A study of the
MIXED MESOPHYTIC, WESTERN MESOPHYTIC,
AND OAK CHESTNUT REGIONS
of the
EASTERN DECIDUOUS FOREST
including

A REVIEW OF THE VEGETATION
and
SITES RECOMMENDED AS POTENTIAL NATURAL LANDMARKS

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for
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A study of the MIXED MESOPHYTIC, WESTERN MESOPHYTIC, AND OAK CHESTNUT REGIONS of the EASTERN DECIDUOUS FOREST including

A REVIEW OF THE VEGETATION and SITES RECOMMENDED AS POTENTIAL NATURAL LANDMARKS

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INTRODUCTION

When the European settlers came to America, they found an almost continuous forest interrupted only by a few grassy meadows and other barren patches. These deciduous, or "summer green", forests extended from central Florida northward beyond the Great Lakes, and in some places westward beyond the Mississippi River. The climate varies with latitude, proximity to oceans, and in a few places with altitudes over 6,000 feet. All of the area is subject to temperatures below freezing at least some time during the year. The annual precipitation is well distributed throughout the year, and is greater than potential evaporation. To the early settlers these forests looked somewhat familiar because they found many new species of oaks, maples, beech and aspen, that they knew from Europe, along with hickories, tulip trees and magnolias that they had never seen before. Interest in plants on the new continent turned to taxonomy, and many botanists spent part, or all of their time collecting, pressing, and naming the new-found treasures. Unfortunately, there are few records of the abundance of the different plants, the kinds that grew together, and their importance and location in the total forest.

To most of the early settlers, the forest was not of botanical or ecological interest, but was an enemy of the people. It hid Indians and snakes, and occupied land needed for their
European type of agriculture. They therefore set out to de¬
stroy the forest as fast as possible. They used a few of the
trees for building materials, and burned the fallen logs, or
allowed them to decay without use.

When the pioneers pushed across the Appalachians, those
forests at first escaped destruction because the land they oc¬
cupied was not suitable for farming. It was not until after
the advent of continuous railroads in the mid-to-late 19th cen-
tury, that the forests in the mountainous regions faced destruc-
tion by being cut for lumber. This cutting, often followed by
burning, continued until the first part of the 20th century,
when a few people began to wonder if there would be any forests
left. At the same time, the remnants of the eastern forests
were being eliminated to make room for expanding cities and in-
dustries. At the present time there are few virgin forests east
of the Mississippi River, and even only small amounts of second-
growth forests left.

We could sit back and bemoan the loss of our beautiful for-
est, or we could get to work to save and restore parts of them.
The ecologists do not recommend destroying cities, farms, and
industries, and returning to a completely forested eastern U.S.
They would like to see a good balance between people and their
activities on the one hand, and natural plants and animals on
the other. They recognize that we do have a "people oriented"
society, but also that the continued destruction and pollution
of our natural environment, including the forests and their
animals, could eventually destroy the people themselves.

Fortunately, fragmentary and disturbed forests, if left alone, and if given enough time, will proceed through stages of secondary succession toward a stabilized condition similar to the original forests. If they are restored before all the native animals are eliminated, the forests will again build a balanced animal population. There is a forest at Spangler's Spring in the Gettysburg Battleground that has been little disturbed since the battle more than a hundred years ago. Pictures from that time show a sad remnant of a battered forest. Today majestic trees and a beautiful forest occupy the spot. It is possibly not yet like the forest the first settlers saw there, but given several hundred years more, it should be. If we were soon to select and preserve other forests, even disturbed and fragmentary ones in early or middle stages of succession, we could again see forests similar to the original ones. This process would be speeded up if we could find and preserve the few spots of virgin forest, or select those locations already in late stages of succession.

If we are to make the best possible use of our lands, we must know what these lands were, or could be, without the interference of man. We need to know what plants can grow in a given area, so that we may best evaluate our manipulations of forests, as well as the use we make of other land. But in all scientific experiments there must be a control, against which to judge the results of experiments. Natural areas that are
left as free as possible from human interference should be our controls. Such natural areas would be of great educational value as natural outdoor museums where the elements and combinations of the plants, animals, and minerals are displayed and enjoyed. The cultural value of natural areas is assuming increasing importance in a world crowded with cities and pollution, where space and privacy are becoming rare.
THE MIXED MESOPHYTIC REGION

The key to the understanding of the entire Eastern Deciduous Forest lies in the Mixed Mesophytic region at its center. This forest region, as mapped by E. Lucy Braun in 1950, occupies all of the unglaciated Appalachian plateau, except the northern part in central Pennsylvania, and the extreme southern part in Georgia and Alabama, where the oak-hickory-pine forests are present. The eastern boundary of this forest region is distinct, and coincides with the Allegheny and Cumberland fronts, for most of their length from southern Pennsylvania through Tennessee, except in the central part near the Virginia-West Virginia border. In this central part, the ridge and valleys are crowded very close to the edge of the plateau. The vegetation in this central part shows a gradual change from mixed mesophytic vegetation to the west, and oak-chestnut to the east. The western boundary of the mixed mesophytic region coincides with the western escarpment of the Allegheny and Cumberland plateaus. The northern boundary is indefinite, because of a large transition area between this region and the hemlock-northern hardwoods to the north in central Pennsylvania, but is somewhat evident along the major streams in the unglaciated sections of northwestern Pennsylvania.

Until the time when Dr. E. Lucy Braun started her intensive study of the vegetation of this region in the early nineteen thirties, there had been very little ecological work on the natural vegetation of this central portion of the Eastern Deciduous
Forest. Most such work had been done around the edges, particularly at the northwestern edge, where a concentration of early American ecologists under the direction of Henry C. Cowles, Frederic E. Clements, and their students, were working in the early years of the century. They made an attempt to apply principles acquired in these regions, to other places, less known to them. One of their ideas, that an undisturbed forest would be dominated by a very few, usually two, genera of trees, was in common usage, and the forests of west Virginia, Kentucky, and Tennessee were called Beech-Maple. Certainly beech and maples are an important part of these forests in the center of the big eastern deciduous forest, but there are many other important species there.

Dr. Braun showed us that the starting place in understanding this forest as a whole, is in its center, where a large part of all species in the total forest are to be found. There are more than twenty tree species in this region, that sometimes together, and often in a grouping of something less than the total, are the dominants of the natural vegetation. Other sections of the big eastern forest have certain of these species as their dominants, but lack many of the others, possibly because growing conditions are progressively less favorable in all directions from the center. The climate to the south gets progressively hotter, and consequently drier; climate to the north gets progressively colder with a shorter growing season and less mature soils, often of glacial origin. Places westward have less precipitation and higher temperatures. Large areas southward and
eastward, have recently emerged from under the ocean, and still have immature soil and poor drainage. Besides the present favorable conditions for plant growth in central portions of the forest, the center is the place where the ancient tertiary forests have existed for the longest period of time, a refuge from advancing glaciers and changing ocean levels.

The mixed mesophytic forest is best developed in the Cumberland Mountains, where it occupies the largest part of the total land area. There is a general impoverishment of the forest, outward in all directions from the center, especially to the north and west, where this type of forest is dovetailed with the adjacent climax regions. Eastward, the limits of the mixed mesophytic are more abrupt. Outside of the area mapped as mixed mesophytic, there are examples of vegetation that resemble the mixed mesophytic in many favorable habitats, especially in the coves of the southern Appalachian Mountains, and in the valleys between the ridges in Virginia, Maryland, and Pennsylvania.
TABLE I
Plants of Ecological Significance in the Mixed Mesophytic Forest Region

(Rearranged from Braun (1950), with revisions of nomenclature to conform with that used by Fernald (1950)) except where authorities are given

I. Trees
   A. Large Trees
      1. Major components and often dominant
         Basswood, *Tilia heterophylla*, *T. floridana*, *T. neglecta*
         Sweet buckeye, *Aesculus octandra*
         Beech, *Fagus grandifolia*
         Sugar maple, *Acer saccharum* and *A. nigrum*
         White oak, *Quercus alba*
         Tulip tree, *Liriodendron tulipifera*
         Chestnut, *Castanea dentata* (No large trees of this species left because of blight, but root sprouts occasional to abundant)
         Red oak, *Quercus rubra* (*Q. borealis var. maxima Ashe*)
         Hemlock, *Tsuga canadensis*
      2. Variable abundance and/or local
         Cucumber tree, *Magnolia acuminata* (never dominant)
         Red maple, *Acer rubrum* (usually a small tree, but sometimes much larger)
         White ash, *Fraxinus americana* and *F. americana var. biltmoreana*
         Silverbell, *Halesia monticola* (Rehd.) Sarg. (In southern Appalachians only)
         Birch, *Betula lenta* and *B. lutea* (*B. allegheniensisBritt.*)
Black cherry, *Prunus serotina*

3. Often present, but never abundant

Hickories, *Carya cordiformis, C. ovata, C. tomentosa*

Sour gum, *Nyssa sylvatica*

Black walnut, *Juglans nigra*

White walnut, *Juglans cinera*

4. On food plains and/or along stream banks

Sycamore, *Platanus occidentalis*

Sweet gum, *Liquidambar Styraciflua*

River birch, *Betula nigra*

Willow oak, *Quercus phellos*

Pin oak, *Q. palustris*

Swamp white oak, *Q. bicolor*

September elm, *Ulmus serotina*

Willows, *Salix* spp.

Silver maple, *Acer saccharinum*

Cottonwood, *Populus deltoides*

5. Trees of other regions found in special habitats in the Mixed Mesophytic

Red Spruce, *Picea rubens* (Near top of high mountains over 4,200 feet in W. Va.)

Scrub pine, *Pinus virginiana*

Pitch pine, *Pinus rigida*

Yellow pine, *Pinus echinata*

White pine, *Pinus Strobus*

Chestnut oak, *Quercus prinus* (*Q. montana* Wild.)*

Black oak, *Q. velutina*
Scarlet oak, *Quercus dociinea*
Black jack oak, *Q. marilandica*
Post oak, *Q. Stellata*

**B. Small Trees**

1. Never a canopy tree

Dogwood, *Cornus florida*
Magnolias, *Magnolia tripetala, M. macrophylla,* and *M. Fraseri*
Red bud, *Cercis canadensis*
Sourwood, *Oxydendrum aboreum*
Service berry, *Amelanchier canadensis*
Hop hornbeam, *Ostrya virginiana*
Ironwood, *Carpinus caroliana*
Striped maple, *Acer pennsylvanicum*
Holly, *Ilex apaca* (can be a canopy tree in certain locations)

**II. Shrubs**

A. Generally present and abundant

Pawpaw, *Asimina triloba*
Spice bush, *Lindera Benzoin*
Alternate-leaved dogwood, *Cornus alternifolia*
Witchhazel, *Hamamelis virginiana*
Wild hydrangea, *Hydrangea arborescens*

B. More or less widespread

Common elder, *Sambucus canadensis*
Mountain camellia, *Stewartia ovata*
Buffalo-nut, *Pyrularia pubera*
Prickley gooseberry, *Ribes cynosbati*
Maple-leaved viburnum, *Viburnum acerifolium*
Hercules'-club, *Aralia spinosa*
White alder, *Clethra acuminata*
Strawberry bush, *Euonymus americanus*
Burning bush or wahoo, *Euonymus atropurpureus*

**C. Dominant in many situations and absent in others**
Great rhododendron, *Rhododendron maximum*

**D. Shrubs associated with dry or rocky hilltops where chestnut oak is the dominant tree**
Mountain laurel, *Kalmia latifolia*
Azaleas, *Azalea* spp.
Blueberries, *Vaccinium* spp.
Trailing arbutus, *Epigea repens* (A small ground cover)
Wintergreen, *Gaultheria* spp.

**III. Vines**
Present but never numerous
Virginia creeper, *Parthenocissus quinquefolia*
Grapes, *Vitis* spp.
Climbing bittersweet, *Celastrus scandens*
Trumpet creeper, *Bignonia capreolata*
Dutchman's pipe, *Aristolochia durior*

**IV. Ferns**
Goldie's fern, *Dryopteris Goldiana*
Broad beech fern, *Dryopteris hexagonoptera* (*Phegopteris* Fee.)
Interrupted fern, *Osmunda Claytonia*
Maidenhair fern, *Adiantum pedatum*
Glade fern, *Athyrium pycnocarpon*
Silvery spleenwort, *Athyrium thelypteroides*

V. Herbaceous Plants

A. Spring blooming flowers

Large flowered trillium, *Trillium grandiflorum*
Purple trillium, *Trillium erectum*
Yellow adder's tongue, *Erythronium americanum*
Large yellow lady's slipper, *Cypripedium Calceolus var. pubescens*

Violets, *Viola* spp.
Bloodroot, *Sangunaria canadensis*
Wood poppy, *Stylophorum diphyllum*
Dwarf larkspur, *Delphinium tricorne*
Waterleaf, *Hydrophyllum* spp.
Scorpion weed, *Phacelia bipinnatifida*
Blue phlox, *Phlox divaricata*
Synandra, *Synandra hispidula*
Lance-leaved, *Anemone lamifolia*
Wood Anemone, *Anemone quinquefolia*
Rue Anemone, *Anemonella thalictroides*
White baneberry, *Actea alba*
Blue cohosh, *Caulophyllum thalictroides*
Spring beauty, *Claytonia virginica*
Spring beauty, *Claytonia caroliniana*
Squirrel corn, *Dicentra canadensis*
Dutchman's breeches, *Dicentra Cucullaria*
Bitter cress, *Cardamine Douglassii*
Foam Flower, *Tiarella cordifolia*

B. Fall blooming flowers

*Aster*, *Aster cordifolius* and *A. divaricatus*
Blue-stem goldenrod, *Solidago caesia*
Goldenrod, *Solidago flexicaulis* (*S. latifolia* L.)
White snakeroot, *Eupatorium rugosum*
MIXED MESOPHYTIC
CUMBERLAND MOUNTAIN SECTION

A thorough understanding of the vegetation of the Cumberland Mountain section in the mixed mesophytic region is essential for an understanding of the total forest. Because Dr. Braun did the major part of the research in this region, most of the descriptions and interpretations of vegetation, are those of her publications (1935, 1937, 1940, 1942, 1950). Fortunately there were still some virgin forests in the area at the time she was working there. Since that time, most of these forests have been destroyed by cutting or burning, and may never be the same again. The original species are still there in the forest fragments, and theoretically, forests like the original ones could again grow there if left undisturbed. However, it might take centuries to do this in locations where fire and erosion have removed the soil that originally took long periods of time to develop. That is why it is so imperative to find and save any virgin tracts, as well as others in which the soils have been less damaged.

The Cumberland Mountains occupy a strip 150 miles long, and 25 miles wide, on the southeastern edge of the Cumberland plateau in Virginia, Kentucky, and Tennessee. Its largest, and most characteristic part is a great fault block of conglomerate with some upturnings at the edges. Its edges are almost vertical at places, forming Pine Mountain, Stone Mountain, Rocky Face Mountain, and others. Altitudes of 2,500 to 3,000 feet are common. This exceptionally high part of the plateau is more than a 1000 feet
higher, and much more dissected than the normal plateau to the west of it. A deep melanized soil is characteristic of most of the area, except on dry slopes and ridges. Thornthwaite (1964), gives the water balance data for Williamsburg, Kentucky, in this area, as an annual precipitation of 1248 mm. (49.1 in.), well distributed throughout the year with surplus of 455 mm. in the months from November through May, and a deficit of only 9 mm. from June through October. This gives excellent water conditions for growing plants in the area.

A mixed mesophytic forest of superlative quality once covered most of the slopes of the Cumberland Mountains. Table I gives lists of plants and their relative importance in the total mixed mesophytic region. Various combinations of the dominant trees show some correlation with altitude, and degree and direction of slope, and consequently with moisture conditions. In general, there are three kinds of forests in the Cumberland Mountains: (1) those composed of only deciduous trees, (2) one that contains some hemlock along with certain hardwoods, and (3) forests on sites much drier than usual in the area, which contain or are dominated by species of drier regions elsewhere.

The All-Deciduous Forests

Eight trees of potentially large size made up 60% to 76% of these forests on the south slopes, and 78% to 93% on other slopes (Braun 1950, p.67) in a number of forest stands in the Cumberland Mountains. These trees were sugar maple, basswood,
red oak, tulip tree, beech, white oak, sweet buckeye, and chestnut. By 1930, almost all of the chestnuts were infected with the blight, and by now, all the large chestnut trees are dead. The species is still represented there by root sprouts, which flourish until again infected by the disease. Other trees, which because of their smaller size and fewer numbers, are usually not dominants, are American ash, cucumber magnolia, sour gum, black walnut, white walnut, red maple, and chestnut oak. Other small trees including dogwood and ironwood are abundant, and red bud, service berry, and hop hornbeam occur less frequently. Rhododendron is never present, except along streams. The shrubs generally present in these woods are pawpaw, spice bush, alternate-leaved dogwood, witch hazel, and wild hydrangea. Others more or less widespread are listed in Table I. The herbaceous vegetation is exceedingly rich and varied. There are many showy plants that bloom in the spring before the deciduous trees are in full leaf. (Table I). Fall-blooming plants are less abundant. Most of these herbaceous plants root in the porous, friable, melanized soil, and are usually absent or much less abundant in other kinds of forests.

