourth time. After World War I the Pennsylvania's forest area reached its historical minimum of about 13 million acres. Much of this forest land was poor quality second growth woodlands, dramatically different from the original cover of virgin forests found in the state. Wildfires were very prevalent at this time. Today, in many areas a healthy forest still cannot grow in some areas impacted by these forest fires because the original rich forest soils were destroyed by the intense fires. With such a history of utilization, and a forest diminished from it, the importance of understanding what made the original forests of the northeastern so healthy and productive cannot be understated.

What is Old Growth?

An enormous volume of materials published promoting various definitions of old growth forest. An excellent overview of the complexities of these issues is presented in a paper entitled "Perspectives on development of definitions and values related to old-growth forests" by Frelich and Reich (2003). These detailed arguments in the Frelich and Reich paper are beyond the scope of this presentation, but a couple of basic working definitions will serve to provide a useful framework.

A Primary forest or natural heritage forest is a: "Forest with a continuous heritage of natural disturbance and regeneration. In North America this usually means that the forest was not cleared for agriculture or heavily logged for timber by Native Americans or by European settlers. ..in many parts of North America large-scale logging is a recent phenomenon and stand ages

greater than the dates of first logging can be used to establish primary status." (Frelich and Reich, 2003)

The term old growth itself, as opposed to primary forest, is subject to debate and carries a degree of baggage with its usage. Old growth is still, however, an important part of the public lexicon and cannot in fairness be ignored. The following generalized definition of old growth is suggested as a basis for discussion:

> *A primary characteristic of an old-growth forest is that it contains a substantial percentage of old trees which are generally late-successional species for that particular region or environmental regime. These forests should also exhibit characteristics of only a limited human impact, but the level of that impact must be considered with respect to other forests in the region. Canopy openings formed by natural processes are often found within the larger old-growth forest. (Frank, 2006)*

There are a number physical characteristics that are common to most old growth forests and can be used as guidelines when trying to identify whether a forest is old or not. Some of these characteristics include: 1) Presence of old trees; 2) Minimal signs of human disturbance; 3) Mixed age stands; 4) Canopy openings; 5) Pit and mound topography, 6) Standing snags; 7) Coarse woody debris; 8) Thick organic soil layer. A second approach deals with the structure of the forest. A nice summary of many of these structural characteristics are presented in a file from the Ontario Extension Notes: http://www.lrconline.com/Extension_Notes_English/pdf/oldgwth.pdf

Why Are Old Growth Forests Important?

Old growth forests have a value beyond their simple aesthetic appeal. Most importantly they represent a reserve of genetic material. The old trees growing in these forests have often survived hundreds of years of competition with other trees. They have survived changes in climate, periods of drought, and infestations of insects. The genetic legacy they hold may be the key to preserving many species with the advent of global warming. There are aspects of old growth forests that are of interest to a wide variety of people. They may contain rare species or yet undiscovered species of plants and animals. They are examples of complex ecosystems that are not fully understood. They are a laboratory in which the effect of natural processes on forests can be compared to the effects of timber management. If an individually large old growth forest contains these important genetic elements, then collectively, the aggregate of many smaller old growth patches must also contain these same genetic reserves and reflect portions of a larger, no longer existent, old growth ecosystem.

Schall's Gap NA Hemlock - This hemlock was reportedly cored by graduate student from the Penn State University Forestry School in the winter of 2000-2001 and was determined to be 550 years old. Similarly Ed Cook has cross-dated cores taken from a 555 year old and a 511 year old hemlock from the Tionesta research Area in 1999. (photo by Ernie Ostuno)

How Do You Distinguish Old Trees?

If a primary characteristic of old growth forests are old trees, then how can old trees be distinguished? It is impractical and undesirable to take tree core samples of every tree in a forest and count their rings to determine their age. Many old trees are partially hollow and cannot be fully dated. However, there are other characteristics that can be used to estimate the age of a tree or forest section. Old trees are often larger trees compared to others in the vicinity. In a particular area it is a fair bet that if all the other growing conditions are comparable, then the larger trees will be the oldest trees. However, size by itself is not an infallible indicator of advanced age. Often the oldest specimens of a particular tree may be nondescript in size or even stunted. In the Niagara Escarpment Area of Ontario there are 1600 year old northern white cedar that are rarely over twenty feet tall growing among the cliffs.

Shaggy bark on an old cucumber tree (photo by Edward Frank)

Balding on an old hemlock tree (photo by Edward Frank)

Top of a white pine, Heart's Content Scenic Area. (photo by Edward Frank)

Bark characteristics are particularly useful. The bark of a tree changes as the tree ages. In fact identifying the tree species by its bark may be difficult in very old trees because of these changes. In general, the bark becomes much thicker as a tree ages. The bark in some trees will also peel and take on a shaggy look reminiscent of shagbark hickory. Old red maple commonly exhibits this characteristic, but it is just one example among the many species that may develop this shaggy appearance. A final characteristic of bark on old trees is called balding. Essentially in portions of the tree, generally near the base, the thick heavy old bark will flake off leaving a smoother surface behind. One side of a tree may have thick, heavily furrowed bark, while the other may exhibit balding.

The pattern of branching is another indication of age. Older trees have existed for a long period of time and have been subject to damage from wind and weather. The branches and tops of the trees often exhibit twisted or gnarled branches. Higher branches are often noticeably thick and heavy. They may form club-like shapes, or shapes with near right angles as main leads were broken and side leads took on the task of further growth. Some trees have tops that resemble clumps of broccoli. With experience one learns to recognize the changes in proportions associated with aging in a species.

Preacher arms on a hemlock in Cook Forest State Park (photo by Edward Frank)

Another characteristic of old trees is the presence of reiterations or “preacher arms” in the trees. These are branches that have after a short outward segment turned upward and are growing vertically acting as a secondary trunk. These are more common in conifers than hardwoods. Once it has been determined that old trees are present in a stand, it might be worthwhile in some cases to core date select trees from the site to confirm the age estimates.

There Are No Pristine Forests

If the criteria for defining old growth forest ideally pristine, totally unaffected forest, then we do not have any old growth forests in the eastern United States. Even if the trees in an area were never cut, they have been impacted by human activities. In the 1920’s and 30’s chestnut blight devastated the American chestnut population. It was a species that in some places represented 90% of the basal area of the forest. More recently we have had the gypsy moth, emerald ash borer, and hemlock wooly adelgid all exotic invasive species, all introduced by human activities that are killing large numbers of trees and in some cases threatening to destroy entire species of trees and their related ecosystems. Other introduced species of plants and animals are displacing native populations.

Large areas of land are continuing to be logged. Vast areas of land are being cleared for residential and commercial development. Alternate clearing and forest regrowth has been the predominant pattern of European-American settlement. Superimposed on this clearing and regrowth sequence are deleterious impacts associated with industrialization. The effects of acid rain can be seen across the eastern seaboard.

A pragmatic/practical approach to determining old growth status, given these influences, would be to evaluate a particular forested site to determine what characteristics it retains of the idealized primary old growth forest and to balance those findings against a baseline of how

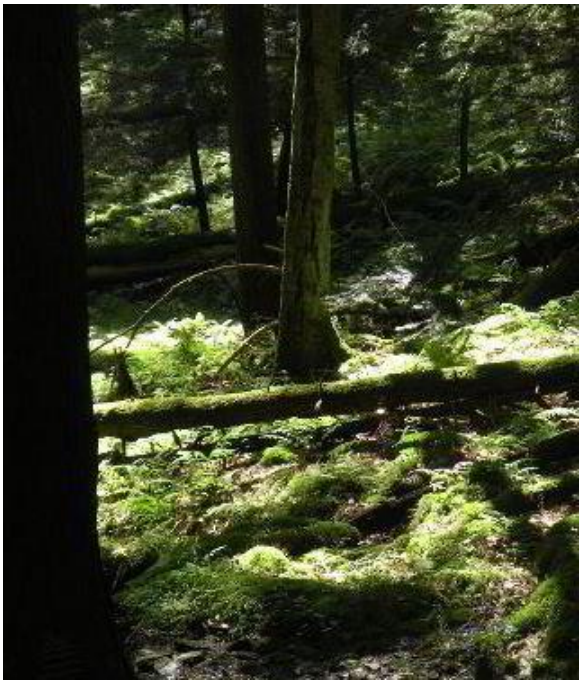
much impact is acceptable for a forest to be considered old growth. Since there is a wide variation in the degree to which forests have been impacted across the eastern United States, this baseline needs to be developed in the context of forests in the local region. For example, European presence in eastern New York and New England dates o the early 1600s. Much of the Cross timbers of eastern Oklahoma were still in virgin condition in the mid-1800s.

How Much Old Growth and Primary Forest Is Left?

A Pennsylvania Department of Conservation and Natural resources website http://www.dcnr.state.pa.us/wlhabitat/forest/oldgrowth.aspx (accessed 11-09-2009) gives the following summary:

Today, the Pennsylvania Bureau of Forestry administers 1,580 acres of old growth forest on its lands. In Allegheny National Forest in northwestern Pennsylvania, the Tionesta Scenic and Research Natural Areas along with Hearts Content encompass 3650 acres of virgin forest. Old growth in state parks or private lands in patches ranging from 35 to 5000 acres and include large barren areas in the Poconos and elsewhere as well as hemlock-hardwood forests such as the Woodbourne Forest in Susquehanna County (200 acres), and the hemlock forest at Ricketts Glen State Park (2000 acres). Total old growth acres in the state, including the pine-scrub oak barrens sites, exceeds 30,000 acres total (< 1.0% total forest land) (Davis 1993, Davis 1999) However, most old growth forest sites occur small patches of less than 500 acres (Davis 1993).

Looking casually at this summary gives a false impression of the abundance of old growth forest in the state. Yes, there are a few larger stands present: Tionesta Scenic and Scientific Area 3500 acres, Rickett's Glen State Park at 2000 acres, Cook Forest State Park at 2296 acres, and "large barren areas in the Poconos and elsewhere." The key point to be made here is that while there are many sites that have a tiny patch of old growth forest, most of these forest patches are indeed tiny.



Cook Forest State Park, PA (photo by Edward Frank)

The two old growth sites in Pennsylvania best known by the public are Cook Forest State Park and Heart's Content Scenic Area. Old growth areas in each are designated as National Natural Landmarks. "Out of 7000+ acres that comprise Cook Forest, 2,296 acres have been classified as old growth forest encompassing nine different old growth stands." (Luthringer, 2009). This is a larger chunk of old growth. Heart's Content is a

different story. In the mid 1800's, a 20 acre parcel was protected from logging by the Wheeler and Dusenbury Lumber Company. In 1934, the virgin timber area and 102 acres of the land surrounding it was designated a "Scenic Area" by the Chief of the Forest Service. Heart's Content is only a fraction of the size of the old growth area at Cook Forest. It is more typical of the size of most of the old growth pockets left in Pennsylvania. http://www.fs.fed.us/r9/forests/allegheny/recreation/camping/heartscontent/

The following table is a listing of some of the other old growth sites found in Pennsylvania as listed by the Pennsylvania Department of Conservation and Natural Resources and some sites discovered and documented by members of the Eastern Native Tree Society.

Some examples of various smaller sites listed in various Pa DCNR websites and others that have been documented by ENTS members.

Why Do These Pockets of Old Growth Forest Exist?

There are only a few reasons why these pockets of forest were never cut. One reason is that the land was in private ownership and the landowner did not want it cut for some reason. Cook Forest and heart's Content are both examples of this rationale. Most of the timber around the Cook Forest Area was logged by the Cook and Son's Lumber Company formed by John Cook in the 1830's. The primary forest within present day Cook Forest State Park was the last of forest in the Cooksburg area scheduled to be harvested. It was located adjacent to the Cook Homestead. Anthony Wayne Cook and a number of other prominent men formed the Cook Forest Association in 1917 to raise money to purchase the land from the other shareholders in the company and to set the property aside to be preserved for future generations. The area at heart's Content surrounded a family hunting lodge before it was set aside.

A second reason that small pockets of forest survived was due to boundary disputes. There were occasional disagreements as to where boundaries between properties lay. Under the timber laws there were severe penalties and fines for cutting trees on someone else's property. So if there was a boundary dispute, these areas were often not harvested for fear of these penalties.

A third reason was that in some cases it was impractical because of the terrain for the trees to be harvested profitably. Some examples of this might include the forests growing on the steep slopes in narrow canyons. Dale Luthringer, Environmental Education Specialist at Cook Forest, and ENTS researcher has documented several examples in narrow canyons in and around the Lake Erie escarpment in northwestern Pennsylvania.

A final reason for not harvesting a forest patch was that the trees on a site were of poor quality and not suitable for lumber. These forests include many of the stunted and twisted forest growing on rocky slopes and talus piles in mountainous areas of the state or in other scattered locations.