The all-deciduous forests are the most characteristic type in the mixed mesophytic region, but they show considerable variation, depending on their location. Some of these combinations of species are so regularly correlated with certain kinds of slopes at certain altitudes, that Dr. Braun calls them "association segregates".
One of these is the sugar maple-basswood-buckeye association segregate which is usually found at 1500 feet to 2000 feet, and up to 2500 feet to 3000 feet. Sugar maple is more abundant toward the upper altitudinal limits, and basswood and buckeye more abundant at the lower limits. The tulip tree is almost always present, and sometimes in abundance. The forest is composed of widely spaced large trees of three- or four-foot diameters, with many spring flowers under them. The soil is deep and dark. This type of forest was regular and common in the Cumberland Mountains, but much less common, usually on north facing slopes, outside of the Cumberland Mountains.

Another association-segregate is one in which beech is the dominant, often making up 58% to 72% of the canopy, with small amounts of sugar maple, tulip tree, basswood, buckeye, and other trees. This kind of forest, which is never extensive in the Cumberland Mountains, is located in ravines and valley flats. There are not many herbaceous plants associated with this forest. A beech-white oak, or a white oak-beech forest, depending on which species is more abundant, occupies southerly slopes at low altitudes. These forests usually contained some red oak, and sour gum, and sometimes tulip trees. Chestnut was rarely found in the association-segregates just described, but it used to be important, along with sugar maple and tulip tree, on the higher slopes of westerly and south-westerly direction, when the slopes were not steep or convex. At some places in such locations, beech or white oak might share dominance. Often small
amounts of basswood, cucumber tree, other oaks, and hickories are in these forests. The undergrowth is similar to that of the rest of the mixed mesophytic, but less luxuriant and continuous.

Forests Containing Hemlock

Forests containing hemlock are usually found at lower elevations and contain varying amounts of hemlock, from a few scattered trees among the hardwoods, to a full forest of hemlocks, usually along or near streams. Beech and tulip trees are the most common associates of the hemlock forests, and occasionally red maple and white oak are codominants on drier slopes below 2000 feet. In some places, chestnut was a codominant. Rhododendron is common on the wetter sites under hemlock, while Kalmia is often present on drier sites. Southern shrubs, such as Magnolia macrophylla, M. tripetata, sourwood, and dogwood, are sometimes present in these woods, and cause these forests to have a different aspect from the northern hemlock-hardwood forests. Herbaceous plants present decrease in number with the increase in hemlock, and are often nearly absent in full stands at hemlock.

Plant Communities in Dry Habitats

Although mixed mesophytic communities originally covered the greater part of the Cumberland Mountains, south-facing slopes and places near the tops of rocky ridges, support a meager forest, whose dominants are those of drier and/or hotter regions of the eastern deciduous forest. Until erosion cycles
reduce these high and often rocky ridges, and until there has been time for building deeper soils and better moisture conditions, this kind of forest probably will perpetuate itself in these locations. The two dominant species of this community formerly were chestnut and chestnut oak. Now that chestnut has been removed by the blight, chestnut oak is often the distinct dominant of these places. When soils are slightly deeper or altitudes low enough, white, scarlet, and black oaks are present along with the chestnut oaks. *Pinus rigida* is sometimes present. There are distinct differences in the lower layers of vegetation between the mixed mesophytic forest and the oak-chestnut forest. Heavy oak litter decays slowly, and the deep mull humus is lacking, along with the delicate herbaceous plants associated with that soil. The open herbaceous layer here includes *Cypripedium acaule*, *Heuchera longifora*, *Lysimachia quadrifolia*, *Aureolaria laevigata*, and other herbaceous plants, not usually found in typical mixed mesophytic forests.

On some sandy exposed ridges and dry rocky summits, pines, including *Pinus rigida*, *Pinus echinata*, and *Pinus virginiana*, prevail along with few-to-many chestnut sprouts and scarlet oak.

Flood Plains

There are few flood plains in the Cumberland Mountains, and there is usually just a band of flood-resistant trees along the sides of the streams. Cottonwood and silver maple (Table I) can endure long flooding; willow oak occurs on broad local stream flats; and willows, sycamore, sweet gum, and river birch, line most stream banks.
THE ALLEGHENY MOUNTAINS

The Allegheny Mountains section of the Mixed Mesophytic includes the southern part of the Allegheny Mountains in Pennsylvania, Maryland, and West Virginia, and a strip of the Ridge and Valley province where the ridges are closely crowded against the Allegheny front along the Virginia-West Virginia border. Throughout this mountain section the rocks are mildly folded, making a somewhat more rugged terrain than the plateau to the west, but far less dissected than the Cumberland Mountains. These folds in Pennsylvania are called Laurel Ridge and Chestnut Ridge. Even at the time there were good mixed mesophytic forests left in the Cumberland Mountains when Dr. Braun was working there in the 1930's, there were very few good forests left in the Allegheny Mountains, where extensive cutting had taken place around the turn of the century. Judging from the skimpy remnants left, the original forest must have contained a large proportion of sugar maple, beech, and red oak, along with tulip tree, cucumber magnolia, and white ash. Some areas contained basswood, black cherry, slippery elm, white oak, chestnut oak, sour gum, sweet birch, white walnut, and occasionally buckeye. Dogwood was usually present, especially in the southern part.

This area does not display the marked segregation seen in the Cumberland Mountains. Sugar maple may be dominant on the lower slopes, often with white oak and tulip tree, chestnut sprouts, cucumber tree, and hickories. On southerly slopes, white and red oaks are more abundant than other species. Shreve
(1910) described slope forests of Maryland based largely on second growth stands, and said they contained linden, cucumber tree, sugar maple, sweet birch, red oak, and shag-bark hickory, about equally abundant. Dr. Braun (1950, p. 78) recorded a stand on the Virginian slope of the Allegheny Mountain that contained red oak, chestnut oak, chestnut with some white oak, red maple, sugar maple, basswood, and magnolia. These forests, largely secondary, contain more oaks and less of the characteristic mixed mesophytic trees of the Cumberland Mountains further south. White oak forests occupy flats in the valleys, especially in western Maryland.

On higher rocky slopes and ridges, the major trees are chestnut oak, black oak, pitch pine, and formerly chestnut, along with red maple, black birch, sour gum, tulip tree, sassafras, white oak, and basswood. Ericaceous shrubs and ground plants, *Kalmia*, *Azalea*, *Vaccinium*, *Epigea*, and *Gaultheria* are abundant, and characteristic of this community. The vegetation of Laurel Hill and Chestnut Ridge are good examples of this type of vegetation (Jennings 1927).

Elevations of mountain peaks in West Virginia are as much as 4860 feet and rise as much as 2000 feet above the valley floor. The highest mountains in Maryland and Pennsylvania are more than 2800 feet, but there is less relief between the peaks and valleys, because the valleys are higher.

In the mid-30's, Dr. Braun (Braun 1950, pp. 82-83) saw a virgin forest on the mountain sides near Linwood, West Virginia,
between 3300 to 4000 feet in which beech, sugar maple, and basswood made up 75% of the canopy trees, with eight other species making up the rest of the forest. The understory had, besides an undergrowth of the canopy trees, striped maple, shad bush, and *Craetaegus sp.*, and a herbaceous layer of typical mesophytic plants. On the higher mountains between 4200 and 4400 feet, red spruce (*Picea rubens*) was the most abundant tree, with beech and sugar maple present in small amounts, along with some yellow and sweet birch, red maple, and wild black cherry. In these higher elevations, several plants of northern affinities were present: *Mainantherum canadensis, Oxalis montana, Trillium undulatum* and *Hydrophyllum virginianum*. Cut-over forests on the slopes of the mountains of the same region showed the sequence of sugar maple in the valleys, a mixed mesophytic forest of beech-maple-birch-basswood on the middle slopes, and beech-birch-spruce on the higher slopes.

The vegetation in the Allegheny Mountains in Maryland and Pennsylvania, contains many northern species and might be considered a transition area to the hemlock-northern hardwood forests, which occupy the Allegheny Mountains in northern Pennsylvania.
CUMBERLAND AND ALLEGHENY PLATEAUS

The less rugged part of the Cumberland and Allegheny Plateau is considered by Dr. Braun to be in the mixed mesophytic region. In the central part, the prevailing vegetation is much like that of the Cumberland and Allegheny Mountains, except as modified by soil conditions. North-eastward, there is a gradual change to northern forest types, with the prominence of beech, sugar maple, and hemlock. Southward, oaks increase, southern pines become prominent on drier sites, and the mixed mesophytic communities are confined to the valley slopes. The nature of the forest is correlated with the major topographic features, and Dr. Braun recognizes four sub-divisions of the region.

The Cliff Section

The cliff section is characterized by bold cliffs from near London, Kentucky, south-westward across Tennessee, and into Alabama. The broad, flat uplands have shallow valleys, except for some deep narrow, young gorges. The southern part of the cliff section from Berea, Kentucky, southward marks the western edge of the plateau. Southward through Tennessee, it is the entire plateau. North of Berea, Kentucky, the cliff section lies back of the western edge of the plateau. Because of the great variety of habitats there is a great variety of plant communities.

The middle part, in southern Kentucky, best represents the vegetation of the cliff section. On the flat-to-rolling plateau, drainage is poor, and streams sluggish. There are swampy areas dominated by pin oak and sweet gum, with some red maple, sour
gum, swamp white oak (*Q. Bicolor*), and shingle oak. The undergrowth contains a number of swamp shrubs. On the very low slopes, beech prevails, accompanied by white oak, sweet gum, and tulip tree. Secondary stands of oak, oak-hickory, oak-tulip tree, or oak-pine now occupy most of the non-swampy areas. These secondary forests are made up of white, black, and post oaks. *Carya ovata*, *C. tomentosa*, tulip tree, dogwood, *Pinus rigida*, and *P. echinata*, with some other oaks and hickories. These forests have a xeric aspect, with few of the herbaceous plants of the mixed mesophytic. The most xeric part of the area is the top of the cliffs at the western edge. Heath shrubs and pines grow to the cliff margin, often with a mingling of scarlet and chestnut oak.

The contrast between the dry pine-oak forest of the plateau, and the forests of the slopes below the cliffs is extreme. Mixed mesophytic forests occupy almost all of these slopes. Hemlock is the dominant tree in the narrowest gorges, often with impenetrable thickets of rhododendron. The forests on these slopes, strongly resemble those in the center of the mixed mesophytic forest in the Cumberland Mountains. Some are entirely hardwoods, and others, hardwoods mixed with hemlock. The all-hardwood stands contain large amounts of beech, tulip tree, and basswood, with some sugar maple, red oak, white oak, chestnut, and cucumber magnolia, and small amounts of hickories, birch, elms, and walnuts (Brown 1950, p. 105). In some of these forests, there is a small amount of hemlock. Variations in composition of the forests on these slopes do occur, but not with the distinct segregation, as in the Cumberland Mountains. The hemlock—
mixed mesophytic, with occasional basswood and buckeye, are confined to the lowest ravine slopes on the south-flowing streams. Here holly (Ilex opaca), is a large tree appearing in the mixed mesophytic forests with hemlock. The absence of chestnut and the presence of Quercus muhlenbergia is related to calcareous soils where sugar maple is often prominent. Beech is usually abundant where deposited soil is built up. In Lee county of Kentucky, white pine is a component of the mixed mesophytic slope forests, where along with beech, tulip tree, sugar and red maple, beech, white basswood, chestnut sprouts, and hemlock, the forests show some resemblances to the Magnolias (M. macrophylla and M. tripetala), and holly give it a southern aspect.

Northward, where the cliffs begin to be discontinuous, there are more chestnut-oak and oak-hickory communities, and the southern species drop out one by one, and a few northern species appear. However, the mixed character of the slopes is still evident. Southward, in Tennessee and Alabama, where the topography is sub-mature and level, and rolling upland prevails, oaks are strong components of most communities. Post oak and black oak occupy shallow and dry soils. In places less dry, the major trees are white, scarlet, chestnut, and southern red oaks, with Carya glabra, C. tomentosa, black gum, sour wood, persimmon (Diospyros virginiana), dogwood, and pines. The woods in general are less dense than the typical mixed mesophytic forests. Dr. Braun includes this area, that looks much like oak-hickory forests, in her mixed mesophytic region, because of the immature topography.
and the few gorges and ravines that do contain mixed mesophytic communities.

The Low Hills Belt

West of the rugged eastern area is an area of low relief with relatively gentle slopes extending in an irregular band from southern Kentucky to near Pittsburgh, Pennsylvania. The resistant Pottsville sandstone is overlain by weak shales that have eroded away, forming low hills. Here there were many oaks in the original mixed forest, and much of the second growth resembles an oak-hickory forest. The bottoms of the valleys are moist or swampy, and contain red maple and sweet gum, with patches of alder on the low hills. Beech, white oak, black oak, and hickory occur in secondary stands.

A report by Crandall in 1876 giving counts of old forest trees in Greenup, Carter, Boyd, and Lawrence counties in eastern Kentucky, shows in the valleys beech, white oak, maple (sugar), yellow poplar (tulip tree), black oak, sycamore, and hemlock in decreasing order of importance, with a little elm, black walnut, hickory, and chestnut. On the hillsides he found, in decreasing order of importance, white oak, yellow poplar, beech, pine, gum, chestnut, oak, and six other species. The hilltops had chestnut oak, black oak, white oak, and pines, as the major old forest trees.

It is evident that mixed mesophytic forests were poorly represented in the original forests and the secondary forests were even more like an oak-hickory or an oak-chestnut forest.
than were the original ones. A similar vegetation is found in the Pittsburgh region. Jennings (1927) says that the upland forests there are dominantly white oak, *carya ovata*, red maple, shingle oak, scarlet, chestnut, black, and red oaks, with some chestnut and black cherry.

The Rugged Eastern Area

The rugged eastern area lies just west of the Cumberland and Allegheny mountains, and in parts between them. This area is naturally dissected and has a strong relief. Most of the rocks of the plateau are shales and sandstones with a little limestone.

The vegetation of this area is distinctly mixed mesophytic except on dry slopes and ridge tops. In the region around Lewisburg, West Virginia, on the rolling hills, white oak is the dominant tree with chinquapin oak (*Q. muhlenbergii*), black oak, hickories, walnut, cherry, ash, tulip tree, sugar maple, cucumber magnolia, and basswood. There are very few forests left in this area because of extensive land use. In the vicinity of Hazard and Pikeville, Kentucky, there are few primary forests, but the secondary forests have much basswood on the east and north slopes, and beech is abundant on south and west slopes along with white oak. Hemlocks are present in some ravines, accompanied by Rhododendron. The uppermost slopes and ridgetops are occupied by oak-chestnut or oak-hickory communities. Pines may be present on the ridge tops.

The Knobs Border Area

The Knobs Border section makes the western border of the
plateau in northern Kentucky and southern Ohio. Shales form the slopes of the knobs and Mississippian rocks top the hills. In parts of this border area, broad valleys extend between the knobs, many of them with two levels: a low swampy part, and a higher flat or rolling part. The tops of the knobs are sandstone, and the slopes, where erosion has cut through, are composed of shales. There are limestone outcrops at places.

A large portion of the slopes of the Knobs Border Areas were originally occupied by a mixed mesophytic forest with beech, tulip tree, basswood, red oak, buckeye, sugar maple, walnut, shellbark hickory, white ash, cucumber tree, red elm, hickory, white oak, redbud, and dogwood. Secondary vegetation on the shale slopes is very different from the primary. If tree cutting were selective, and fires excluded, which happened in only a few cases, there is still a secondary mixed forest. Usually erosion has removed all humus and most of the A horizon, leaving slightly weathered shale or slopes covered with rock fragments where the vegetation is largely pines or oaks. In some areas, well established secondary oak forests are present which have a shrub layer of blueberries and huckleberries. Dr. Braun thinks these could return to the mixed mesophytic conditions, but only slowly after several hundred years. Near the summit of the knobs and ridges, there are woods containing chestnut oak and other oaks; also chestnut sprouts, hickories, or pines. Any combinations of these may be found on the knobs with a heath layer of laurel, huckleberries, and blueberries. High on many of the slopes are woods containing only chestnut oaks.
Well drained level valley floors and low slopes are dominantly white oak with scattered post black oak much like similar places in the Allegheny Mountains. Wide swampy valley flats have forests of pin oak, sweet gum, red maple, swamp white oak, and shingle oak, with an occasional beech.
### Table II

**Trees and Large Shrubs of Ecological Importance in the Western Mesophytic Region (terminology by Fernald 1950)**

**I. Common in Mixed Mesophytic Region, but usually found only in ravines and mesic slopes in the Western Mesophytic Region**

<table>
<thead>
<tr>
<th>Tree/Species</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>buckeye</td>
<td><em>Aesculus octandra</em></td>
</tr>
<tr>
<td>basswood</td>
<td><em>Tilia heterophylla</em> and related species not <em>T. americana</em></td>
</tr>
<tr>
<td>beech</td>
<td><em>Fagus grandifolia</em></td>
</tr>
<tr>
<td>sugar maple</td>
<td><em>Acer saccharum</em></td>
</tr>
<tr>
<td>hemlock</td>
<td><em>Tsuga canadensis</em></td>
</tr>
<tr>
<td>cucumber tree</td>
<td><em>Magnolia acuminata</em></td>
</tr>
<tr>
<td>great-leaved magnolia</td>
<td><em>M. macrocphylla</em></td>
</tr>
<tr>
<td>umbrella tree</td>
<td><em>M. tripetala</em></td>
</tr>
<tr>
<td>tulip tree or yellow poplar</td>
<td><em>Liriodendron tulipifera</em></td>
</tr>
<tr>
<td>black walnut</td>
<td><em>Juglans nigra</em></td>
</tr>
<tr>
<td>white walnut</td>
<td><em>J. cinerea</em></td>
</tr>
<tr>
<td>bitternut hickory</td>
<td><em>Carya cordiformis</em></td>
</tr>
</tbody>
</table>

**II. Common in oak-hickory regions and found in many well drained to dry sites in the Western Mesophytic Region**

<table>
<thead>
<tr>
<th>Tree/Species</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>White oak</td>
<td><em>Quercus alba</em></td>
</tr>
<tr>
<td>black oak</td>
<td><em>Q. velutina</em></td>
</tr>
<tr>
<td>bur oak</td>
<td><em>Q. macrocarpa</em></td>
</tr>
<tr>
<td>southern red oak</td>
<td><em>Q. falcata</em></td>
</tr>
<tr>
<td>post oak</td>
<td><em>Q. marilandica</em></td>
</tr>
<tr>
<td>chinquepin oak</td>
<td><em>Q. prinoides</em></td>
</tr>
<tr>
<td>pignut hickory</td>
<td><em>Carya glabra</em></td>
</tr>
</tbody>
</table>
III. Common in Oak-chestnut Region and sometimes found in the Western Mesophytic region, especially the eastern part

- chestnut oak: *Quercus prinus*
- Northern red oak: *Q. rubra*
- scarlet oak: *Q. coccinea*
- chestnut sprouts: *Castanea dentata*
- red maple: *Acer rubrum*
- sour gum or red gum: *Nyssa sylvatica*
- mountain laurel: *Kalmia latifolia*
- great rhododendron: *Rhododendron maximum*

IV. Present in flood plains, stream banks, and other poorly drained areas

- Cypress: *Taxodium distichum*
- water tupelo: *Nyssa aquatica*
- sweet gum: *Liquidambar styraciflua*
- pecan: *Carya pecan* Engl. and Graebn.
- Swamp white oak: *Quercus bicolor*
- willow oak: *Q. phellos*
- overcup oak: *Q. lyrata*
- swamp white oak: *Q. Michauxii*
V. Common in the beech-maple region and in the Western Mesophytic region, especially in the northern part

beech  
"Fagus grandifolia"

sugar maple  
"Acer saccharum"

Ohio buckeye  
"Aesculus glabra"

linden or basswood  
"Tilia americana"

VI. Trees of minor importance except locally and in special habitats

hackberry  
"Celtis laevigata" and "Celtis" spp.