Unusual Forests

In addition to primary forests and old growth forests are other types of forest that deserve special consideration. Many of these examples below might include sections that could be considered old growth depending on the definition of old growth is used.

1) Unusual assemblages: This category would include forests with an unusual assemblage of trees and other plants. Lee Frelich has talked about the Rock Elm forest in Minnesota near the boundary between prairie and forest. Other such forests might include those growing in various types of barrens in which the assemblage is restricted by the geologic conditions.

2) Mixed Conditions: We should also consider those forests such as are growing in a mixed condition like trees in swamp setting or trees in desert setting. These are not what we would normally consider a forest, but they are a vital part of the ecosystem. The old growth post oak systems in the cross- timbers areas of Oklahoma and Texas are a good example of this type of assemblage.

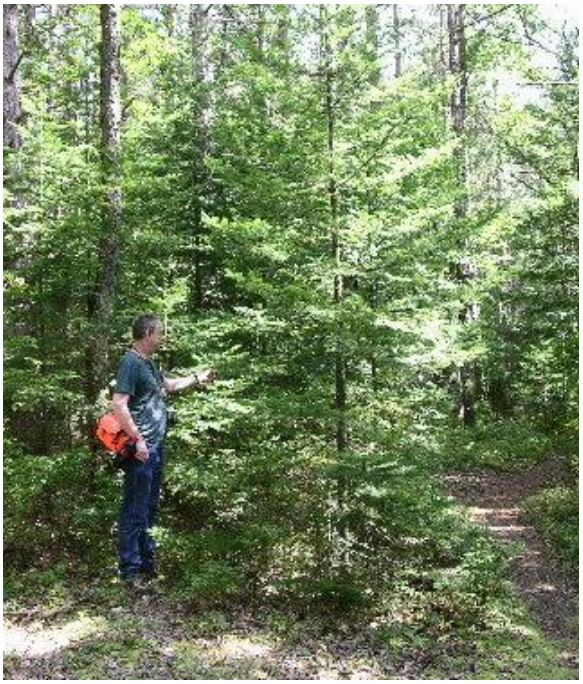
Classic example of a stunted pine forest growing atop Mt. Everett, in Massachusetts (photo provided by Gary Beluzo)

3) Forests with character: This is a somewhat subjective category, but a forest segment with these characteristics would likely be recognized by a wide number of people. The term "aged with adversity" has been used and this is really the focus of this characteristic. Don Bertolette wrote, "some of the oldest trees of several species that come to mind (foxtail pine in the Sierra Nevada's, bristlecone pine in the Sierras and White Mountains., western juniper) are growing on relatively depauperate sites, in environmentally extreme climatic conditions." So we have the concept of trees that have character because they have been aged by adversity. This would include many of the stunted forests growing under harsh environmental conditions. The age of these trees may not be easily apparent hidden by their unusual form, and certainly they are not

large for the species, but they do have character.

4) Forests with unusual structural complexity.. This structural complexity often comes in two forms: accumulated biomass and geologic. Older forests tend to have complex structures in the form of nesting cavities, snags, coarse woody debris, moss, tip-up mounds etc. Forests of any age growing on boulder fields or other rocky situations also have an abundance of complex structural features for wildlife to utilize. Structurally complex forests often are synonymous with "primary" and "old-growth" forests but not always.

5) Relict woods. These are forest patches with assemblages of species representative of a previous climatic regime. These are characterized by disjunct populations separated from their typical range by a large distance.



A disjunct population of Balsam Fir is found at Black Moshannon State Park – likely a naturalized population escaping from a planted specimen rather than a true native population. (photo by Edward Frank)

6) Understory: Certainly the character and composition of the understory of the forests is also worth considering when suggesting that something is unusual or uncommon. I want to include in this listing those forest sections that deserve consideration and discussion about whether they fit this category.

7) Forests with relatively intact ecosystems. With the ecosystems of many of the forests being under assault by invasive species and direct and indirect human impacts, those forests with relatively intact and functional ecosystems should be considered unusual and worth documenting.

These unusual forests are important for a number of reasons, besides simple aesthetics. Dr. Lee Frelich wrote (December 6, 2008): *"I think unusual forests are important because they may have covered millions of acres in the past, and may again in the future. For example the elm forest of Minnesota which probably now totals only a few hundred acres, covered the southern half of MN, WI, and most of IA, IL and IN 11,000 years before present. It may also be the forest of the future when the climate changes."*

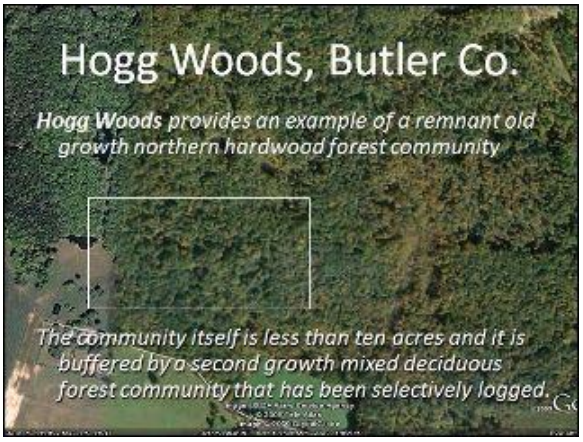
Some Examples of Small Pockets of Forest

Hogg Woods, Butler County, PA

Hogg Woods is described in the Butler County Natural Heritage Inventory document prepared by the Western Pennsylvania Conservancy http://www.naturalheritage.state.pa.us/CNAI_P

DFs/Butler%20County%20NHI%201991%20WEB.pdf:

> ***Hogg Woods*** *provides an example of a remnant old growth northern hardwood forest community (NC015) which is located northeast of Slippery Rock. This community is dominated by American beech (Fagus grandifolia) and is one of two examples of a climax forest in the county, the other one being Deshon Woods in the Butler quadrangle (p. 107). For this reason, it is frequently used as an outdoor laboratory by Slippery Rock University biology classes. The community itself is less than ten acres and it is buffered by a second growth mixed deciduous forest community that has been selectively logged.)*



On the photo above the area of the biggest trees in the stand as marked by the coarser texture are outlined by the white box. On the topographic map Hogg Woods is located in a stream valley head surrounded on three sides by strip mines. A site visit http://www.nativetreesociety.org/fieldtrips/penna/20090610-hogg/20090610-hogg.htm found an old overgrown road, possibly once a mine haul road cutting across the valley. Much of the area was wet with poor drainage. The original drainage patterns in the area had be disrupted by the old mining operation and no longer drained freely. Off to one side was a bright orange bottomed stream flowing into the bottom. The orange is indicative of acid mine drainage, Fe(OH)3 precipitate in particular.