Kentucky coffee tree  
"Gymnocladus dioica"

Shagbark hickory  
"Carya ovata"

winged elm  
"Ulmus alata"

September elm  
"Ulmus rubra"

red bud  
"Cercis canadensis"

ironwood  
"Carpinus caroliniana"

hophornbeam  
"Ostrya virginiana"

white ash  
"Fraxinus americana"

black cherry  
"Prunus serotina"

red cedar  
"Juniperus virginiana"
WESTERN MESOPHYTIC FOREST REGION

The Western Mesophytic Forest region, as mapped by Braun (1950), begins in the east at the western edge of the Cumberland and Allegheny plateaus, and ends westward at the bluffs along the Mississippi River. In the north, it extends to the southern tip of the Wisconsin glacier in Ohio and eastern Indiana, and to the southern boundary of the Illinois glacier in western Indiana and Illinois. It includes the Ozark Hills of Illinois. In the south, it includes parts of northern Alabama and Mississippi.

The precipitation in the region ranges from 1366 mm. (53.6 inches) in south-western Tennessee at Milan, to 1025 mm. (40.3 inches) at Cincinnati, Ohio, with other weather stations in the area reporting about 47 inches. This gives a surplus of water, according to Thornthwaite (1964), of from 294 to 529 mm, for the months of December through April, and a slight deficit of 8 to 62 mm, from June to September.

The vegetation of the Western Mesophytic region forms a big transitional area between true mixed mesophytic regions to the east, oak-hickory to the west, oak-hickory-pine to the south, prairie to the north west, beech-maple to the north, and coastal plain vegetation at the Mississippi River. Dr. Braun considers an area to be in the western mesophytic region so long as it has at least occasional forests resembling mixed mesophytic in the ravines.
The occurrence of mixed mesophytic in ravines become less frequent westward, with the drop-out of typical mixed mesophytic plants, especially buckeye and basswood. Beech and sugar maple, with some hemlock in the ravines, stay prominent in the northern parts. An increase of southern oaks occurs in the southern areas. The local distribution of major trees is highly influenced by topography and soil types. Table II lists trees of ecological importance in the Western Mesophytic region.

There has been extensive agricultural use of lands in this entire region, and consequently only fragmentary forests are left from which to reconstruct any kind of a picture of what the original forests were like.
The Bluegrass Section

This section is a roughly circular area nearly 100 miles in diameter in north-central Kentucky surrounded by a belt of knobs. The central part is a fertile prosperous section of rolling land formed from soluble phosphatic limestone. This inner blue grass area is surrounded by a concentric belt of shales which form a poor yellowish soil that has been severely eroded by poor farming methods, leaving numerous limestone slabs on the surface. Outside the zone of shale is another ring of less soluble limestone.

There is very little natural vegetation now left in the entire area, except in the gorges of the Kentucky River in the southern part, and this vegetation is certainly not typical of the rest of the bluegrass section. Many old forest trees are now found on the extensive estates in the area, but since no undergrowth is present, there is little clue from these as to what was originally present as smaller plants. Represented among these estate trees are bur oak, chinquapin oak, white oak, white ash, blue ash,hackberry, sugar maple, black maple, black cherry, honey locust, Kentucky coffee tree, shagbark hickory, American elm, Ohio buckeye, and red mulberry (see tables). Beech is not present on the estates of the inner blue grass region. The meager forests of the shale belt at the present time are largely oaks, and even trees around houses are oaks, indicating that there was never a mixed forest on the shale belt. The Outer Bluegrass seems to be similar to that of the Inner Region.

Our knowledge of the original condition of the Bluegrass
section comes from early writings of Daniel Boone and Filson as reproduced by Jllson in 1930. They described that country as well timbered with sugar tree, honey locust, coffee tree, "pappa" tree, and small cucumber trees, black mulberry, and buckeye. The area must not have been entirely forested, because they comment on the abundance of buffaloes browsing on the leaves of cane or cropping the herbage on extensive plains. They tell of the abundance of blooming flowers all year except wintertime, which, as we know it now, would not take place in a closed forest. The early geological surveys of Kentucky mention most of the trees now found on estates. Trees of the Outer Bluegrass according to the geological surveys were about the same as those of the inner part except that beech is occasionally present.
Nashville Basin

The Nashville Basin is a more or less oval area about 60 miles wide and 120 miles long, enclosed by the Highland Rim. Its topography is rolling or flat except for some hills which are the reduced remnants of the Highland Rim. Limestone underlies the floor of the basin and in many places is at or very near the surface.

The vegetation of the rolling part of the basin resembles that of the Bluegrass section of Kentucky. White oaks and tulip trees are the principal trees of the knolls, and sugar maple is abundant on the slopes. Other trees include hackberry, American elm, winged elm, black walnut, red oak, chinquapin oak, bur oak, shagbark hickory, sour gum, black cherry, and sweet gum. Higher hills support mixed mesophytic forests in which beech is abundant on the sheltered slopes.

The "Cedar Glades" are a very distinctive feature of the Nashville Basin. The conspicuous dominant tree species of cedar glades is eastern red cedar (*Juniperus virginiana* L.), with which winged elms and scrubby hackberries are usually associated. Trees must root in crevices or pot holes in the rock, and thus are dispersed in a scattered or dense pattern determined by the physical nature of the underlying rock. Where soil occasionally developed to sufficient depth to support a real forest, chinquapin oak, and pignut hickory invade and eventually dominate the wooded areas.

Extensive open areas (glades) occur where no footholds for trees are available. These may be expanses of bare rock, rock
covered with gravel and thin soil, or somewhat deeper soil dominated by grass or, in later stages of succession, by shrub thickets that in turn are invaded by cedars. Open glades are dominated by one or more endemic species of *Leavenworthia*, by *Sedum pulchellum*, and *Arenaria patula*, all winter annuals that flower in March and April. Through the dry summer months, gravel glades appear essentially bare except for patches of an annual sedge, *Cyperus inflexus*, local populations of a local endemic *Talinum calcaricum*, and large beds of the blue-green algae, *Nostoc commune*. Soil about three to eight inches deep supports open glade vegetation dominated by two grasses, *Aristida longispica* and *Sporobolus vaginflorus*, one endemic legume, *Petalostemon gattingeri*, and a moss *Pleurochaete squarrosa*. Grassy glades are also the site of many other herbaceous endemics, for example, *Viola egglestonii*, *Lobelia gattingeri*, and *Echinacea tennesseensis* as well other species endemic to the Interior Low Plateau. Except for *Echinacea*, which flowers all summer, the peak flowering season for showy species is from April to mid-June. (Quarterman 1950 and Baskin, Quarterman and Caudle 1968)
Area of Illinoian Glaciation

Parts of southern Ohio and Indiana which were covered by the Illinoian glacier, but not later covered by the Wisconsin, are included in the Western Mesophytic by Dr. Braun because some mixed mesophytic forest communities are found on the dissected parts. Dr. Braun thinks that the former presence of glaciers does not necessarily exclude a mesophytic vegetation, if the erosion cycle and soil building processes have had a long enough time to develop mesophytic soils. It is usually not the climate that eliminates certain species of the mesophytic regions from areas immediately north of it, but young undeveloped soils.

In much of the flat, poorly drained parts of this area the major trees are pin oak, sweet gum, red maple, and American elm, along with lesser numbers of swamp white oak, sour gum, shell bark hickory, and beech. Various combinations of these trees may be present depending on minute variations in drainage or past history. Sugar maple is conspicuous by its absence in this kind of location.

The dissected better drained parts of Illinoian glaciation support forests essentially like those of the Mixed Mesophytic region, even including the two most characteristic species of the Mixed Mesophytic, sweet buckeye, and basswood, in the southern portions of this area. Many large beech trees among the other mesophytic species indicate that the beeches may be older and may have been left from times when beech was much more important in the vegetation than now. Dr. Braun (1950) reports the following trees, along with beech, basswood, and buckeye, in the southern
part of the area: American ash, sugar maple, black cherry, hackberry, red and chinquapin oak, and black and white walnuts. Most of these species are reproducing and show promise of continuing as trees of the forest there.
Hill Section

Parts of this hill section are widely separated, but since the vegetation is quite similar, they are considered together. This section includes the Knobs of Kentucky, all unglaciated southern Indiana, the Ozark hills of Illinois, and the western coal fields of Kentucky, including the Dripping Springs escarpment.

The vegetation of the Knobs is somewhat like that of the Appalachian Plateau with chestnut, chestnut oak, sour wood, and species of *vaccinium* on the drier uplands, and mixed mesophytic forest communities in the more favorable sites. These mixed mesophytic forests are, or were, sometimes a chestnut-beech-tulip tree type and sometimes have basswood, buckeye with a wealth of herbaceous plants. These forests have fewer mesophytic species and a higher percentage of beech than do the mixed mesophytic forests of the Cumberlands. The chestnuts all died much earlier here than they did in the Cumberland Mountains and the large number of young sugar maples suggests that this species may increase in importance.

Virginia pine is extensive in secondary growth. Red cedar is prominent on the driest rocky slopes along the border of the Knobs facing the Bluegrass.
The Hill Section of Indiana

Vegetationally, this is an area of mixed forests, usually some kind of mixed mesophytic forests on northerly slopes, and of oak-hickory on the slopes and ridges (Gordon 1936). The more mesophytic forests of ravines and northerly slopes have a number of tree species of the Mixed Mesophytic, but the greater abundance of beech and sugar maple and the absence of buckeye and basswood, suggest a transition to the beech-maple forest. The herbaceous layers are somewhat like that of the Mixed Mesophytic, but with fewer species. This area is truly a transition area to the oak-hickory to the west and beech-maple to the north. Minor variations in site conditions seem to produce a complex of different kinds of plant communities.

A group of people at Butler University has done research on these variations: Friesner and Potzger 1937, Potzger and Friesner 1940, Potzger and Friesner and Keller 1942. Dr. Braun includes the hill section of Indiana in the Western Mesophytic region because of a few stands resembling mixed mesophytic in the ravines.
Ozark Hills

In the Ozark Hills of southern Illinois there is much hilly terrain with mixed mesophytic communities in the ravines containing beech, sugar maple, tulip tree, wild black cherry, ash, elm, mulberry and species of hickory (Miller and Fuller 1921). The upland forests are composed largely of oaks, especially black and white oaks. Flood plain and swampy forests include cypress (*Taxodium distichum*).
Dripping Springs Escarpment

In southwestern Kentucky there is a more or less circular area of plateau with a rugged belt formed by the outward-facing Dripping Springs Escarpment from Princeton to Bowling Green to Mammoth Cave. Valleys in the central part are frequently swampy, while near the borders of the plateau there are deep and sometimes gorge-like valleys.

The present vegetation on the plateau is largely secondary and consists of oaks or oaks and hickories, and early survey records indicate a dominance of oaks (Kentucky Geological Survey Vol. II, p. 30, 1857). Mesophytic forests of the slopes of the rugged border contain yellow buckeye, beech, white oak, chestnut oak, formerly chestnut, shell bark hickory, butternut, mulberry, tulip tree, Magnolia macrocarpa, M. tripetala, red maple, sugar maple, holly, sour gum, sour wood, and white ash. Hemlock is locally abundant in the gorges. Mountain laurel (Kalmia) is plentiful in the undergrowth but Rhododendron is missing. Deep talus soils on slopes of ravines usually have beech as the most abundant species along with sugar maple, tulip tree, white ash, and red and white oak.
The Mississippi Plateau

The Mississippi plateau, a region in northern Mississippi, Alabama, western Tennessee and Kentucky, is usually a rolling plateau surface, but streams have made irregular ridges and slopes especially in the eastern part. The vegetation is a mosaic of many kinds of plant communities depending on the physiography, drainage, and soils of the local area. As a whole it is a large transition area to other kinds of vegetation.

The most mesic part is the dissected eastern Highland Rim that has beech as the dominant tree along with sugar maple, basswood, buckeye, white ash, red and white oak, and sometimes hemlock. Where drainage is good in the rolling plateau, oak forests were formerly widespread with white oak, black oak, and southern red oak (Q. falcata) the most abundant species, with some sugar maple, beech, tulip tree, hickories, and white ash. In southwestern Tennessee, and northern Mississippi post oak and blackjack oak may be present, with an absence of sugar maple and the other more mesophytic species. The entire area is now largely used for agriculture and almost all of the scattered fragments of forests are secondary ones.

There is an area south of the Green river in Kentucky in a northeast-southwest band reaching nearly to the Tennessee border with fertile red calcareous soils formed from underlying limestone. Early accounts (Kentucky Geology Survey, Vol. IV, p. 192, 1861) called these areas barrens, and said they were treeless places occupied by tall grasses. Farm land and pastures now occupy most
of the land, and species common to the prairies further west are abundant on roadsides. At a few places there are young stands of post oak and blackjack oak with some black oak and dogwood. Dr. Braun (1950) interprets this as oaks moving into former prairie because of a change in climate. There are other smaller areas similar to these in the limestone areas of the Mississippi Plateau.

The Tennessee River flows westward through northern Alabama and a tip of northwest Mississippi, then north through Tennessee and Kentucky. Along the river is a hilly belt in which white oak woods prevail on most of these slopes except the higher drier ones where chestnut oak, black oak, hickories, post oak, and blackjack oak make an open forest. The ravine communities where beech, tulip tree and sugar maple are present have slight resemblances to a mixed mesophytic forest. In northern Alabama there are some limestone flats where cedar is the dominant tree and resemble those the Nashville basin in Tennessee. West of the Tennessee River to the alluvial plains of the Mississippi is an area of low relief, generally rolling but locally hilly. The oak or oak-hickory forest communities vary in composition with local changes in topography and soils. White oak is abundant in ravines and between Knobs, and southern red oak is the usual dominant on low hills. Post oak is sometimes the dominant in flat areas, and blackjack oak and black oak are often present. In the southern part of the section loblolly pine (*P. taeda*) in varying proportions is often present. Beech and sugar maple are rare. The broad alluvial valleys, which are usually only a little lower than the hills, support a luxuriant forest, the principal trees of which are willow
oak, swamp chestnut oak, overcup oak, water oak (*Quercus nigra*).

American and winged elm, hackberry, river birch, pecan, sycamore, red maple, sweet gum, black willow, silver maple, box elder, and cypress.
Loess Hills

The Loess Hills, made of very fine, wind-born soils, rise 125 to 256 feet above the flood plain along the east side of the Mississippi River from the Ohio River into Louisiana and are from 5 to 15 miles wide. Penetration of precipitation is so fast that there is little run-off and erosion except by streams. The western slopes toward the Mississippi River are rugged along streams and are almost vertical cliffs at some other places. The less steep and rugged eastern side is much prized for farm land. Rich hardwood forests with a large number of mixed mesophytic species occupy the ravine slopes and the flat or rounded divides between the slopes. Beech is the most abundant species of these forests, but its commonly associated species are tulip tree, red oak, hickories, cucumber tree, sugar maple, and basswood. Smaller trees are dogwood, red bud, pawpaw, ironwood, hophornbeam. Common shrubs are *Hydrangea arborescens*, *Sambucus canadensis* and spice bush. Many of the herbaceous plants and ferns are those commonly found in the mesophytic region.