Large beech tree at Hogg Woods with Carl Harting for scale (photo by Edward Frank)

The most impressive trees at the site were the beech trees. They were massive; perhaps they are simply remnants that had not been cut when the rest of the area had been logged. It is also possible that they have grown since the logging, but this seems unlikely. Looking in the area we found a number of stumps. In addition to the beeches there was only one tree of size in the area, a red maple 10’2” in girth and 102

feet tall. The rest of the trees were small and none gave an appearance of age. The area had been logged at some time in the past. Measurements of a few of the larger beeches:

Hogg Woods		
Species	CBH (ft)	Height
American Beech	10.3	101.5
American Beech	10.5	108
American Beech	8	102
Red Maple	10.9	102

Many of the beech trees showed a large amount of decay around their bases. One large specimen had fallen within the last year or so and was lying amidst the others. I think this may be due to the general dampness of the site as a result of changes to the drainage patterns by the mining operations. In the immediate area of the beeches the stream itself had been altered. A high levee had been built up on the one side of a stream to keep it in its channel. This channel modification might have kept large amounts of runoff from the strip mine from flowing directly into the flats, but at the same time it prevented water in the flats from flowing into the stream. There are many of the larger beeches that still appear to be healthy, but their long term future is cloudy. The area has been severely impacted by the mining, there is the problem of beech bark disease in the population as a whole, and on top of this the land is owned by three different absentee land owners.

What makes this site especially complicated is determining if the area is indeed a pocket of old growth. It appears that the area was selectively logged leaving the beech behind. This does not eliminate it as an old growth area as some of the original trees are still present, provided the beech trees really are old. The problem is how to determine the age of the beech trees. Beech trees have smooth bark which does not become thicker, more furrowed, or shaggy as do many other trees. Coring of the trees is not a viable solution as most of the large beech trees, if not all, at this site are hollow. There is not even a good understanding of how the appearance of beech trees changes over time because of the limited amount of core data available for the species.

This tree is located in Brookville, PA. The verses carved into the "Bible Tree" were carved around 1910 – 100 years ago. The tree must have been big at that time for it to have been chosen- Likely ate least 50 years old. Girth 10.2 feet, Height 89 feet. (photo by Edward Frank)

The oldest cross-dated example listed on the eastern Old-list http://people.eku.edu/pedersonn/oldlisteast/ for the species is only 204 years old from

Backus Woods, Ontario, Canada. Abrams and Orwig (1996) reported a beech 275 years old from Cook Forest based upon ring counts. Hough and Forbes reported a beech 366 years old based upon ring counts from the Tionesta area. It is possible that the beech trees in the Sylvania Wilderness in Michigan may be approaching 400 years. So it is possible that these are really old beech trees, but there also is the possibility that they date from the period since the area was first logged. I just don't know. Perhaps a core could be obtained from the large red maple in the stand if it is not hollow.

Plain Grove Fen, Lawrence County, PA

The Lawrence County Natural Heritage Inventory document http://www.naturalheritage.state.pa.us/CNAI_PDFs/Lawrence%20County%20NAI%202002.pdf prepared by the Western Pennsylvania Conservancy (31 MB) contained a brief description of the wetland:

> *Plain Grove Wetlands BDA*
>
> *Plain Grove wetland rates as one of the most significant wetlands in Lawrence County both in terms of its rarity and overall quality. The wetland area hosts a complex of seepages and fens with fourteen plant species of special concern, including a globally rare plant species…. Surrounding uplands feature young forests with canopy species typically including white oak (Quercus alba) and red oak (Quercus rubra) with young black cherry (Prunus serotina), hawthorn (Crataegus spp.) and an understory of American hornbeam (Carpinuscaroliniana) and dogwood (Cornus florida). Other low abundance species present are red maple (Acer rubrum), black gum (Nyssa sylvatica) and green ash (Fraxinus pensylvanica).*

This was not exactly what we found when we visited the area. Instead of a young forest with smaller trees, the site contains a large number of large oaks and sugar maples of some age. http://www.nativetreesociety.org/fieldtrips/penna/20090610-plaingrove/20090610-plain.htm

Aerial photo of the Plain Grove Fen site

The area we visited is located in the upper portion of this aerial photo of the overall site. We parked near the outlet of the mine haul road and headed into the woods from along the road a few hundred yards west of where we parked. Immediately we encountered a large tree. It was a white oak snag still standing 81 feet tall with a girth of 13 feet, just below the roadway.

Large white oak at Plain Grove Fen (photo by Edward Frank)

Old sugar maple at Plain Grove Fen showing balding of the bark (photo by Edward Frank)

It was one of several large white oaks and a black oak we measured in that immediate area. There were swampy areas near the base of the slope filled with black mud and skunk cabbage. At the bottom of the slope was a shallow free flowing stream perhaps 20 feet wide with a cobble bottom.

On the far side of the stream on the edge of the stream bank was the first of many large sugar maples we encountered. This was a magnificent specimen standing 92 feet tall with a girth of 10.8 feet. The trunk of the tree showed a high degree of balding and had numerous bumps. From this tree we could see many more large trees extending up the slope and to both the left and right. One of the best finds here was a large black cherry, 10.1 feet in girth and 102 feet tall.

Looking at the data we measured 17 different species of tree. We measured 12 trees over 10 feet in girth, representing five different species, with several more trees and species just short of the 10 foot barrier.

Plain Grove Fen		
Species	CBH (ft)	Height
Red Oak	13	108.5
White Oak	12.5	81
White Oak	12	90.5
Black Oak	11.9	102
White Oak	11.7	95.5
Red Oak	11.4	110
Sugar Maple	10.8	92
Red Oak	10.8	114
Sugar Maple	10.6	84
Red Oak	10.5	113

This is an example where there was a written description of the site available, but that description did not match what was found at the location. Carl Harting learned of this site by talking to a local forester and actually visiting the site rather than simply writing it off based upon an inaccurate report. As with any good site, once we arrived the goal was to measure and photograph as many different types of trees we could find on the site, and to measure and photograph the largest trees we could locate on the site. With a site of this quality a single visit is not adequate to document the forest and additional trips to the area are planned.