It is because of this mixed mesophytic forests on the Loess Hills that Dr. Braun includes vegetation this far west in the Western Mesophytic region. The Crowley Ridge about 222 miles along through Missouri and Arkansas on the west side of the Mississippi is also loess soil and has a vegetation similar to the Loess Hills east of the Mississippi. Dr. Braun considers that mixed mesophytic area west of the Mississippi is evidence that this kind of forest once occupied much larger areas than at the present time.
Oak-Chestnut

The Oak-Chestnut Forest Region, as mapped by Braun (1950), covers most of the southern Appalachians including all of the Blue Ridge mountains from north Georgia into Pennsylvania, and all of the Ridge and Valley Province (Fenneman, 1938) except the northern end in the Hudson-Champlain valley. It also extends into the Piedmont Plateau in northern Virginia and over all of the Piedmont in Maryland, southern Pennsylvania and the northern part of New Jersey. It includes an area of coastal plain from upper New Jersey through south eastern Massachusetts.

The rainfall ranges from about 40 inches at Holtwood in southeastern Pennsylvania to more than 60 inches at Andrews, North Carolina, and other places in the southern mountains, and is in the low 40's at most places. According to Thornthwaite (1948), there is a surplus of water in all stations in the fall and winter months, greatly overbalancing the slight water deficit for the mid-summer months.

Although the chestnut is not, and will never again be one of the dominant trees of the region, its presence as a small plant is a key indicator of the Oak-Chestnut forest region which is different in many respects from the oak-hickory to the south and east and the more luxuriant mixed mesophytic forest to the west. There are still some people living in 1970 who remember the American chestnut tree as "king of the forest" in eastern United States. In 1904 the chestnut blight caused by the fungus *Endothia parasitica* was discovered in New York City, where it had been introduced...
from Asia on Asiatic chestnuts. The sticky conidiospores can be carried long distance by insects and birds (Heald and Gardens, 1914) while ascospores may be blown by wind (Metcalf, 1912), so the blight quickly spread northeast, west and south. By 1910 it had spread as far as southeastern Pennsylvania, and in 1920 the 80 percent infection zone extended along the Blue Ridge to Central Virginia. By 1930, 80 to 90 percent of the chestnut trees in North Carolina were infected. An infected tree did not die all at once, but limb by limb. In 1950 numbers of large chestnut trees with usually only a few living branches were standing in the southern part of the range of the species (Keever, 1953). In many places the trees were cut for lumber after they became infected. Many people hoped that some blight-resistant individual trees might survive and repopulate the areas, but this has not happened. Roots of the original trees produce root sprouts which sometimes grow to be more than 10 feet tall, but when increase in diameter causes the bark to fissure, the plants contract the disease and die back to the roots again. A new taxonomist to the area who did not know the past history of the tree would see this plant as a small shrub or tree. It may continue as a small shrub or tree as long as it can live long enough to build a food surplus before it is killed back by the blight.

There are people who object to the name oak-chestnut on the basis of the present insignificance of the chestnut in the area, but no one as yet has arrived at a satisfactory name that can be generally accepted. Kuchler (1964) calls an area approximately in the same location "Appalachian oak forest", but fails to give
chestnut oak the prominence it has in the Oak-Chestnut region of Braun (1950). There are many people who think that there should be little classification and naming of major forest regions and that each individual stand should be considered alone without reference to other similar or contrasting stands. Others would like to consider each species as a unit of vegetation and talk in terms of range and habitats of a single species. There are merits to all these ways of expressing the distribution of vegetation. However, if one can see past the minor variations and fluctuations, there are some major patterns of vegetation in North America. In some places a given combination of major species does occupy large areas because they are the species which have the genetic possibilities of living under the prevailing climate and environmental conditions. Within such a large area there are usually local variations in environments favoring certain plants and eliminating others. In some areas where there are few major variations in environmental factors, a similar type of vegetation did cover large areas, and people who did research in these areas could see the large overriding pattern. Where one such vegetational region comes in contact with another such region, there is usually a transition of sometimes a hundred miles or more, where even minor variations in conditions allow great variations in presence and combinations of species. Many people fail to see any predominant pattern in these areas and prefer a more flexible viewpoint in describing vegetation. Dr. Braun (1950) looks at vegetation from the "large pattern" viewpoint while accounting for the variations and overlapping in space. She also looks at
vegetation from long-range time viewpoints and includes areas of present-day seemingly different vegetation in the same large unit because she believes that when erosion cycles and soil development proceeds far enough, much of the vegetation could, and probably would, become more like the major pattern of the large area. Whatever viewpoint one adopts and whatever language one uses in describing vegetation is a matter of personal choice depending on the location of the area and the use to be made of the information.
TABLE III
Trees and Shrubs of Ecological Importance in the Oak-Chestnut Region

(Terminology is that of Fernald 1950)
S = more common in southern parts, N = more common in northern parts

I. Common in ravines, valleys and other mesic habitats

<table>
<thead>
<tr>
<th>Tree Type</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>basswood (S)</td>
<td>Tilia heterophylla</td>
</tr>
<tr>
<td>Linden or basswood (N)</td>
<td>Tilia americana</td>
</tr>
<tr>
<td>buckeye (S)</td>
<td>Aesculus octandra</td>
</tr>
<tr>
<td>silverbell (S)</td>
<td>Halesia monticola (Rehd. Sarg.)</td>
</tr>
<tr>
<td>yellow birch</td>
<td>Betula lutea</td>
</tr>
<tr>
<td>hemlock</td>
<td>Tsuga canadensis</td>
</tr>
<tr>
<td>beech</td>
<td>Fagus grandifolia</td>
</tr>
<tr>
<td>white ash</td>
<td>Fraxinus americana</td>
</tr>
<tr>
<td>cucumber magnolia</td>
<td>Magnolia acuminata</td>
</tr>
<tr>
<td>ear-leaved magnolia (S)</td>
<td>M. Fraseri</td>
</tr>
<tr>
<td>great-leaved magnolia (S)</td>
<td>M. macrophylla</td>
</tr>
<tr>
<td>umbrella magnolia (S)</td>
<td>M. tripetala</td>
</tr>
<tr>
<td>yellowwood (S)</td>
<td>Cladrastis lutea</td>
</tr>
<tr>
<td>bitternut hickory</td>
<td>Carya cordiformis</td>
</tr>
<tr>
<td>sugar maple (N)</td>
<td>Acer saccharum</td>
</tr>
<tr>
<td>holly (S)</td>
<td>Ilex opaca</td>
</tr>
<tr>
<td>spice bush</td>
<td>Lindera benzoin</td>
</tr>
<tr>
<td>Pawpaw</td>
<td>Asimina triloba</td>
</tr>
<tr>
<td>hydrangea</td>
<td>Hydrangea arborescens</td>
</tr>
</tbody>
</table>

II. Shade tolerant trees of ridges and slopes

<table>
<thead>
<tr>
<th>Tree Type</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>chestnut oak</td>
<td>Quercus prinus</td>
</tr>
<tr>
<td>northern red oak</td>
<td>Q. rubra</td>
</tr>
<tr>
<td>scarlet oak</td>
<td>Q. coccinea</td>
</tr>
<tr>
<td>white oak</td>
<td>Q. alba</td>
</tr>
</tbody>
</table>
black oak  Q. velutina  
chestnut sprouts  Castanea dentata  
red or sweet pignut hickory  Carya ovalis  
mockernut hickory  C. tomentosa  
pignut hickory(S)  C. glabra  

III. Shade intolerant and successional  
black cherry  Prunus serotina  
sweet cherry  P. avium  
fire cherry  P. pennsylvanica  
choke cherry  P. virginiana  
black locust  Robinia pseudo-acacia  
white ash  Fraxinus americana  
sycamore  Platanus occidentalis  
slippery elm  Ulmus rubra  
Ailanthus  Ailanthus altissima  
bear or scrub oak (N)  Quercus illicifolia  
sassafras  Sassafras albidum  
tulip tree or yellow poplar  Liriodendron tulipifera  
white pine  Pinus strobus  
pitch pine (N)  P. rigida  
virginia pine (S)  P. virginiana  
trembling aspen (N)  Populus tremuloides  
large-toothed aspen(N)  P. grandentata  
grey birch (N)  Betula populifolia  
paper birch(N)  B. Papyrifera  
black or sweet birch  B. lenta  
sweet fern  Comptonia peregrina
IV. Shade tolerant and small trees

red maple  \( \text{Acer rubrum} \)  occasionally a large tree, especially in northern parts

dogwood  \( \text{Cornus florida} \)

striped maple (N)  \( \text{Acer pennsylvanica} \)

witch hazel  \( \text{Hammamelis virginiana} \)

maple-leaved-viburnum  \( \text{Viburnum acerifolium} \)

Flame azalea (S)  \( \text{Rhododendron calendulaceum} \)

great rhododendron  \( \text{R. maximum} \)

huckleberry  \( \text{Galussacia ursina} \)

blueberry  \( \text{Vaccinium spp.} \)

mountain laurel  \( \text{Kalmia latifolia} \)

V. Trees of flood plains, stream banks or swamps

box elder  \( \text{Acer negundo} \)

silver maple  \( \text{A. saccharinum} \)

red or river birch  \( \text{Betula nigra} \)

slippery elm  \( \text{Unmus rubra} \)

sycamore  \( \text{Platanus occidentalis} \)

white cedar (N)  \( \text{Chamaecyparis thyoides} \)

black spruce (N)  \( \text{Picea mariana} \)

VI. Infrequent or in special habitats.

red cedar  \( \text{Juniperus virginiana} \)  In open and rocky areas

post oak (S)  \( \text{Quercus stellata} \)  In dry habitats

blackjack oak  \( \text{Quercus marilandica} \)  In dry habitats

hophornbeam  \( \text{Ostrya virginiana} \)

service berry  \( \text{Amelanchier spp.} \)

sourwood (S)  \( \text{Oxydendrum arboreum} \)
<table>
<thead>
<tr>
<th>Ironwood</th>
<th>Carpinus carolinina</th>
</tr>
</thead>
<tbody>
<tr>
<td>VII. Plants of high altitudes or northern parts of area</td>
<td></td>
</tr>
<tr>
<td>red spruce</td>
<td>Picea rubens</td>
</tr>
<tr>
<td>balsam fir</td>
<td>Abies balsamea</td>
</tr>
</tbody>
</table>
THE SOUTHERN APPALACHIANS

The Southern Appalachians include the mountain mass south of the Roanoke Gap in Virginia, and is made up of the Blue Ridge, and the Unaka Range including the Great Smoky Mountains and other peaks, such as the Black Mountains, Grandfather Mountain, and the Nantahala Mountains. The elevations range from 1300 feet at the margin of the Piedmont to 6711 at the top of Mt. Mitchell. The vegetation of this area is much more varied and luxuriant than that of the rest of the oak-chestnut region further north. Many old endemics, relics of the tertiary flora, have persisted in this area, especially in the Smoky Mountains. The great variation of over 5000 feet in elevation allows for patterns of altitudinal zonation, and the contrast of slopes and valleys gives variation of vegetation at any given altitude. The principal forest type on the slopes of moderate elevations was chestnut or oak-chestnut before the advent of the chestnut blight. Since this type of habitat makes up a large portion of the total area, Dr. Braun (1950) uses oak-chestnut as her name for the region. Mixed mesophytic forests sometimes with and sometimes without hemlock, occupy the more mesic sites often in the coves and valleys, and oaks or an oak-pine plant community occupies the dry slopes and ridges. Higher elevations are occupied by birch, beech, and sugar maple, and spruce and fir are present on the highest elevations above 4500 feet. Occasional treeless balds, some grassy and some covered with heaths of exceeding beauty, are found in these mountains.

Whittaker (1956), who prefers the species distribution approach, made an intensive study of the Smoky Mountains in which he recorded
species presence and importance in a large number of plots distributed along transects from low altitudes to high altitudes. Each plot was classified as to moisture condition. The data for each species were analyzed to find out at which altitude and in which moisture region the plant grew best. For most species an optimum location was determined, even though the species did grow at other places. He then grouped the species according to their optimum environment, considering altitude and water conditions, and arrived at a classification of vegetation in the Smokies. Table III is taken from Whittaker (1956) with some rearrangements (the addition of common names), and change of some scientific names to agree with Fernald, 1950.

Parts of the southern Appalachians other than the Smokies have a similar composition of communities and distribution of species except that there is less of the mesic cove forests and high spruce-fir forests and more of the sub-mesic, sub-xeric forests of the lower and less rugged mountains. It is because of this vast area that Dr. Braun calls this the oak-chestnut region. Table IV gives lists of trees and shrubs of ecological importance for the entire oak-chestnut region.

There has been much interest in the effect of the elimination of the chestnut on the forests of the oak-chestnut regions. The study by Keever (1950) in the extreme southern part, in stands on the slopes, showed red oak and chestnut oak to be the most abundant tree species, with hickory (Carya glabra and C. ovalis) abundant on south facing slopes. White oak was also more abundant on south-facing slopes than on north-facing ones. Chestnut was
abundant as small plants, either seedling or root sprouts, but almost all of the big chestnut trees were dead. Red maple was abundant as an understory tree, but rarely ever reached canopy size. Other trees present but not abundant, were sour wood, scarlet oak, sweet birch, common locust, blaak gum, tulip tree, white pine, silverbell and sassafras. The most abundant of the smaller trees were dogwood, flame azalea, great rhododendron, and witch hazel along with reproduction of most of the canopy trees. The most abundant shrubs often forming nearly impenetrable thickets, were huckleberry (Gaylussacia ursina (M. A. Curtis) T. and G.) and blueberry, with some mountain laurel.

Woods and Shanks (1959) studied 2569 openings left by dead chestnut trees in the Smoky Mountain national parks to see what trees were filling in these openings. Chestnut oak (17%), red oak (16%), and red maple (13%) were the most abundant replacement trees in the entire area. Hemlock, tulip tree, Magnolia fraseri, silverbell, basswood, and sugar maple were often present as replacement trees in mesic coves, and sourwood, scarlet oak, and pitch pine were present on the dry slopes and ridges. Carya glabra was present but of only very minor importance.
TABLE IV
Plants of the Smoky Mountains taken from Whittaker (1956) with some rearrangements and change in some scientific names to agree with Fernald 1950, except where authority is given.

I. Mesic habitats below 4500 feet.

A. Trees

Basswood- *Tilia heterophylla* and *T. truncata* Spach.
Buckeye- *Aesculus octandra*
Silverbell- *Halesia monticola*
Yellow birch- *Betula lutea*
Hemlock- *Tsuga canadensis*
Beech- *Fagus grandifolia* (white and red)
White ash- *Fraxinus americana* and variety biltmoreana
Cucumber magnolia- *Magnolia acuminata*
Magnolia- *M. Fraseri*
Magnolia- *M. tripetala*
Yellow wood- *Cladrastis lutea*
Black cherry- *Prunus serotina*
Bitternut hickory- *Carya cordiformis*
Holly- *Ilex opaca*
Iron wood- *Carpinus caroliniana*
Hop hornbeam- *Ostrya virginiana*

B. Shrubs

Strawberry bush- *Euonymus americana*
Spice bush- *Lindera benzoin*
Hydrangea- *Hydrangea arborescens*

C. Herbs

Dryopteris spinulosa var. intermedia
Athyrium thelypteroides
Eupatorium rugosum
Cimicifuga racemosa
Impatiens pallida
Caulophyllum thalictroides
Laportea canadensis
Trillium pedatum
Actaea pachypoda
Thalictrum dioicum
Hepatica acutiloba
Viola rotundifolia and spp.
Stellaria pubera
Tiarella cordifolia
Mitchella diphylla
Euonymus abovenus
Galium triflorum
Mitchella repens
Osmorhiza longistylis

II. Submesic, centered in oak-hickory or oak-chestnut forests.

A. Trees

Red oak- Quercus rubra
Tignut hickory- Carya glabra
Mockernut-hickory- C. tomentasa
False shagbark hickory- C. ovalis
Red maple- Acer rubrum
Sweet birch- Betula lenta
Striped maple- Acer pennsylvanica
Dogwood- Cornus florida
Witch hazel- Hamamelis virginiana
Shad bush- *Amelanchier arborea*

Mountain holly- *Ilex montana*

White alder- *Clethra acuminata*

**B. Shrubs**

Buffalo nut- *Pyrularia pubera*

Flame azalea- *Rhododendron calendulaceum*

Huckleberry- *Gaylussacia ursina*

Maple-leaved viburnum- *Viburnum acerifolia*

Carolina allspice- *Calycanthus fertilis* and *C. nannus*

New Jersey tea- *Ceanothus americanus*

Hercules club- *Aralia spinosa*

Common greenbrier- *Smilax rotundifolia*

**C. Herbs**

Christmas fern- *Polystichum acrostichoides*

*Smilacina racemosa*

*Viola hastata*

*Aureolaria laevigata*

*Solidago* sp.

*Prenanthes trifoliolata*

*Uvularia pudica*

*U. sessilifolia*

*Feldicarius canadensis*

*Desmodium uniflorum*

*Mediola virginiana*

*Veratrum parviflorum*

*Goodyera pubescens*

*Galium latifolium*

*Parthenocissus quinquefolia*
**Polygonatum** spp.

**III. Subzeric**, centered in oak-chestnut heath and dryer oak-chestnut forests

**A. Trees**

- Chestnut- *Castanea dentata*
- Chestnut oak- *Quercus prinus*
- White oak- *Q. alba*
- Black oak- *Q. velutina*
- Black gum- *Nyssa sylvatica*
- Sour wood- *Oxydendrum arboreum*
- White pine- *Pinus strobus*
- Black locust- *Robinia pseudoacacia*
- Sassafras- *Sassafras albidum*

**B. Shrubs**

- Mountain laurel- *Kalmia latifolia*
- Maleberry- *Lyonia ligustrina*
- Blueberry- *Vaccinium constablae*
- Sawbrier- *Smilax glauca*

**C. Herbs**

- **Galvix aphylla**
- **Chimaphila maculata**
- **Chimaphila civaricata**

**IV. Xeric**, centered in pine forests and pine heaths

**A. Trees**

- Scrub pine- *Pinus virginiana*
- Pitch pine- *P. rigida*
- Table mountain pine- *P. pungens*
- Scarlet oak- *Q. marilandica*
3. Shrubs (Low vaccinoides dominant)

Blueberry- Vaccinium vacillans
  V. hirsutum
Deerberry- V. stamineum var. melanocarpum
Huckleberry- Gaylussacia baccata
Fetter-bush- Pieris floribunda
Mountain holly- Ilex montana var. beadlei

C. Herbs

Coreopsis major
Andropogon scoparius
A. virginicus
Tephrosia virginiana
Baptisia tinctoria
Pteridium aquilium var. lattusculum
Sericocarpus asteroides
S. linifolius
Aster sp.
Antennaria sp.
Panicum sp.
Gaultheria procumbens
Epigea repens

V. Stands at 4500 or higher

A. Trees

1. Mesic sites above 4500
   Beech- Fagus grandifolia
      ("Gray" population)

2. (Ecotone) sites around 4500
   Yellow birch- Betula lutea
Mountain maple- *Acer spicatum*
Smooth shadbush- *Amelanchier laevis*
Alternate-leaved dogwood- *Cornus alternifolia*

3. Subalpine forests between 4500-6000 feet
Red spruce- *Picea rubens*

4. Subalpine forest at highest altitudes
Frasier's fir- *Abies fraseri*
Mountain ash- *Sorbus americana*

B. Shrubs

1. Ecotonal mesic
Hobblebush- *Viburnum alnifolium*
Red-berried elder- *Sambucus pubens*
Prickly gooseberry- *Ribes cynosbati*

2. High elevation heath
Purple rhododendron- *Rhododendron catawbiense*
*R. carol nianum*
*Leiophyllum lyoni*

3. Sub-alpine forests
Mountain cranberry- *Vaccinium erythrocarpum*
Minnie bush- *Menziesia pilosa*
Bush honeysuckle- *Diervilla sessilifolia*

C. Herbs

1. Mesic high elevation
*Rudbeckia laciniata*
*Circaea alpina*
*Solidago glomerata*
*Chelone lyoni*
Clintoria borealis
Diphylleia cymosa
Lilium superbum
Oxalis montana
Senecio rugelii
Monarda didyma
Aster acuminatus
Streptapus roseus
Trillium erectum

2. Submesic high elevation
Sedge- Carex nestiralis
Sedge- Carex sp.
Preanthes altissima
Solidago sp.
Arisaema quinatum nutt. Schott
Houstonia serpyllifolia
Smilax herbacea
Athyrium felix-femina var. asplenioides
Angelica triquina
Thalictrum polygamum

3. Grassy balds
Danthonia compressa
Potentilla canadensis var. caroliniana
Stachys lingmanii and other introduced species
NORTHERN BLUE RIDGE

This section extends from the Roanoke River Gap in southern Virginia northward into southern Pennsylvania and includes adjacent ridges east of the Blue Ridge in Maryland. It is generally a single mountain range usually no more than 12 to 14 miles wide.

The forests of the northern Blue Ridge are not as luxuriant and variable as those of the southern Appalachian section. The climate is less favorable, the topography less variable, and there is less range of altitude. Because it is readily accessible from the Piedmont to the east and the Great Valley to the west, it has been excessively lumbered and most of the forests are young.

The Shenendoah National Park, which ranges in altitude from 600 feet to 4049 feet, is representative of this section (Braun 1950). Red cedar is common on the limestone outcrops on the low mountains in the west. Black locust and sassafras are successional species on the slopes and tulip tree in the coves. Oak-chestnut forests are common everywhere on the slopes. Tulip tree is present in concavities low on the slopes and birch is abundant on high slopes. Red oak, sugar maple, and basswood, with some hemlock, are present in north-facing concavities high on the mountains. On windswept slopes and knobs, chestnut oak is abundant and locally pines are present. Only on the highest elevations of Hawk's bill Mountain are spruce and fir present. The taxonomic position of the fir is in dispute, but it is not Abies balsamea of the southern Appalachians. White Oak Canyon on the east slope of the Blue Ridge is the most extensive area of undisturbed forest. All the variations of plant communities there may be grouped into
two principal types, one in which sugar maple is present and one in which it is absent. Oaks and formerly chestnut make up 88% of the canopy in the one without sugar maple, with white, chestnut and red oaks, and formerly chestnut being the major species. In the type where sugar maple (16%) is present, the oaks and chestnut form only 40% of the cover and many mesic species including basswood are present (Braun 1950, p. 244). Caledonia State Park in southern Pennsylvania, in the extreme northern tip of the Blue Ridge, is in a mesic valley that has hemlocks, white pine, tulip tree, white oak, and dense thickets of rhododendron. White oak diminishes upward on the slopes, and chestnut, red and scarlet oaks become more abundant along with some pitch pine in the canopy and ericaceous shrubs.
RIDGE AND VALLEY SECTION

This section extends from southern Tennessee northeastward through Virginia and into northeastern Pennsylvania almost to the glacial boundary. It is about 40 miles wide in Tennessee, becomes progressively wider in Virginia, and reaches a maximum width of 80 miles in central Pennsylvania. Past geological history strongly influences the present form of this section and its vegetation. The rocks are largely sedimentary, with originally parallel layers of sandstones, conglomerates, shales, and limestones. There was an upwarping and compression of the entire area, followed by erosion that removed the softer shales and limestone and left the harder sandstones and conglomerates as ridge sides and tops. Now the area is a series of more or less parallel even-topped ridges with valleys between. The sides and slopes of the ridges are usually sandstones and conglomerates, and the valleys either shales or limestones depending on the degree and position of erosion. Soils formed from the sandstones are usually thin and sandy. Soils formed from shales can be good productive soils if weathering has proceeded far enough. The best soils are those derived from limestone.

The vegetation of this area is unusually varied, influenced by climatic differences caused by latitude, soil and topographic differences brought about by the nature of the underlying rocks and the nearness of different vegetational regions adjacent to it. It is very hard, even with a stretch of imagination, to see one climax for the entire region and one is tempted to use a species approach or a polyclimax viewpoint. However, there are some
groupings of species that remain somewhat constant throughout the entire length of this area. In general, the forests of the ridges are oak-chestnut except in sheltered ravines and coves where mesic species including hemlock are found. The valley floors are dominated by white oak and other oaks, while certain ravines along streams below the valley floor are beech or mixed mesophytic. The southern part of this section from Knoxville, Tennessee, southward, lacks the mountain ridges so conspicuous farther north and the vegetation looks much like that of the Great Valley. The section through northeastern Tennessee and southern Virginia has the ranges separated by broad valleys and there are only a few mesic species of the Cumberland Mountains except in the areas quite close to the Cumberlands. A number of forest communities are well illustrated in the mountains near Mountain Lake, Virginia (Braun 1950, p. 232). Chestnut was formerly the dominant tree on the slopes, but now that it is gone, Red oak, its former most important associate, seems to be assuming first place. Other trees are white oak, red maple, sweet birch, cucumber tree, and service berry. Striped maple, mountain holly, witch hazel, and some ericaceous shrubs are present. Hemlock forests with rhododendron are abundant in the coves and slopes near the lake. Dwarfing of many species of the area is common on windswept ridge crests and sometimes bear oak (*Q. illicifolia*) is the dominant species. White oak is less abundant on the low slopes here than it is farther north.

The middle section, from Spruce Knob of West Virginia southward for about 100 miles, is a mountainous region of closely
packed ranges. The western part close to the Cumberlands has vegetation much like that of the mixed mesophytic forest, especially on the low slopes and in the valleys, except that basswood and buckeye are absent or rare. Mixed forests with hemlock, beech, tulip, red maple, red and white oak, and occasionally sugar maple, basswood, and white pine are present in the most mesic habitats in the ravines. Oaks occupy the slopes, with white oak the usual dominant on mesic areas and chestnut oak on the drier slopes. Chestnut is now gone from the area except for sprouts. Pines are common on the cliffs.

The ridges in the Pennsylvania part of the Ridge and Valley section have been repeatedly lumbered and most of the forests are secondary. Oaks of one kind or another make up the major vegetation of the slopes and ridge tops. White oaks are more common on the lower slopes. Chestnut oak is the major tree on rocky and thin soiled slopes. At many places there are large areas of rock slides occupied largely by chestnut oaks which are low branching and undesirable from a lumberman's point of view. Where the soil is not so thin, red oak and scarlet oaks and, at lower elevations, white and black oaks are components of a mixed oak forest. Red maple, striped maple and sometimes dogwood, along with young trees of the major oaks, make up the lower tree layer. Mountain laurel, huckleberries, blueberries, and other ericaceous shrubs are often abundant in these chestnut-oak or mixed oak woods. Small hickories are often present, but almost never become canopy trees in these oak-chestnut woods. Small chestnut plants, sometimes as tall as 20 feet, are universally and abundantly present
in any woods where chestnut oak is dominant. The larger of such chestnut plants almost always show obvious infections of blight.

Rocky road cuts and other open areas along the slopes are quickly invaded by sweet birch, trembling aspen (*Populus tremuloides*), red maple, big toothed aspen (*Populus grandidentata*), bear oak, and common locust. Gray birch (*Betula populifolia*) is often the major tree in such places in the more northern ridges, and tulip tree is seen in such open areas at low elevations in the southern ridges. Large sweet birch trees are often present in the less dense woods, and red maple remains as a constant subdominant tree in all the wood on the slopes.

Only the large Susquehanna River and the smaller Juniata River cut through the major ridges. The secondary streams run nearly parallel to the ridges in the valleys, with their smaller tributaries arising on the slopes. In the flat-bottomed ravines of these small streams, hemlock is often the dominant tree. If one crosses the ridges from Bethel, Pa., in the south to Bloomsburg in the north, there is a noticeable change in the position of hemlock. In the southern part, hemlock is largely confined to a narrow strip along the small streams or in the small flood plains, with only a few trees of this species short distances up on north-facing slopes. The farther north one goes, the farther up the slopes hemlock is found, until on the last ridges before the Allegheny front, hemlock is found all the way to the top of the ridges, especially north-facing ones.

The valleys between the ridges are the locations of towns and villages often associated with coal mines. In areas where
coal is not found, considerable farming takes place. In either case there are few forests left and vegetation must be judged by scrappy patches. White oak is the major tree of the valleys and black, red, and scarlet oaks much less numerous. In these valleys hickory trees are sometimes present as large as the oaks. Farming in these small valleys in Pennsylvania is not particularly profitable and some farm land is being abandoned. Virginia pine is a common invader in abandoned fields south of Pennsylvania State College and there are now a number of young stands in that area. White pines sometimes invade abandoned fields in central Pennsylvania and were planted to some extent there until the bud worm made such a practice unprofitable.

The anthracite coal mines of Pennsylvania are located in the northeastern part of the Ridge and Valley section of Pennsylvania. This area was originally oak-chestnut forests on the slopes and white oaks with other mesic species in the valleys. When pit mining was the major way of removing coal, there was some destruction of forests, as enormous black refuse piles or shaly rocks mixed with inferior unmarketable coal were built up around the collieries and towns. Fires were common around the mines, and often whole mountain sides were burned over. But these destructive forces were minor in comparison with that brought about by the more recent strip mining. Most of the seams of coal are tilted and deep, and tremendous earth moving machines now move vast quantities of soil in securing the coal. This leaves long ridges of buff colored overburden along one or both sides of a deep trench. State laws require that these trenches be
back-filled or a penalty paid. But it was usually cheaper for coal companies to pay the penalty than to fill the trenches. Recent laws demand back-filling, and hopefully there will not be any new trenches left. The Anthracite Coal mine region is now a mosaic of burned-over mountainside trenches, overburden piles, and mountains of black coal refuse and black settling basins where fine coal from the cleaning processes has settled. State laws require that plantings be made on the overburden, but growth on these plantings has not been as successful in the anthracite region as it has been in the bituminous coal sections of western Pennsylvania and Ohio. Very few plants of any kind will grow on the black sludge of the settling basins. Schramm (1966) carried on experimental work for a number of years trying to find out why plants would not grow on black wastes and came to the conclusion that excessive heat at the black surface killed most plants. Chapofsky is presently carrying on research on the growth of plants, on both black refuse and spoil banks, and finds that, in addition to the surface heat, soil acids prevent growth of most plants. He is having success in some places by adding lime, but since this is impractical for large areas he is trying to find species that can endure the acid conditions. There are a few native plants that do grow over most spoil banks and over some black refuse. These are gray birch (*Betula populifolia*), sweet birch, trembling aspen, and big tooth aspen, sweet fern (*Comptonia perigrina*) and sometimes red maple and fire cherry (*Prunus pennsylvanica*). But most of these trees are short-lived and of no commercial value, and Dr.
Chaposki continues the search for trees that will grow on coal refuse and spoil banks that will also be of some commercial value. This region that was once among the most attractive in the state is now deeply scarred and ugly. It is so unattractive and aesthetically depressed that people hesitate to move to industries that are being established in the area to replace the declining coal mine industries.

If present laws demanding back-filling are enforced, if plants that will grow on the waste piles are found and encouraged, and if fires are eliminated, it would be possible to get some kind of forests on at least parts of this area. Already sections of the mountain that were burned and some of the older mine spoils are covered by a stunted forest of bear oak with occasional chestnut and other oak trees and an extensive ground cover of sweet fern. Young stands of aspens and birches are now seen on some refuse piles abandoned less than 20 years ago. If any kinds of plants, native or introduced, get started, they shade the soil accumulate litter, add organic matter to the soil, and at least cover up the unsightly piles of mine refuse. The big problem is still the black refuse piles where little growth has taken place even after 50 or more years of abandonment.
PIEDMONT SECTION

The piedmont section of the oak-chestnut extends from southern Virginia, where it is a narrow strip along the Blue Ridge, into Maryland, Pennsylvania, and New Jersey nearly to the glacial border. This is the area of early colonial settlements, continual farming, and presently high industrial use and urbanization. Few forests remain, and those are located on rough and unproductive lands that probably never had typical forests of the area.

In some of these fragmentary forests there are small chestnut sprouts indicating the former presence of this species. Through Virginia and Maryland the dominant trees are often white oak and black oak with tulip tree, red maple, and sour gum, hickory and scarlet oak reaching canopy, and dogwood abundant in the small tree size. The shrub layer includes azaleas, huckleberries and blueberries. Forests on the hilly section near the Blue Ridge often contain chestnut oak and red oak. These forests show some characteristics of the oak-chestnut forests to the west and oak-hickory-pine forests to the east, and south are an area in which each stand needs to be considered alone and classification is difficult.

This piedmont section in Maryland lacks the hilly areas of Virginia. In 1910, Shreve reported on the Piedmont upland west of Fapp's ridge in which 35% of the trees were chestnut, 30% black and white oaks, 28% mockernut, pigment, and bitternut hickories. In others he reported that chestnut oak was the leading species.

In Pennsylvania south and east of the first ridge lies an
area of questionable geological history (Fenneman 1938). It in­cludes the end of the Blue Ridge, the beginning of the New England Province, two limestone valleys, the Great Valley and the Lancas­ter Valley, a band of triasic sandstones and shales and a true piedmont area with metamorphic rocks. The areas of less eleva­tion are interrupted by patches of highlands and ridges rising as much as 600 feet above the general 300 to 400 foot level of the gently rolling lower parts. Streams are generally sluggish and meandering through the limestone valleys, but have often cut deep gorges through the river hills near the Susquehanna River.

The vegetation of this region is complex because it has so many kinds of underlying rocks, varied topography and proximity to several vegetational regions. Dr. Braun (1950) maps it as oak-chestnut, and in some places it does resemble those forests. Harshberger (1911) considers this area to be an extension of the mesophytic forest so common in West Virginia and Kentucky. Illic (1925) thinks the vegetation of certain ravines in Lancaster county resembles the hemlock northern hardwoods of northwestern Pennsylvania. This area was a center of taxonomic research in colonial days and many lists of species were published for dif­ferent parts of it, but there was little comment on the major aspects of vegetation or the distribution of species. By the time modern plant ecology began, soon after 1900, practically all the original forests were gone from southeastern Pennsyl­vania and ecologists turned their attention to the still abun­dant forests of the northwestern part of the state.

There are a large number of tree and shrub species present
in this part of Pennsylvania and their combinations in communities vary from habitat to habitat. Some communities are typical oak-chestnut, some have resemblances to oak-hickory, and some contain species combinations of the poor mixed mesophytic or possibly hemlock northern hardwoods.

Most of the best farmlands have few native trees left of any kind to indicate what the former forests were like. The following evaluation of this area is given from the unpublished data and personal observations of Catherine Keever, who has lived and taught plant ecology near Lancaster, Pennsylvania, for 15 years.