Six Mile Run, Moshannon State Forest, Centre County, PA

I became aware of this section of old growth in trip report by Gary Thornbloom of the Moshannon Chapter of the Sierra Club about a hike along the Allegheny Front Trail http://pennsylvania.sierraclub.org/moshannon/OTT/OTT04-5AlleghenyFrontTrail.htm he wrote:

> *Large rhododendron and hemlocks form a canopy over the path. Here the trail uses two sections of old logging railroad grades. According to Ralph Seeley in Greate Buffaloe Swamp this small grove of hemlock giants survived only because they were along a disputed property boundary. The penalty for cutting your neighbors trees was quite severe. This resulted in numerous stands of trees not being cut and we now have many small glimpses of the forest that once was. The AFT soon comes out on Route 504.*

I visited the site in May 2009 http://www.nativetreesociety.org/fieldtrips/penna/20090519-sixmile/20090519-sixmile.htm The trail starts on the east side of a of a bridge on Route 504 where it crosses Six Mile Run. It crosses a short plank bridge over a side stream and immediately jogs left to bypass an A-Frame camp and heads up the hill and then after a gain of 100 feet of elevation or so it turns right to parallel and follow Six Mile Run upstream. This level path follows along the base of a scree slope and is overhung by large Great Rhododendron bushes. After a short distance the trail drops back down to stream level and continues to follow the run upstream. The trail after a short distance rises over a shallow prong and again drops to the stream level. It is here that the small remnant of older trees is found.

Old hemlocks growing along Six Mile Run, oshannon State Forest, PA (photo by Edward Frank)

There aren't many of them. There are six to eight large hemlock trees growing in a flat area a hundred feet wide along the stream. The area is dissected by old stream channels and is generally populated by Great Rhododendron, many smaller hemlock trees, yellow birch, and scattered other species. The larger hemlocks are all under a hundred feet tall and 8 to 10 feet in girth. The largest hemlock was 95.1 feet tall and 9' 5" in girth. Another one nearby likely would have been taller, but its top had broken out and the tree was dying.

These would not even be notable in a place like Cook Forest with hundreds of large hemlocks, but here among the smaller trees they really stood out. There was a distinct jump in size between these individuals and the many smaller hemlocks in the area which leads me to believe these are indeed a small remnant pocket from the pre-logging era. Ideally with the limited number of old and large hemlocks present, each of the individual trees should be measured and documented– a practice not widely implemented, but crucial to a complete description and full documentation.

Area of scree slope along Six mile Run, Moshannon State Forest (photo by Edward Frank)

Beyond this flat area the trail climbs and turns to the left up a side valley and eventually leads to the hilltop above. Much of this section of the trail crossed a scree slope of generally loose flat stones from cobble to flagstone sized on a comparatively steep slope. Most interesting is the assemblage of plants growing on these slopes. Huckleberry and bracken fern are the predominant small plants growing on the scree surface, There are some small trees sprouting in the rock slope, generally yellow birch and hemlock, with scattered black cherry, red maple, oak, and white pine. There are clumps of rhododendron. For the most part much of the scree surface is fairly open. Where trees are present their leaf litter allows for some soil formation atop the loose rocks. These form little islands of plant growth among the rocks. Those pine and hemlock trees present are squat

in form and the green branches extend all the way to the ground. I don't really know how old any of these trees are without any core data, but some of them could predate the logging operations.

Even if the individual trees are not that old, this type of forest could be primary forest mediated by fire frequency and represent an old growth dynamic system. How many places are there where there are primary forests, old forests, or old growth forest systems where the trees are growing in generally poor conditions? Perhaps they were not logged because of the poor quality of the wood, or because of the terrain upon which they are growing. If they are not gigantic in size, or extremely dwarfed and gnarled, perhaps we are simply not noticing them? How many poor looking, moderately stunted, old forests are growing places that we simply have not noticed? I don't know if this is an example or not, but it could be.

Mount Logan Natural Area, central PA

Mount Logan is a state forest Natural Area located in central Pennsylvania just south of the town of Lock Haven. The location is described on the PADCNR website as: "A 512-acre tract features an old growth eastern hemlock stand and an outcrop of Tuscarora sandstone, both near the summit." I revisited Mt. Logan Natural Area on June 04, 2009 accompanied by Lin Greenaway. Lin is an ENTS member and a forester with the Pa. Bureau of Forestry. http://www.nativetreesociety.org/fieldtrips/penna/20090605-mtlogan/20090605-mtlogan.htm

Stunted white pine growing atop Mt. Logan (photo by Edward Frank)

What most impressed me was not the somewhat stunted white pine and hemlocks atop the mountain, but were the bent old trees growing on the massive talus slope on the south side of this east-west oriented ridge. Some of the trees on the summit were reportedly cored to ages over 200 years. Many of the trees growing in the talus slope are in my opinion every bit as old as those at the top, if not older. The talus consists of quartzite rocks from cobble to boulder sized, generally ranging from 2 to 6 across and flattened. The talus piles are at approximately the natural angle of repose for material at 42.4% (23 degrees). This means that the pile is for the most part stable, with only a slow amount of creep occurring over time.

Stunted white pine growing in the Mt. Logan talus slope. (photo by Edward Frank)

Birch tree growing in the talus slope of Mt. Logan (photo by Edward Frank)

There is limited vegetative cover on much of the talus slope on the southern side of the ridge and scattered open barren areas. On this talus are the dominant tree species in the short canopy were birch (Betula sp.), red oak (Quercus rubra), red maple (Acer rubrum), chestnut oak (Quercus Montana), and white pine (Pinus strobus).

In the understory striped maple (Acer pennsylvanicum) and mountain laurel (Kalmia latifolia) were prominent. It was surprising that red oak was more common in the talus slope than chestnut oak. American chestnut (Castenea dentate) was also fairly common in the understory. Many other species including cherry, common serviceberry or juneberry (Amelancher arborea), black gum (Nyssa sylvatica), and butternut (Juglans cinerea) were present in lesser numbers or occasionally on the talus slope. Near the top on the south side were a scattered handful of eastern hemlock and even sassafras. Ground cover in the talus field was sparse. There were various lichens growing on the rocks themselves – rock tripe, reindeer moss – and various other unidentified crustose, squamulos, fruticose, and foliose lichens. Some species can only be identified through chemical analysis. Various mosses,

patches of huckleberry, hay scented fern, currants, and Virginia creeper were also present on tiny pockets of soil. These trees have the appearance of age and are stunted. This is another example of an old growth or primary system that commonly is not recognized as such because the trees present are not of commercial value.

I am not sure how we should be dealing with sites dominated by stunted trees. Some of the trees that have the most character, the ones that appear to be among the oldest, are neither the largest nor the smallest of the trees present. A standard practice for sites with normal sized tree is to develop a Rucker Height index. This is the numerical average of the maximum height of each of the ten tallest species on as site. A Rucker Index could be developed for just the talus slope area, but with the irregular heights I am not sure what is gained by this process. The focus on height for sites like these does not seem to be meaningful. There really needs to be some better way the evaluate sites with old but stunted forests than we have in our repertoire presently. We already know the trees are stunted overall, what is gained by measuring a series of trees with differing degrees of how stunted they might be? On these severe sites, maybe the lack of signs of human direct disturbance should be the primary criteria for assessing old growth status.

Sixteen Mile Run, Erie County, PA

On Monday, September 21, Dale Luthringer, Rob Frank, and I visited Sixteen Mile Run.

Dale Luthringer had previously documented some impressive trees in other examples of narrow canyons in the Lake Erie Escarpment. These include Wintergreen Gorge, Six-mile Run, Walnut Creek, and Elk Creek.. From air photos on Google Earth, this site looked like it has similar potential and it had not been visited by ENTS previously. We arrived at the meeting place at the intersection of 89 and I90 at around ten o'clock and headed to the gorge. We entered the upper end of the western branch of the complex just south of a gold course. I will avoid the suspense and say that the canyon had been cut previously and we did not find any really big trees. You can't win them all. The canyon was a beautiful walk. The one highlight of this trip was the presence of some old looking stunted trees along the upper edge of the steep and narrow canyon.

I wanted to include this in the discussion because it demonstrates that people must go out into the field and ground truth their assumptions about the potential or lack of potential for large trees or old-growth in a particular area.

Marion Brooks Natural Area, Elk County, PA

Marion brooks is a 979 acre natural area that contains a unique stand of paper birch. In the latter part of the 1800's the entire region had been logged. By around 1912, the area was a wasteland of barren and eroding hills. Repeated fires took place among the branches, brush, and tree tops left behind after the logging operation. These frequent and intense fires burned across the area and devoured even the organic materials in the soil, leaving behind a mineral soil with virtually no organic content. It was in this soil that a few pioneering species, like paper birch were able to establish a foothold, where nothing else would grow. As a result of these fires the area is today occupied by an almost pure stand of paper birch (*Betula papyifera).* Overall in the purest stands around 90% of the mature trees present were paper birch. The floor of the woods was covered by a carpet of green bracken and blueberry. Serviceberry was indeed present and red berries were growing on the trees when I last visited the site in July 2009. Beyond that the most common trees present were sassafras (*Sassafras albidum)* and serviceberry. I was surprised at the number of sassafras present. It usually is not that common of a species in the forests around here. Sassafras was also commonly present in the shallow herbaceous layer. Other trees that were relatively common were red maple (*Acer rubrum)*, red oak (*Quercus rubra)*, and witch hazel (*Hamamelis virginiana*). Scattered small white pine (*Pinus strobus*) grew here and there. Less commonly found were black cherry (*Prunus serotina*), white oak *(Quercus alba)*, and pitch pine (*Pinus rigida*). I found a single cucumbertree *(Magnolia acuminata)* just as I was leaving.

The overall distribution pattern of the trees is very patchy. The cluster of paper birch near the parking area occupies about 10 acres. Surrounding this area dominated by paper birch are areas of trees where oaks and maples are more common and generally larger in size. In other areas the ground is open with only an occasional tree. These are generally occupied by blueberries and to a lesser extent by bracken ferns.

Paper birch splays at Marion Brooks Natural Area (photo by Edward Frank)

The paper birch trees are mostly splaying multitrunk clusters of trees. This likely indicated that after the paper birch first sprouted after the initial wave of intense fires, another fire took place. This second fire was less intense but burnt the newly growing paper birches off at ground level. Afterwards they resprouted from the surviving roots forming these multitrunk clumps. Some reports have suggested that the paper birch trees are dying out as they are reaching the end of their natural life spans. There are open areas within the paper birch dominated area where birch trees have died and fallen. There are fallen tree trunks on the forest floor. I do not believe that they are generally dying because they are reaching the end of their normal life span. There is the normal thinning of the trees over time. What birch trees that are dying are doing so for a variety of reasons. It is common for individual trunks in a multitrunk clump to be lost over time as the other trunks become more dominant. Many of the larger trees seem completely healthy. There are single trunked trees growing that also appear to be doing well.

The problem seems to be not that the paper birch colony is dying from old age, but that they are not being replaced by younger trees. Indeed none of the trees currently growing regardless of species are being replaced by younger trees. Most of the trees in the stands are in the 80 to 100 year old rage. The youngest trees growing I would guess are at least thirty years old. Given the stunted nature of the trees overall they could even be older. What would normally be the sapling “layer” of the forest is generally empty. It is likely that the bracken ferns are inhibiting the growth of new trees and a new fire would be required to reinitiate paper birch growth in the stand.

It is clear from historical accounts that this area had been logged in the past and that a series of fire that developed after the logging operation created the conditions that formed this interesting paper birch forest. What bothers me in these discussions about primary forests and old growth forests is the question of whether this site is qualitatively different in composition than would be a site that had undergone a severe fire without having been logged first? Is there any substantive difference between the two results, and if not, are we making arbitrary distinctions between these forest types?

Presque Isle State Park, Erie County, PA

The park occupies a peninsula that juts 2 miles out into Lake Erie forming a curved spit about 6

miles total in length. Presque Isle is the most visited state park in the state because of a series of popular beaches facing Lake Erie.

I visited the park on August 24, 2009. The park consists of a series of dune ridges separated by low lying marshes and lagoons. The Erie County Natural History Inventory (1993) prepared by the Western Pennsylvania Conservancy for the Erie County Department of Planning outlined the vegetation present on the peninsula.

> *East of Long Pond, within the road that encircles the sandspit's interior, a considerable portion of the sandspit's interior natural communities remain in essentially pristine condition. Generally speaking, the natural communities on the sandspit are progressively older toward the Presque Isle Bay side and on the western end of Presque Isle Peninsula. The result is a mosaic of natural communities (i.e., habitats) supporting a diverse assemblage of flora that represents a continuum of successional seral stages, tending from palustrine ponds and bays (i.e., hydric) to a terrestrial (i.e., xeric) climatic climax community (Kormandy, 1984; 1969).*

The oldest and largest trees I located on this trip were found along the Old Ridge Trail. None of them were exceptionally impressive in size, but this section might be considered to be old growth forest.