Oaks are clearly the most abundant trees of the area. There is some evidence from a few scrappy stands and groves of trees near houses that white oaks may have been very abundant on low gently rolling areas and may have been the dominant tree of the presently best farms. A few large black oaks usually accompany the white oaks. One stand on nearly level but slightly rocky soil was composed of very large white oak trees 3 or 4 feet in diameter and almost as many hickory trees (Carya tomentosa) of the same size, along with a few large black gum trees and a heavy understory of dogwood, red maple, and maple-leaved viburnum, but no ericaceous shrubs. There were many 3-to-4-inch-high seedlings of white oak in this stand, but no intermediate sizes of the species. This stand has recently been cut and all the large oaks and hickories have been removed.

Chestnut oak is the usual dominant of the highest and often the rocky or sandy hills, and is usually accompanied by lesser numbers of black, scarlet, red and sometimes white oak. Chestnut sprouts are always abundant in stands in which chestnut oak is
the dominant and the major shrubs in such stands are mountain laurel, blueberries, and azalea (Azalea nudiflora), dogwood, red maple, and black gum, with reproduction of the oaks making up the small tree layer. Hickories (C. tomentosa) and (C. ovalis) are present as small plants rarely over 10 feet tall but never grow to be canopy trees in such woods. The only place hickories seem to be able to grow to be large trees in this region are dry rocky areas where vegetation in general is sparse. Lower and less rocky hills often have about equal amounts of these oaks, with an increase in number of white and black oaks and a decrease in number of chestnut oaks and ericaceous shrubs.

Beech seems to be much more common in the piedmont of Pennsylvania than it is in Maryland and Virginia. It is sometimes present mixed in oak woods near the bottom of the low hills. It is often found in otherwise almost pure white oak stands on low gently rolling areas. It is most abundant on west-to-southwest-facing bluffs along minor streams and in ravines of the river hills. Hemlock is abundant in the ravines of the river hills and occasionally on steep north-facing bluffs along the minor streams well away from the river. Red oak is more common with hemlock in the ravines than it is in the general oak woods.

Sugar maple is usually absent from most of the woods, but in a few special places it is abundant. These places are north- or west-facing steep slopes above streams or occasionally in ravines with hemlock and beech. Basswood (Tilia americana), umbrella tree (Magnolia tripetala) and holly are occasionally found in the ravines near the river. Pawpaw is common in the
ravines and other mesic woods of the area.

Tulip tree is presently the dominant tree in many of the forests near the river. These forests were heavily lumbered about 70 years ago and these trees must have gotten started at that time. There is no reproduction of tulip trees in closed forests except in rare openings. There are a few understory tulip trees that are sometimes interpreted as reproduction, but increment borings show these trees to be nearly as old as the big ones, and many of them are dead or dying. Young tulip trees are usually present in any open disturbed places in the more mesic sites. A wooded area where a pasture on a hillside was abandoned about 35 years ago has tulip trees and sycamores as the two most abundant species, but neither are reproducing there.

Box elder (Acer negundo) is the dominant tree in flood plains where it grows to be a large tree and reproduces freely. Box elder is common in abandoned fields and pastures, but does not remain in mature well drained woods. Silver maple, river birch, and slippery elm, are sometimes present in flood plains, and sycamore regularly lines most of the small streams.

Farm land is rarely ever abandoned in the limestone valleys, but in the low hills and less productive soils of the schist and sandstone areas it may be. The earliest woody invaders are sumac, wild cherry, box elder, common locust, slippery elm, white ash, sassafras, ailanthus and sometimes tulip tree and sycamore in moist habitats. Pines never invade abandoned land in limestone areas, but Virginia pine often comes in the non-limestone areas of the southern part of Lancaster county.
Red cedar is rare except in a large area in southern Lancaster county near the Maryland border where there is serpentine rock at or near the surface. Red cedar is abundant on the thinnest soil there, and Virginia pine is common where the soil is slightly deeper. Post oak and blackjack oak are replacing the pines and cedars in the more advanced stages of succession.

Gordon (1941) reports on the vegetation in Chester County between Lancaster and Philadelphia and gives much the same picture of vegetation there as exists near Lancaster.

The glaciated northeastern section of the region mapped by Dr. Braun (1950) including parts of many physiographic regions for the east-central part of Pennsylvania, the northern half of New Jersey, the Hudson valley, past Albany and eastward through most of Connecticut, Rhode Island and the southeastern parts of Massachusetts. One thing in common for all this area is that most of it was once covered by glaciers. The present topography varies greatly from more or less rugged upland areas to smooth outwash plains of Long Island and Connecticut, with their numerous bogs and swamps.

Ecological and forestry research in the area was abundant in the early part of this century. (Nichols 1913, 1914, 1916, 1920; Raup 1938, 1941; Taylor 1923; Bromley 1935; Lunt 1938; Tryon 1930; Bromley 1935). Vegetational analysis and interpretation has been continued by Cantlon 1953, Buell 1954, Niering 1953, Pearson 1960, Buell, Langford, Davidson, and Ohmann 1966, and many others. All of this research agrees that oaks of one kind or another predominate over much of the area today and that chestnuts were abundant there before the time of the blight.
This entire area has been much used and abused by man. It was consistently burned by the Indians before the time of the white man. Since then, the forests have been cut time after time and fires have continued until the urgent fire prevention campaigns of this century. Much land was cleared for farming and pasturing soon after European settlement. The best of this cleared land is still farmed, but much of it was abandoned beginning more than 100 years ago when the railroads made the extensive and better farm land of the central part of the country available. Species of oaks and chestnut have been favored by cutting and burning because they sprout freely from stumps and unburned roots. Hawley and Hawes (1912) call most of this region a "sprout hardwood" forest. Had the broad fertile valleys been left in forests we might have a different concept of the forests of the region.

There is a supposedly virgin forest, the Hutchinson Memorial Forest, near New Brunswick in the gently rolling part of New Jersey that has been intensively studied by ecologists at Rutgers University. The canopy (Monk 1947) is dominated by white oak, black oak and white ash. Trees rarely ever reaching canopy size are sugar maple, red maple, Norway maple (Acer platanoides) and sweet cherry (Prunus avium). Dogwood forms a continuous layer under the larger trees. Maple-leaved viburnum is the most common shrub and black-haw (Viburnum prunifolium), black cherry, choke cherry, (Prunus virginiana), spice bush, Viburnum dentatum, Smilax rotundifolia, Leucothoe racemosa and poison ivy are present in special habitats. This area has never been completely cleared but has been subject to fires and removal of fallen trees.
Niering (1953) studied the vegetation of High Point State Park near the northwest corner of New Jersey, an area on sandstone and conglomerates. He found that chestnut oak and red oak were most abundantly present over the entire area except for the valleys, which were predominantly white oak, and that the ravines contained sugar maple, white ash, sweet birch, yellow birch, and sometimes hemlock.

Buell, Langford, Davidson, and Ohmann (1966) sampled 60 stands scattered over most of northern New Jersey and found the region overwhelmingly dominated by oaks, with chestnut oak more common on the xeric sites and other oaks in areas of intermediate moisture conditions. Sugar maple or hemlock along with basswood (Tilia americana), beech, hickories, red maple, sweet birch, white ash, and black cherry were present in the best soils. There was very little reproduction of oaks, but reproduction of the mesic species, especially sugar maple was good. From this they proposed that, if fire and cutting were eliminated, the forest of the future might contain much more sugar maple and other mesic species than at present.

The upland of Connecticut is much like that of northern New Jersey. Egler and Niering (1967) describe the vegetation of the McLean Game Refuge in north central Connecticut. The western highland part has elevations up to 1100 feet with sandy loam soils varied by stony phases. Its highest slopes have stunted forest 99% chestnut oak with a solid ground cover of huckleberry (Gaylussacia baccata) and blueberry (Vaccinium angustifolia and V. vaccillans). Farther down the slopes the only tree is chestnut oak but not stunted as above, and mountain laurel is the major
ground cover. The greatest area in the western highlands is on the middle slopes, where red oak, white oaks, and chestnut oaks are the major trees, with black birch (*Betula lenta*), grey birch and paper birch in places of recent lumbering and other disturbances. Maple-leaved viburnum and witch hazel are the most abundant shrubs on the middle slopes. The lower slopes have a forest of mixed dominance with oaks (other than red oak), hickories, sugar maple, yellow birch, hemlock, beech, white ash, and American basswood.

East of the western highlands are tilted beds of Triassic rocks called trap rock ridges, with gentle soil-covered slopes on the southeast side and steep cliff like face above talus slopes on the other side. Near the top are belts of red cedar, with some scrub oak (*Quercus ilarifolia*), shrubby chinquapin oak (*Q. prinoides*) and pitch pine. On the upper gentle slopes are a number of hickories and below this a band of oaks. In forests on the lower gentle slopes red oak and pigment hickory (*Carya glabra*) make up 70 percent of the forest with some sugar maple, hemlock, white ash, white pine, various oaks, hop-hornbeam, flowering dogwood and red cedar. On the steep north-facing cliffs of the trap rock are found hemlock, paper birch, sugar maple, and striped maple. The talus slopes of the north side have basswood, hemlock, sugar maple, dogwood, black birch, red oak, hop-hornbeam, gray birch, white pine, and hickory.

In the McLean Game Refuge there are sand plains which are thick deposits of coarse to fine sands usually capped by sandy gravel that were deposited by glacial streams. Much of these sand plains were once used for farming and pasture, but were
abandoned before 1900 and often burned after that. During the time of grazing and burning, red cedar, mountain laurel, grey birch, oaks, and other hardwoods became established. Now that fires are being controlled, white pine and pitch pine are becoming established among the hardwoods, and the grey birch and trembling aspen are beginning to die out. At the present time there is a great mixture of many species depending on its past history present topography and soils.

There are a large number of ponds, lakes and swamps in southern New England. Nichols (1915) and others have described these wet areas. White cedar (Chamaecyparis thyoides) is the dominant tree in certain of these swamps and bogs, as it is along the Atlantic coast southward. It is sometimes associated with black spruce (Picea mariana), a more northern species. In many of the wet depressions left by glaciation there are deciduous swamp forests in which red maple, white elm, pin oak, swamp white oak, sour gum, and occasionally sweet gum are present. At places white cedar is present, in the swamp forests of the glaciated section.
LITERATURE CITED


Egler, Frank, and W. A. Niering. 1967. The natural areas of the McLean Game Refuge. State geological and Natural history surveys of Connecticut. The vegetation of Natural Areas no. 3. 36 pages.


Other references pertaining to specific sites are given with those stands.
Map of
FOREST REGIONS AND SECTIONS

DECIDUOUS FOREST FORMATION

From Braun: "Deciduous Forests of Eastern North America".
Alabama
1. Bee Branch Scenic Area

This 1200 acre site is located in Lawrence County, Alabama, 22 miles N.E. of Haleyville and 20 miles S.W. of Moulton (see map). It is managed by the U.S. Forest Service, William Bankhead National Forest. A responsible person at the site is William E. Bustin, District Ranger, P.O. Box 339, Haleyville, Alabama. It is a scenic area in the National Forest. This information was supplied by Catherine Keever, Millersville State College, Millersville, Pa., in November, 1970. While hunting for the office of the Bankhead National Forest, I talked to Mr. Rayford Hyatt, who is Game and Fish Commissioner at the Turkey Foot Conservation Station near the National Forest. He told me about what he thought was the best piece of virgin vegetation anywhere in the area. He told me that the Alabama Conservancy was very much interested in seeing that this area be made a Wilderness Area. The Forest Service has designated a 128-acre parcel of this site as a Research Natural Area. I have considerable information of the plants and animals of the area from Mrs. Robert E. Burks Jr., vice-president of the Alabama Conservancy. From all that I hear, this is the largest, the best, and most desirable natural area in Northern Alabama. I did not have an opportunity to go into the area.

Those familiar with the site are:
Mr. Rayford Hyatt, Dept. of Conservation,
Route 3, Moulton, Ala.
Mrs. Robert E. Burks Jr., 3733 Dunbarton Drive, Birmingham, Ala. 35223
Thomas A. Imhof, 1036 Pike Road, Birmingham, Ala. 35218

"The heart of the Area, comprised of over 1200 acres on Bee Branch of the Sipsey fork of the Black Warrior River, is an extensive block canyon cut deeply in native rock. The canyon walls, ranging up to 100 feet high, permit only limited access and enclose an area outstanding for scenic beauty and large timber.

This is one of the last remnants of virgin cove hardwood forest known to exist in the south. Among the many tree species found here are hemlock, yellow poplar, black birch, white and red oaks, sugar and red maples, beech,
sweet gum, big-leaved magnolia, cucumber tree and holly. Various native shrubs and many kinds of ferns are found here.

The largest known yellow poplar tree in Alabama, 80 inches in diameter and 150 ft. high, is located just below a waterfall near the head of the east fork of Bee Branch."

(This description is taken from the Forestry pamphlet describing the area).

Further descriptions of the area with lists of plants and animals of the area are in the appendix.

References:
Pirtle, Caleb. "In Search of a Wilderness," Southern Living, (With Supplementary Materials).

Evaluation:
I have not seen this site but, without doubt, it is the best piece of vegetation in northern Alabama. According to the accounts, the deep canyon has been too inaccessible to allow lumbering allowing this virgin stand to escape the saw. The large trees are of the species common in the mixed mesophytic regions and it is because of such vegetation in canyons and ravines that Dr. Braun includes the northern part of Alabama in the Western Mesophytic region. The Alabama Conservancy would like to see the virgin area of 1200 acres and a much larger non-virgin area surrounding it be made a Wilderness Area, but is running into some legal obstacles.

Recommendation:
The 1200 acres of virgin forest in the Bee Branch Scenic Area is highly qualified to be a Natural Landmark no matter what disposition is made of the request to make the larger area a wilderness.

Priority 1
Figure 1
Bee Branch Scenic Area
(Taken from Forestry Brochure)
This 80-acre site is located in Franklin County, Alabama, 5 miles north of Hackleburg, and one mile off U.S. 43; there are signs at the U.S. 43 turn off. It is owned by Paul Massey and Mrs. Mildred Massey, Route 3, Phil Campbell, Alabama. It is a private park, admission 90¢. There are trails, steps, benches, and direction signs, but practically no disturbance to the vegetation. The Masseys were in the process of selling the area to the Alabama Conservancy when I was there in the summer of 1970. A former graduate student at Vanderbilt University told me about the place and I went to see it in the summer of 1970. When I did go into the gorge, I was struck with awe at its beauty and grandeur. The vegetation is obviously virgin with many large trees typical of the Mixed Mesophytic region. A number of biology departments from Alabama colleges make regular visits there.

Mr. Massey told me that the following people know the site well:

Dr. Charles S. Prigmore a professor at the University of Alabama in Tuscaloosa who is the new president of Alabama Conservancy.

Mrs. Robert Humphreys, 9220 Brookhert St., Birmingham, Alabama, the past president of Alabama Conservancy.

Mr. John Scott, Box 2069, Montgomery, Alabama.

A small stream has cut a deep ravine through sandstone a hundred feet deep. There are numerous large sandstone boulders forming tunnels and caves. The vertical sides of the ravine are covered with masses of liverworts, ferns, and mosses on the dripping sides. There are several waterfalls over the sides of the cliffs. The lower part of the ravine has a fertile flood plain covered with hemlocks, beeches, sweet gum, tulip trees, sugar maples and other mesophytic trees. Some of the hemlocks are nearly four hundred years old and many of the largest trees are three or four or more feet in diameter. An inventory of the woody plants present in the ravine is in the appendix. There is no doubt that this place is virgin and has never been disturbed.

References:


Evaluation:

This place is relatively small, but virgin and beautiful. It is distinctly set apart by vertical cliffs from the worn-out farmland surrounding it. It is far superior to the Cathedral Park Natural Landmark, in West Virginia because it has a greater variety of species of trees and other plants. The paths, steps and rustic bridges have not harmed the vegetation. Now that the Alabama Conservancy owns it, there is no question of its preservation.

Recommendation:

This site is exceedingly well qualified to be designated as a Natural Landmark. Priority 1.

Figure 2
Dismal Wonder Gardens
3. - Hurricane Creek Park

This 80-acre site is located in Cullman County, Alabama, 7 miles north of Cullman on U.S. 31. There are signs at the Hurricane Creek bridge on U.S. 31. The site is owned by William E. Rodgers, Route 1, Vinemont, Alabama. His home is on U.S. 31 south of park. It is now a private park with trails, bridges, steps, and benches. There has been no damage to the vegetation since Mr. Rodgers has owned it. He charges 75¢ admission and is using all of his income from the park in improving trails. He hopes to keep the place undisturbed, and would be willing to sell to some conservation group. Dr. Ben Channel and Dr. Robert Krawl of the Vanderbilt University Biology Department told me about the site. They occasionally take classes there to study the vegetation. I went to see it in the summer of 1970 and talked to Mr. Rodgers. He is a wounded veteran and is running the place as a hobby and not particularly as a money-making place. His health has been worse lately and he wonders how long he can manage the area. I walked through the ravine and took notes and lists of plants there.

References:
So far as I know there is no published data on the site.

Those familiar with the site are:
Dr. Ben Channell, Department of Biology,
Vanderbilt University, Nashville, Tennessee.
Dr. Robert Krawl, same address.
Mrs. Barbara Turner, Department of Biology,
Peabody College, Nashville, Tennessee.