Ridge Pond, Presque Isle State Park (photo by Edward Frank)

What caught my imagination were the many stunted and gnarled trees growing elsewhere, especially along the Dead Pond Trail. These oak, cherry, and sassafras trees showed evidence of harsh weather with twisted and bent branches, but were generally small in size. I do not know if these are old or not. A permit would be needed to core some of the trees and get a better idea of the age ranges of the trees growing along various dune ridges in the park. The other aspect of interest is the extensive shrub forests growing along the edges of the interior ponds and marshes. Many of these are potentially quite old and may include specimens that are notable in size for their species. This is

another area ripe for research in the heart of the most visited state park in Pennsylvania.

Where to Look for Pockets of Old Forest

These pockets are scattered across the state in a wide variety of settings. Problems with boundary locations can be present anywhere. Other potential locations for pockets of old trees include:

- Atop and within narrow canyons
- Remnants in swamps and marshes
- Barrens, including shale barrens, pine barrens, serpentine barrens
- Rocky talus and steep scree slopes
- Rock “cities” and islands
- Rocky cliffs
- River Islands
- Old private estates
- Churchyards and cemeteries
- Parks – city, county, state, and national

Lake Erie area canyon (photo by Dale Luthringer)

Dale Luthringer has found a number of pockets of old tree in the narrow canyons around Lake Erie. Other known locations around the state also are found in narrow, steep walled canyons with relatively small flow volume streams in their bottoms.

Old growth at Conneaut Marsh (photo by Dale Luthringer)

Swamps and marshes were generally logged, but there are still small sections found in many of them, along their edges, or on islands within swamps. There are a number of barrens in which trees are often thinly scattered, nearly absent, or stunted. These are often related to the chemistry and character of the bedrock. Shale barrens and pine barrens are fairly common. Many of these have been logged to

some degree, but they may contain patches where the trees were not logged because they were small and stunted.

Serpentine Barrens grassland in southeastern PA

Serpentine barrens and a few others are a direct result of the chemistry of the weathering products of the bedrock being toxic to trees. These are limited in extent, but trees growing around the edges of these rock outcrops are often small and stunted and may be quite old.

Trees growing on a talus slope at Mt. Logan Natural Area (photo by Edward Frank)

Old trees can be found growing in talus and scree slopes as cited in the examples of Mt. Logan Natural Area, and within Moshannon State Forest cited above. There are likely many more similar examples that simply have not been noticed and discovered yet.

Rock City at Beartown Rocks, Clear Creek State Forest (photo by Edward Frank)

An interesting phenomenon is the existence of rock cites and islands. These are large bedrock blocks that sit in clusters in a valley or hillside. The tops of these blocks contain unusual assemblages of trees and other plants as they are not subject to browsing by deer. Old trees often grow among ad around these rock features. Steep rocky cliffs with rock ledges may also form a home for pockets of old forest. In fact the 1600 year old white cedar trees are growing on the rocky cliff sides in Niagara Escarpment.

Courson Island, Allegheny River Islands Wilderness (photo by Edward Frank)

River Islands may preserve pockets of forest. The Allegheny River Islands Wilderness is one example. Some of the islands were in the past farmed, cattle grazing took place in the 1800s, and perhaps some trees were removed. But for many of the islands these impacts were limited to just small sections or had only a limited long term impact on the forest cover of the island. Most of these impacts have been washed clean by annual flooding in the years since they were abandoned. The old growth forest at Cook Forest State Park and at Heart's Content is pockets that were under private ownership until they were donated to the state to be preserved. There are still many large private estates around that may contain areas of forest that have never been logged. The difficulty is to get permission to explore these forests from their owners.

An enormous white oak at the Old Union Church in Philipsburg, PA (photo by Edward Frank)

Individual old trees and smaller pockets of trees may be found in old cemeteries and churchyards. Generally these trees survived because it was deemed inappropriate to harvest them from the sacred ground or resting places. Finally there are often pockets of old

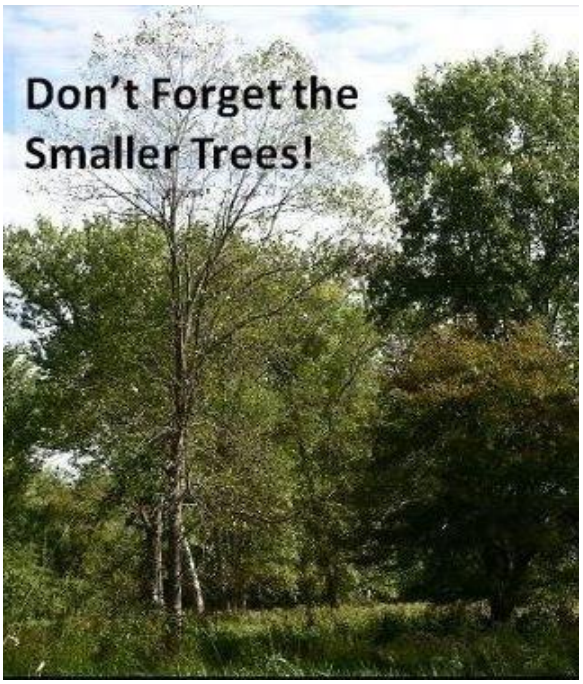
forest in existing parks. Some of these patches are known, but others have not been documented or recognized.

Urban parks are often a haven for unrecognized patches of old forest. George Fieo recently wrote about Pennypack Park, in Philadelphia County, PA. http://groups.google.com/group/entstrees/browse_thread/thread/389e0716d604eb9a?hl=en He writes: *"The park stretches nine miles along Pennypack Creek, for which the park is named after, from the Delaware River to the city's border with Montgomery Co. The park was established in 1905 and contains 1,395 acres, nearly all of it is wooded."* Within this park, in essentially an urban area, were tuliptrees over 150 feet tall, and dozens of old trees with heights over 100 feet and girths over ten feet.

Pennypack Park, Philadelphia County, PA

In other situations when evaluating the nature of old growth in an urban area consideration must be given to the context of those remaining patches of forest. In general those forests closer to or within urban areas have been among those most heavily impacted by human activities and utilization. Most forests in the immediate vicinity of urban zones have typically been cut at least several times in their history; any forest section that contains some old-growth characteristics is extremely rare and should be considered valuable and worth documenting and preserving. (Frank, 2009)

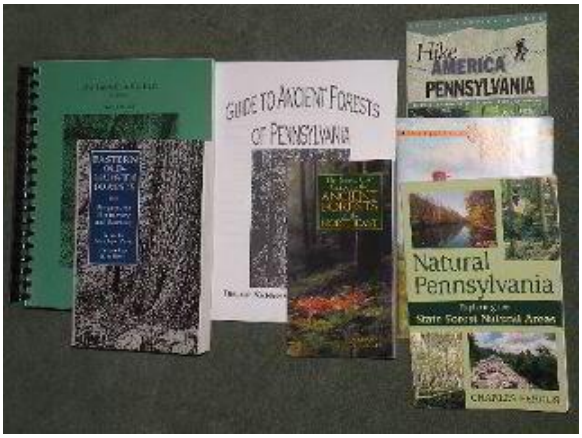
Often the areas with big trees are well known, but those with smaller trees may not be recognized. The old stunted oaks around Little Round Top at Gettysburg National Military Park are examples of old growth existing in a park, but not yet adequately documented. Large areas of shorter oak dominated forest in Shenandoah National Park and the Blue Ridge Parkway in Virginia are old growth forests with trees well over two hundred years old, but are not designated as such on the park maps, and likely are not considered as such n terms of planning either. These areas need to be documented and their extent outlined so that they may be managed properly.



When looking at these forests one thing to remember is to not just look at the biggest trees, but look at the smaller tree species as well. They are part of the matrix of the forest that needs to be documented. The smaller tree in the foreground is a dotted hawthorn on King Island, in the Allegheny River Island Wilderness. It is just under forty feet in height. It has more big tree points than the current national champion for the species, but could easily have been overlooked in the excitement of measuring the tall silver maples and sycamores on the island.

Sources of Information

One of the best sources for information on the location of these small pockets of forest is other people. Talk to people who spend time in the woods. They might include: Foresters, hunter, Hikers, farmers, fishermen, old timers, birders, wild flower enthusiasts, or anyone else who spends time in the forest.



Secondary sources of information are books and published article. A selection of books for old growth in the east and in Pennsylvania in particular is shown above. These examples include:

1. Old Growth in the East – A Survey, by Mary Byrd Davis
2. Eastern old Growth Forests – prospects for Rediscovery and Recovery – edited by Mary Byrd Davis
3. The Sierra Club Guide to Ancient Forests of the Northeast – by Bruce Kershner and Robert Leverett
4. Guide to Ancient Forests of Pennsylvania – by Bruce Kershner (not in print)
5. Hike America Series: Hike Pennsylvania – by John L. Young
6. Natural Pennsylvania: Exploring the State Forest Natural Areas – by Charles Fergus
7. Pennsylvania Game News – this magazine has published several article on old growth forests in Pennsylvania.

In Pennsylvania there is the Pennsylvania Natural heritage Program. http://www.naturalheritage.state.pa.us/CNAI_Download.aspx Reports are available for downloading detailing sites of biological

interest are available for 56 of Pennsylvania's sixty-two counties.

> *"County Natural Heritage Inventories showcase WPC's conservation science efforts by combining and presenting information on unique plants, animals, natural ecological communities, and other important natural resources in Pennsylvania. These projects identify, map and discuss important places within a county, prioritize them based upon their attributes, and provide recommendations regarding their management and protection.*
>
> *County Inventories are designed to inform the residents of a county about their living heritage and give them a tool to use in planning the future of their communities. County and municipal planners; federal, state and local agencies; businesses; environmental consultants; developers; local conservation organizations; and many other people and groups use these studies to help make land-use decisions within their counties. With increasing emphasis on planning within the state, these studies will become more and more important for considering the resources of the commonwealth wisely and comprehensively. County Natural Heritage Inventories are snapshots of the known biological information available to PNHP at the time of the study and, therefore, some areas may have been overlooked."*

Those in the western part of the state were prepared by the Western Pennsylvania Conservancy, while those in the eastern portion of the state were generally prepared by the Pennsylvania Science Office or the Nature Conservancy. They vary in length and detail, but are an invaluable resource.

Internet Resources

Search on the internet for the terms old growth forest and the location of interest. There are many search engines available:

1. Metacrawler http://www.metacrawler.com
2. Google http://www.google.com
3. Yahoo http://www.yahoo.com

Typically the results will provide a wide variety of references, some of which are useful. In Pennsylvania there are a number of official websites for the Department of Conservation and Natural Resources that talk about old growth in the state:

1. Auto Tour of Old Growth Forests in PA http://www.dcnr.state.pa.us/FORESTRY/oldgrowth/index.aspx
2. Old Growth Forestry In Pennsylvania http://www.dcnr.state.pa.us/wrcp/keynotes/summer99/growth.htm
3. Websites for individual parks and forests detail old growth forests in their boundaries

In addition there are pages from Allegheny National Forest, The Nature Conservancy, the Western Pennsylvania Conservancy, the Sierra Club, the Easter Native Tree Society, many newspapers, and numerous individual reports. There are a couple of nice articles by Marcia Bonta, a well know naturalist writer, http://marciabonta.wordpress.com/2004/11/ who writes a monthly column for the Pennsylvania Game News. All of these provide

locations or information that can warrant further exploration.

Other useful tools available on the internet are various map resources. Sites like Google Maps, Google earth, Map Quest, Terraserver-USA all provide surface maps, topographic maps, or air photos of the entire state. Areas of interest can often be seen with enough detail to distinguish individual trees.

1. Google Maps http://maps.google.com
2. Google Earth http://earth.google.com
3. Mapquest http://www.mapquest.com
4. Terraserver-USA http://www.terraserver-usa.com

There are other mapping resources available, but these are a good place to start.

Long Term Prospects

What are the long term prospects of these sites? Some of them are protected within existing parks and preserves. They are surrounded by younger forests that can serve as a buffer to direct human impacts. Indirect impacts will still affect them, but they have a good prospect for longer term survival. If the chance happenings of fire and winds do not destroy these sites in the short term, their prospects for survival are good. They can potentially serve as the core and seed source for an old growth ecosystem to develop over time in the surrounding younger forests. Others are small in size and have been impacted to such an extent that their survival for much longer is unlikely. Many of these small forest pockets fall somewhere between these two extremes. For these forest pockets their future is a matter of the choices we make. If we chose to give them some protection from development and logging, if we set aside buffers for these pockets, they may survive and flourish. In the smaller pockets some more active measures may need to be taken where invasive species are removed, and some native species replanted. These types of active measures are working well for several small community based conservation groups. On a broader scale we as a people need to determine what we want to do in terms of forest management and wilderness preservation. Only time will tell what will eventually happen.

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