The park is in a ravine cut through sandstone by the Hurricane Creek. The walls of the ravine near the top are almost vertical, with rock boulders and talus slopes forming the lower part of the ravine. There is a small flood plain at the bottom. One side faces north and the other side faces south. The vegetation on the south-facing slope is dominated by chestnut oak and virginia pine with some white, post, black and southern red oaks. Other smaller trees are persimmon, dogwood, red maple, sourwood, black gum, sassafras, mountain laurel, hickories, service berry, paw-paw, and magnolia. This vegetation, except for the mountain laurel, paw-paw, and magnolia, is typical of dryer areas in the region. The north-facing slope had much
mosses, ferns, and liverworts on the cliffs, and the canopy
trees were magnolia, hickory, chestnut oak, beech, sugar
maple, and white oak. The smaller trees were basswood,
black birch, hemlock, sweet gum, ironwood, red maple, sour-
wood, persimmon, dogwood, oak-leaved hydrangia, species of
azalea, tulip poplar, and a few small virginia pines. The
north-facing slope had strong resemblances to the mixed
mesophytic region. There was no visible evidence of lum­
bering. The largest trees on the south-facing slope were
only 12-18 inches in diameter, but the largest trees on the
north-facing slope were as much as three feet in diameter.
If this site were preserved it would show examples of the
two major kinds of plant communities in that area.

Evaluation:
Hurricane Creek Park lacks some of the distinct
beauty of The Dismal Gardens that lie some fifty miles west
of it. Hurricane Creek Park is in a gorge cut through
sandstone but the gorge is much wider and admits more light,
producing a vegetation on its south facing side typical of
the uplands of the region. It is protected now but there
is some danger that the owner may have to sell it to some­
one who would not protect it. There are some valuable
lumber trees on the north-facing side but with the diffi­
culty of removing them from the gorge, the danger of
lumbering is reduced, even if Mr. Rodgers had to sell it.

Recommendations:
Priority 2.
Figure 3

Map of Northern Alabama

1) Bee Branch Scenic Area
2) Dismal Wonder Gardens
3) Hurricane Creek Park
CONNECTICUT
1. - William Buell Natural Area

This 72-acre site is located in Litchfield County, 3
to 4 miles on State Route 63, north of Litchfield. It is
owned by the Nature Conservancy of Connecticut, c/o Dr. R.
Goodwin is the nearest responsible person. Present land use
is preservation of natural features. This information was
supplied by Dr. Murray F. Buell, Rutgers University, New
Brunswick, New Jersey who is the former owner of the property,
which had been in the Buell family since the land was
settled.

Those familiar with the site are:
Dr. W. A. Niering, Connecticut College,
Dr. F. H. Bormann, School of Forestry, Yale
University, New Haven, Connecticut.
Dr. F. Egler, Aton Forest, Norfolk,
Connecticut.

The property is located on the Berkshire Plateau. The
terrain generally slopes down toward the east. A tributary
of the Bantam River flows across the property, most of the
way through a gorge, and leaves the property near the north­
est corner. Most of the vegetation consists of an old
forest of northern hardwood species. A small area of swamp
forest occurs at the northeast part of the property along
the stream. North of the stream the vegetation is young
woodland, characteristic of old field succession in fairly
late stages. Rapid residential growth is starting to envel­
lope the area, so that the principal danger of deterioration
could result from careless incursion by people of the sur­
rounding area. Considering the quality of residential
growth and the present largely rural nature of the area such
deterioration would seem only a danger in the distant future.
Moreover, if the present type of residential development is
maintained, the danger will probably be minimal.

Evaluation:
I have not seen this site, but Dr. Buell described it
to me. He said there had been no cutting since the very
early part of this century in the wooded area which he
thought was as good as any in the area and certainly typical
of the region. The Buells gave it to Nature Conservancy and
it certainly will not be cut and will be protected as far
as is possible.
Recommendation:
This site should be investigated further to see if it is suitable as a potential Natural Landmark. Priority 2.

Figure 4
William Buel Natural Area

2. - Natural Area of Connecticut Arboretum

This 140-acre site is located about 1 mile north of New London, Connecticut near the Connecticut College campus on State Highway 32, and is owned by the Connecticut College. A responsible person at the site is Dr. William A. Niering, Department of Biology, Connecticut College, New London, Connecticut. Long range ecological studies by faculty and students are being done in the Natural Area without management or disturbance of the flora and fauna. Mapping, inventories of plants and changes following natural blowdowns are being followed. Parts of the Arboretum are being planted and managed, but the 140 acres of natural area are not being disturbed.

Those familiar with the site are:
Dr. William A. Niering, Department of Botany, Connecticut College, New London, Conn. 06320
Dr. George S. Avery, Brooklyn Botanical Garden, 1000 Washington Avenue, Brooklyn, New York 11225
Dr. Richard H. Goodwin, Department of Botany, Connecticut College, New London, Connecticut

The topography of the Natural Area is irregular and underlain by granite-gneisses of complex origin. Except for irregular rock outcrops, a relative thin mantle of ground
moraine overlies the bedrock. The area includes wooded ledges, which give way westward to a moist wooded ravine transversed by numerous small intermittent streams. The dominant trees are black, scarlet, and white oaks with sweet birch and hemlock locally abundant. Many of the trees are small because a hurricane blew down over a hundred large hemlocks in the area in 1938. Much of the ecological study deals with the recovery of this stand following the hurricane. The natural area also includes an island in the Thames River that is connected to the mainland by a small tidal swamp. This island area is also being studied ecologically by the faculty and students of Connecticut College.

The entire Natural Area gives an excellent example of the different kinds of vegetation found in that part of Connecticut: moist ravine, open woodland, a rocky promontory and tidal marshland. It will not be managed to change the vegetation and will continue to exhibit examples of normal vegetation of the region.

References:


Evaluation:

This is the kind of place we should be looking for as a potential Natural Landmark. It is protected and will continue to be. It is not virgin, but there is little virgin forest in New England. It is the kind of place that could be proudly displayed to out-of-the-region-visitors as typical vegetation.

Recommendation:

This site would make a good and suitable Natural Landmark. Priority 1.
Figure 5
Natural Area of Connecticut Arboretum
(taken from the Arboretum brochure)
3. - McLean Game Refuge

This 1700-acre site is located in Hartford County, Connecticut near Granby. It is owned by the Hartford National Bank, Hartford, Connecticut which acts as agent for the trustees of an endowment from the George P. McLean estate. The Natural Area is about half of the McLean Game Refuge and is permanently protected under terms of the McLean will. This information was supplied by Dr. W. A. Niering, Department of Botany, Connecticut College, New London, Connecticut. Dr. Niering suggested this as one of the best places in Connecticut. I have not seen it.

Those familiar with the site are:
Frank E. Egler, Aton Forest, Norfolk, Connecticut 06058
W. A. Niering, Department of Botany, Connecticut College, New London, Conn.

This Natural Area is large enough to include most of the kinds of vegetation of that part of New England:
1. Chestnut oak-ericad forest of the summits
2. Chestnut oak-laurel forest of the upper slopes
3. Mixed oak forest of the middle slopes
4. The beech-maple-birch-hemlock forest of the lower slopes
5. A fern belt and swamp forest
6. Successional vegetation on sand plains
7. Lakes, swamps, or bogs in undrained kettles

Although the vegetation has been disturbed in the past, it is now protected and has an excellent chance of again becoming the kind of vegetation that originally occupied the area.

References:

Evaluation:
I have not seen this site. However, Dr. Niering, who has worked extensively in Natural Areas in Connecticut, says it is the best place in the state. It is well protected and is large enough to include all variations of vegetation of the region.
Figure 6
McLean Game Refuge
(taken from Egier and Niering 1967)

Fig. 1. Routes to the McLean Game Refuge, located approximately 12 mi. northwest of Hartford.

Fig. 2. Map of the McLean Game Refuge, showing locations of its two Natural Areas, one in the Western Highlands (left) and the other in the Connecticut River valley on the sand plains, with one of the diabase hills or trap-rock ridges (Barndoor Hills) shown in the northeastern part of the map by 3 star-like symbols. The remainder of the Refuge is designated as Wildlife Areas, where management of the vegetation is permitted in order to increase wildlife values. A limited area has been set aside for picnicking in the northern part of the Refuge. Three kettles are shown by 1, 2, and 3.
Figure 7
McLean Game Refuse
(taken from U.S. Geological Survey Topographic Map of the Tariffville and New Hartford Quadrangle)
Recommendation:
This site is well qualified as a potential Natural Landmark. Priority 1.

4. - The Cathedral Pines

This 20-acre site is located in Goshen, near Cornwall Village, Litchfield County on Connecticut Highway 4; and is owned by the heirs of John E. Calhoun. This information was supplied by William E. Niering. When I talked to Dr. Niering in the summer of 1970, he suggested this as one of the best forest sites in Connecticut and wanted to see it recommended as a possible Natural Landmark. This is an old over-mature stand of white pines with an understory of hardwoods.

Those familiar with the site are:
Dr. W. A. Niering, Department of Botany,
Connecticut College, New London, Conn.
Henry W. Hicock, The Connecticut Agricultural Experiment Station, P. O. Box 1106, New Haven, Connecticut 06504

References:

Evaluation:
I give this site a low priority. Pines are successional in New England and the life time of white pines is limited. Many places in upper United States and lower Canada had extensive stands of very large red and white pines when the first white settlers came there. Most of these pines are about the same age and now are assumed to have started in the mid-sixteenth century after a forest fire removed most of the vegetation from the area. Carbon dating gives evidence of the time of the fire. There are now few of these stands left; those that were not destroyed by lumbering are now dying of old age and are being replaced by hardwood or hardwood-hemlock stands. I would hesitate to put a Natural Landmarker on this and have the last white pine tree fall down about the time the marker went up. Priority 3.
Other Sites in Connecticut not Recommended at This Time:

1. There is only one Natural Landmark in Connecticut, the Dinosaur Trackway in Hartford County, which does not feature vegetation.

2. Nature Conservancy holdings in the oak-chestnut region probably not suitable as Natural Landmarks:
   a. 5 mixed hardwood stands each less than 60 acres.
   b. 4 ravines with hemlock each less than 60 acres.
   c. 8 coastal marshes each of less than 12 acres.
   d. 5 second growth and abandoned farms each less than 100 acres.
   e. 5 sites with inadequately described vegetation each less than 100 acres.
   f. 4 rocky outcrops each of less than 40 acres.
   g. 6 swamps, flood plains or bogs each of less than 60 acres.

3. Nature Conservancy holdings that might be considered as potential Natural Landmarks. No one recommended these and I have no further information about them:

   A. Mixed hardwoods.
      5. Juniper Hill Natural Area, New Haven County, 133 acres. Mixed hardwoods around Sperry Pond and some marsh. Open to public.

   B. Ravines and other habitats with hemlock.
2. Burnham Brook Preserve, Middlesex County, 99 acres. Hemlock and mixed hardwood forest; ravine traversed by springfed stream. Visitors by permission.


C. Others


4. Sites recommended by Dr. Niering for which I could not get adequate information or permission of owners.

a. Meshomasic State Forest

b. Pachaug State Forest

c. Devil's Den, a 1,376-acre Nature Conservancy site in Fairfield County. I wrote asking for further information and got no answer.

d. Research area in the Connecticut Agricultural Experiment Station. Mr. Paul E. Waggoner, chief, Ecology and Climatology, (Connecticut Agricultural Experiment Station 123, Huntington St., Box 1106, New Haven, Connecticut 06504) wrote the National Park Service about this site suggesting it as a potential Natural Landmark and it was sent on to me. However, there was insufficient information in the letter. I wrote Mr. Waggoner for additional information, but never heard from him. His original letter and reprint are included in the supplementary materials.
GEORGIA
1. - Fort Mountain State Park

This site consists of parts of the 1897-acre state park located in Gilmer and Murray Counties, Georgia, 5 miles southeast of Chatsworth via U.S. 76 and Georgia 52. It is owned by the State of Georgia. A responsible person at the site is Tom Winkler, Superintendent, who can be reached at Fort Mountain State Park, Chatsworth, Georgia. It is a State Park with some picnic and camping facilities, but with several scenic and forest areas that the state is considering leaving in a natural state. This information was supplied by Miss Robin Jackson, assistant to the Director, Department of State Parks, 270 Washington Street S. W. Atlanta, Georgia 30334 in March 1970. I have not seen this site, but judging from the literature and information received from the Department of Georgia State Parks, it should be investigated. I cannot tell from the literature the state of disturbance of the vegetation; however, if it were left undisturbed over a period of time it should revert to typical vegetation of the region.

Evaluation:
I have not seen this site nor do I have detailed information on the vegetation. The chances of this site being virgin are remote, but, since it has been a state park and undisturbed since 1934, the site should be approaching climax condition even if it were lumbered before then. I am highly in favor of finding some "normal" areas of vegetation that represent the typical vegetation of the region and this could be one of them. It is large enough to contain upland forests, ravines and bluffs. It should be further investigated.

Recommendation:
Someone should investigate this site to see its possibilities as a Natural Landmark. My priority for this site is 2.
Figure 8
Fort Mountain State Park
(taken from Park brochure)
2. - Cloudland Canyon State Park

This site consists of parts of the 1699-acre State Park located in Dade County, Georgia, near Rising Fawn, 20 miles northwest of LaFayette, via Georgia Highway 143. It is owned by the State of Georgia, and administered by the Department of State Parks. A responsible person at the site is Mr. J. M. Crawford, Cloudland Canyon State Park, Rising Fawn, Georgia. It is a State Park with some camping and picnicking facilities, but most of it is undisturbed forest land. This information was supplied by Miss Robin Jackson, Assistant to the Director, Department of State Parks, in March 1970.

Evaluation:
I have not seen this place nor do I have any detailed information on the vegetation. However, it is large and most of it is described as undisturbed forest land. With the low elevations and accessibility to railroads it is doubtful whether much, if any of the site is virgin. However, since it has been a state park for a number of years and has been protected and will continue to be protected, it might contain areas of forest that are truly typical of this region. The Georgia Department of State Parks is interested in having this site considered as a Natural Landmark.

Recommendation:
I think the chances are high that there are parts of this park that are worthy of being designated as a Natural Landmark. It should be investigated. Priority 2.

3. - Chattooga River (Parts of)

This area consists of 43 miles of the Chattooga River located in Macon County, North Carolina; Rabun County, Georgia; and Oconee County, South Carolina. The river forms the state line between South Carolina and Georgia near Clayton, Georgia and Walhalla, South Carolina. Most of this area is in the Chattahoochee National Forest; land owners include the Federal government, the Georgia Power and Light Co., and some private parties. The Chattooga River was identified by Congress as a potential addition to the national wild and scenic rivers system in Section 5(a) of the Act of October 2, 1968.

References: See papers in supplementary materials.
Evaluation:

I have not seen this area except for certain upper parts in North Carolina a number of years ago. The Forest Service is the lead agency in a study nearing completion that will determine whether the Chattooga should be included in the national wild and scenic rivers system. If this is done, it should receive priority over a Natural Landmark designation. The rivers that rise in the southern Appalachians and flow south-eastward have scoured valleys and gorges that contain vegetation of particular interest to biologists because they are the meeting places of northern and southern flora and fauna. Some of these river areas are still virgin because of the difficulty of reaching them with lumbering machinery. Much research has been done in this region by biologists associated with the Highlands North Carolina Biological Station. The chief danger to these rivers is from the power companies who are claiming as many of them as possible for electrical power. The Chattooga is one river system that, so far, has escaped; and all of us who are interested in the preservation of our native vegetation should do all in our power to save it.

Recommendation:

We should do all in power to make this area a "Wild and Scenic River." If that fails, some of the best vegetational sites should be considered as potential Natural Landmarks. Further investigation should be done to choose the exact locations.

I give this area a priority of 2, not because it is not good, but because the "Wild and Scenic River" designation should be given priority over a Natural Landmark.
4. - The Zahand Tract

This 160-acre site is located in Walker County, Georgia near Chattanooga, Tennessee. It is administered by the Georgia Department of State Parks. The land has been set aside as a Natural Area by the State of Georgia. This information was supplied by Mr. John Gordon, Director, Department of State Parks, Atlanta, Georgia.

This tract is on Lookout Mountain on the Georgia side near Chattanooga, Tennessee. The Pennsylvanian Pottsville sandstone formation is unusual for the area and is covered by dwarfed chestnut oaks, pines, mosses, and lichens that can live in this severe habitat.

References: See description is supplementary materials.

Evaluation:

The dwarfed vegetation on rocky outcrops and ridges may not be as luxurious as that in the rich coves, but it is a true example of native vegetation and very interesting to biologists studying survival and evolution of plants growing in severe habitats. I have not seen this particular tract but I have been at other places on Lookout Mountain in Tennessee. I think one or more of such places should be considered as a potential Natural Landmark, and this may be the one. What is the status of the rest of Lookout Mountain? Is it publically or privately owned? Since the Zahand tract is owned by the State of Georgia and is being protected as a Natural Area it may be the site that should be designated a Natural Landmark, representing this type of geological formation and vegetation.

Recommendation:

This site should be further investigated as a possible Natural Landmark. Priority 3.
Figure 10

Map of northwestern Georgia

1) Fort Mountain State Park
2) Cloud Canyon State Park
3) Chatooga Wild and Scenic River
   (see Figure 9)
4) The Zahand Tract
The Georgia Natural Areas Council has made an intense search of all of the state in the past few years to locate areas to be designated as Natural Areas. The following is unpublished information concerning prospective locations in northern Georgia in the Oak-Chestnut and Mixed Mesophytic vegetational regions. I have studied this information and find that none of these seem to qualify as Natural Landmarks at this time. If they are protected over a number of years some of them might then qualify. Since I have not seen any of these I may be mistaken in my judgment against them.

Whitfield County

Hurricane Valley Area - natural, biological, scenic beauty; native species of trees and plants; water from large spring flows north. Located in the southwest part of the county, southwest of Dalton, Georgia, in Chattahoochee National Forest, in vicinity of Mill Creek Watershed Structure No. 8.

Fannin County

Mill Creek Area - a 1,000 acre wilderness area acquired by the federal government in 1912; no timber cut since then. It is located off State Highway 60 above Rock Creek Fish Hatchery in the southern part of the county.

Hemp Top Mountain - Tumbling Creek Area - a 2,000 acre scenic area owned by the federal government. Follow State Highway 2 from Blue Ridge to Watson's Gap and turn right. The area is relatively undeveloped.

Gilmer County

Carter's Lake - approximately 6,000 acres, including lake and surrounding area. It is owned by the federal government. Located near U. S. 411, and is in good state of preservation.

Chattahoochee National Forest - located on U. S. 76 and 411. Size - approximately 25,000 acres. Owned by the federal government. In a good state of preservation.

Georgia

The Appalachian Trail - begins near the county line, located north of Georgia 52 east. It is owned by the federal government and is in good state of preservation.

Union County

Brasstown Bald - 100 acres, 2 miles north of Vogel State Park, near Georgia 180. Plant and other natural beauty. Administered by the U.S. Forest Service.

Cooper Creek Scenic Area - trout fishing, campsites, nature observation. Take Georgia 60 from Suches towards Morganton; turn right at Thomas Grocery on Mulkey Gap Road for 5 miles. In excellent condition. Approximately 200 acres. Administered by the U.S. Forest Service.

Neel's Gap - nature observation; scenic beauty, hiking on Appalachian Trail; Blood Mountain, place of Indian battle nearby. Approximately 100 acres administered by the U.S. Forest Service. Located on U.S. 129 2 miles south of Vogel State Park.

Rabun County

Black Rock Mountain State Park - exposed rock 500 feet high and 1,200 feet long that permits panoramic view of surrounding area; camping, cottages, picnic areas. Located 2 miles west of Mountain City, Georgia on the Talmadge Trail. Size 1,447 acres. State owned. Five to fifteen acres have been developed; the other is suitable for development.

Tallulah River Recreation Area - waterfalls and some original timber, good trout streams, abundant game, camp sites. Area is approximately 9 miles long, along a narrow river between mountains, located in the northwest corner of the county on a gravel road from Persimmon Community, and paved roads from there to Highway 76 west of Clayton, Georgia, Size - 2,600 acres. Administered by the U.S. Forest Service.

Overflow Creek Road - natural area of outstanding plant and animal habitat, geological interest, and scenic beauty. On the West Fork of the Chattooga River, located between Georgia 246 to Highlands from Dillard, and Pine Mountain Community on Georgia 28 from Mountain Rest, S.C. to Highlands. Size - 56,000 acres. Administered by the U.S. Forest Service. Original forests.
Catoosa County

Catoosa Rifle Range - east of Ringgold on State Route 2, one mile east of intersection of State Route 2 and U.S. 41. This property containing some 1,600 acres, presently owned by the Federal government, has a development potential as a major regional recreation area, provided the property can be secured by Catoosa County. Proximity to Interstate Highway 75 makes it readily accessible to a large area and population.
I found the man who knows more about Natural Areas in southern Illinois than any other person. He is Dr. Robert Mohlenbrock of the Department of Botany at Southern Illinois University in Carbondale. I went there and talked to him, and he was very cooperative. I saw his unpublished data on more than a hundred potential Natural Areas in that part of the state. These records had maps, descriptions of vegetation, size, location, ownership, and state of preservation. He told me there were three excellent sites that he could recommend highly as potential Natural Landmarks and promised to give me complete records of these sites in time to include them in this report. He directed me to one of these, Pine Hills, and I went to see it. I do not even know the names and locations of the other two sites he had in mind because he promised to send me records. However, I have not heard from him.

1. Pine Hills Area

The Pine Hills area is a very large tract located in Union County about 23 miles southwest of Murphysboro by way of State Highways 149 and 3. It is part of the Shawnee National Forest. It is a 5 to 8 mile stretch at the bottom and top of a high limestone cliff and contains all possible variations of vegetation for that part of Illinois. There is a very large swamp near the base of the cliff in which pumpkin ask is the major tree with some red maple, swamp cottonwood, water locust, and a few bald cypress. Swamp shrubs and herbaceous water plants are abundant. There are some areas, periodically flooded, in which the dominant trees are red maple, and swamp cottonwood, along with some silver maple, sweet gum, and pin oak. Below the cliffs in areas never flooded are Beech, tulip poplar, sugar and red maple, large sassafras and some cucumber magnolia. A road through a big cover from the bottom of the cliff upward passes through a beautiful forest of white oak, northern red oak, and beech as the dominant trees with diameters of 18 to 24 inches. On higher elevations the major trees were post oaks, black jack oak, with a few white oaks. They say there are many yellow pines on the ridge top but I saw only a few along the road.
There are several scientific publications on the area:


Evaluation:
This is the best site I saw in the northern part of the Western Mesophytic region. It is large and publically owned and has all variations of plant communities in it. It is not virgin, but most of it is quite mature and climax. I do not know its preservation status but there were few disturbances evident.

Recommendation:
If you can secure the cooperation of the Forest Service it certainly should be made a Natural Landmark. Priority 1.

Figure 11
Pine Hills Area

Other Sites in the Western Mesophytic Region of Illinois

1. There are no Natural Landmarks in this region.

2. If Dr. Mohlenbrock provides the information on the other two sites he had in mind, and if they are nearly as good as Pine Hill, they should be considered as Natural Landmarks. He said one of them was a virgin cypress swamp.
INDIANA
I wrote letters to all ecologists in the southern part of Indiana asking for sites suitable for Natural Landmarks. All answerers said that Dr. Alton Lindsey of Purdue University was the person who knew these places and that if Dr. Lindsey did not know them, no one did. Dr. Lindsey has selected those sites from the Western Meso- phytic region of Indiana that he thinks worthy of being made Natural Landmarks, and sent the list to me. All of these sites are excellently described and located in the book:

Lindsey, Alton A., Damian V. Schmelz and Stanley A. Nichols. 1969. Natural Areas in Indiana and their Preservation. Published by the Department of Biological Sciences, Purdue University.

I will not copy or duplicate the descriptions of these nine stands, but have rearranged them according to Dr. Lindsey's forest types and priorities. Page numbers below refer to Dr. Lindsey's Natural Areas in Indiana . . . map numbers refer to Figures 12 and 13 of this report.


d. Cypress Slough, a 120-acre flood plain forest in Posey County. Priority 2. Map number 1, Page 75.


h. Pioneer Mothers Forest, a 80-acre beech maple forest in Orange County. Priority 1. Map number 8, page 194. Has been designated a Research Natural Area by U. S. Forest Service.


All of these sites are suitable as potential Natural Landmarks. Those with priorities 1 in each group should be attended to first.

Other Sites in the Western Mesophytic Region of Indiana

1. There is only one Natural Landmark in this region, Ohio Coral Reef and it does not feature vegetation.

2. There is only one Nature Conservancy holding in this region and it was not recommended by Dr. Lindsey.
Figure 12
Map of Southeastern Indiana

3. Jackson Woods
6. Lilly-Dickey Woods
7. Officers Woods
Figure 13

Map of Southwestern Indiana

1. Cypress Slough
2. Donaldson's Woods
4. Hemmer Woods
5. Kramer Woods
8. Pioneer Mothers Forest
9. Wesselman Park Woods
This 425-acre site is located in Letcher County, Kentucky, 30 miles south of Hazard by way of Kentucky Route 15, 7, and 1103 (all black top road). The Kentucky Department of Natural Resources manages this natural area which is open to the public. This information was supplied by Dock and Kelly Cornett, who may be reached by mail at Skyline, Kentucky. With meager information, I (Catherine Keever) went wandering over dirt roads across mountains and finally found this beautiful forest along a good blacktop highway. Dock Cornett, the son of Lilley Cornett, proudly showed me the forest.

Those familiar with the site are:
- Mr. and Mrs. Austin M. Zimmerman (Botanist at Morton Arboretum near Chicago), Brae Burn Farm, Algonquin, Illinois 60102
- George A. Armstrong, Cooperative Extension Service, U.S.D.A., Quicksand, Kentucky 41363
- James Newman, Department of Forestry, University of Kentucky, Lexington, Kentucky 40500
- Nevyle Shakelford, Resource Development Specialist, Beattyville, Kentucky 41311

With 425 acres, Lilleys Woods represents a relatively large tract of virgin forest. Botanists have estimated that 100 species of trees grow there, and many have attained large size. On the ridges and slopes that I saw, white and red oak, hemlock, hickory, beech and walnut predominate. Depending on slope and other factors, pine, rhododendron, mountain laurel, and maple also grow well.

One white oak measured 14 feet DBH and others of similar size were seen. No trees have been cut in the tract except for chestnuts after they were killed by the blight. The owners have prevented any timber trespass and suppressed all fires. Some charred logs were noted near the top of one ridge.

Bird life was noted to be very abundant. Mammals were scarce, with evidence of only squirrels, chipmunks, and raccoon.
The area has steep terrain, with three east-west ridges joined by a transverse ridge to the west. Two deep hollows separate the ridges. The rocks are horizontal sedimentary beds of siltstone, shale coal, and sandstone. The latter caps the ridges and produces vertical cliffs and overhangs. A small cave has attracted spelunkers.

Mr. Lilley Cornett (pronounced like "hornet") bought the land shortly after World War I. Apparently it had never been disturbed. Mr. Cornett "liked trees" and continued to preserve it. He did range hogs and cattle on the tract until a range law was passed in the 1920's. A well-rotted hog pen and an old rail fence are the only reminders.

References:

Evaluation:
If one looks for a forest to fit exactly Dr. Braun's descriptions of the association segregates in the mixed mesophytic forest, this is it! All the species are there at their proper positions in the coves and on the ridges. It certainly is virgin. Mr. Dock Cornette told me his father bought this land with money he earned working in a coal mine at 10 cents an hour and then paid local people to help him guard it, when forest fires were raging in other forests near by. The Kentucky Department of Natural Resources with help from the Federal Government bought it a year or two ago and is now in the process of building trails and bridges in it and opening it to the public. They say they will protect this forest against any disturbance. I have seen only one forest, Savage Gulf in Tennessee, in the entire eastern deciduous forest that was better than this one.

Recommendation:
This site should be made a Natural Landmark as soon as possible. Priority I.
2. Tight Hollow

This 100-acre site is located in Wolfe County, Kentucky, 50 miles east of Winchester and 10 miles east of Stanton, Kentucky by way of Kentucky Highways 15 and 715. It is in the Daniel Boone National Forest. The Forest Service is planning to make Tight Hollow a Natural Area. This information was supplied by Mr. Richard Clark, Forest Service, U.S.D.A., Box 727 Carol Road, Winchester, Kentucky. I (Catherine Keever) went to the National Forest office looking for potential Natural Landmark sites. They were very agreeable to my work and did all they could to help me by calling in all the foresters there and discussing with me which sites to recommend. All agreed that Tight Hollow was one of the best ones. They warned against trying to see it without a guide.

Those familiar with the site are:
E. Lucy Braun, 5956 Salem Road, Mt. Washington, Cincinnati, Ohio 45230
Dr. Mary Whorton, Department of Biology, Georgetown University, Georgetown, Kentucky

This hollow is enclosed by sandstone cliffs which have made lumbering impossible, and for that reason it has remained virgin. Dr. Braun told me this was the site at which she first began to develop her concepts of the mixed mesophytic forest.

Evaluation:
I did not see this site, but from what Dr. Braun and the foresters told me, it is a beautiful, virgin, well-protected place with vegetation typical of the mixed mesophytic forest. The officials at the Daniel Boone National Forest will give all help possible in showing it to representatives of the National Park Service.

Recommendation:
This site meets all the requirements as a potential Natural Landmark. Priority 1.
This 5000-acre site is located in Wolfe County, Kentucky 20 miles east of Stanton by way of Kentucky Highway 15 or the Mountain Parkway and Kentucky Highway 715. It is in the Daniel Boone National Forest and is being set aside as a Natural Area with no further cutting, no automobile roads and only minor trails. This information was supplied by Mr. Richard Clark, Forest Service, U.S.D.A. Box 727 Carol Road, Winchester, Kentucky, who told me about this in an interview in the national forest office. Dr. E. Lucy Braun had written me several times about it.

Those familiar with the site are:
Dr. Mary Whorton, Department of Biology, Georgetown College, Georgetown, Kentucky
Dr. Jerry Boskins and others, Department of Botany, University of Kentucky, Lexington, Kentucky

This large area is under the cliffs in the Red River Gorge and contains second growth mixed mesophytic vegetation including many rare and nearly extinct herbaceous plants. The Forest Service plans to allow no cutting under the cliffs or even above them and to keep it as a wilderness-like area.
References:

Evaluation:
Dr. E. Lucy Braun would give her life to protect and preserve this place if she thought it would help. Fortunately, that will not be necessary. Even if the high dam is put on the Red River, this area in the upper gorge would not be flooded. The National Forest Administrators agree with Dr. Braun on its value and will preserve it. Little of this area is virgin, but the cutting has been so long ago that the major part of the forest is back to climax. Dr. Braun has bewailed so loudly the cutting of virgin forest that I had the idea she would disdain anything less than a virgin forest. However, from my discussions with her this summer, I think she has changed her mind and realizes that if the species are still present in a place and protected, the forest will return to its original state. Dr. Braun wrote me about the Red River Gorge vegetation thus: "This Red River country is outstanding; it is a large area of National Park quality, an area that Governor Nunn of Kentucky has stated should be a National Park."

It is a magnificent wild area; grander, I think, than anything else in the East. Much of the area is second growth, but some of this was cut over many years ago before the destructive type of logging now used. Some of the area is second growth because stands of dead chestnut have been replaced by beautiful stands of Magnolia macrophylla. There is one outstanding piece of primary forest; the road in the Red River gorge goes through the lowest part of it. Below the road is the beech consociation of the Mixed Mesophytic Association; on the slopes above the road is an excellent and representative stand of mixed mesophytic forest — one of the very few remaining. This latter stand is very rich on the lower slopes (limestone influence in part) and changes somewhat in composition higher up where the substratum is sandstone, but deeply covered. Above this stand are the sandstone cliffs, and far above, the marginal plateau forest. (Figures on pages 136 and 139). (Braun 1950) This area is located a short distance downstream from where State Route 715 crosses the Red River. The beech part of the forest is marred by picnic tables.
The trail to Rock Bridge goes through a beautiful forest -- selectively logged long ago of big trees, especially white pine, and river birch on the stream, and many variations in vegetation. One could spend weeks in the Red River country and not see it all. Natural Bridge State Park is adjacent to the southwest, and is an excellent area vegetationally. (p. 116 Table 16, Braun 1950).

I did not see this site because it would take a full day or more and a good guide to see it. However, it is the place first mentioned by most of the botanists that I talked to in Kentucky about potential Natural Landmarks.

Recommendation:
This place is excellently suited to be designated a Natural Landmark. Priority 1.

Figure 15
Red River Gorge
(taken from U. S. Forest Service)
4. - Rock Creek Natural Area

This 190-acre site is located in Laurel County, Kentucky 20 miles southwest of London on Kentucky Routes 92 and 1193. It is in the Daniel Boone National Forest. The site is now a Research Natural Area (SAF-23). This information was supplied by Mr. Richard Clark, Forest Service, U.S.D.A., Box 727, Carol Road, Winchester, Kentucky; other foresters at the National Forest office in Winchester also told me about this site.

The stand is largely virgin hemlock and hardwoods. The foresters who had seen Lilley's Woods thought this site was as good or better than that.

Ivan Sandor of the research center in Berea, Kentucky, has much unpublished research data on this site. There is also research data and other information about this place in the National Forest office in Winchester, Kentucky.

Evaluation:
All the foresters I saw at the National Forest office in Winchester, Kentucky thought this was absolutely the best area for vegetation in the entire Daniel Boone National Forest. It is virgin, relatively large and has the typical mixed mesophytic species along with much hemlock.

Recommendation:
This place is excellently suitable to be designated as a Natural Landmark. Priority 1.

5. - Natural Arch Scenic Area

This 945-acre site is located in Daniel Boone National Forest, McCreary County, Kentucky. It is approximately 27 road miles south of Somerset via U.S. 27 and State Route 927. The site is now a U-3 Scenic Area to be left natural with no cutting. This information was supplied by Mr. Richard Clark, Forest Service, U.S.D.A., Box 727, Carol Road, Winchester, Kentucky; and other foresters at the National Forest Office in Winchester. I started out to see it, but was stopped by a terrific rainstorm.

The major attraction here is a 113-ft. falls. The vegetation is young and small with pines on top of the falls and bottom land trees below the falls.
Evaluation:
Undoubtedly, this is a beautiful waterfalls; but the vegetation is young and successional. Since there are other places with much better vegetation nearby, it cannot receive a high priority. If anyone goes down to evaluate the nearby Rock Creek Natural Area and Yahoo Falls, he could compare them with the Natural Arch area.

Recommendation:
This site should be studied further as a possible Natural Landmark. Priority 3.

6. - Yahoo Falls Scenic Area

This 258-acre site is located in the Daniel Boone National Forest, McCreary County, Kentucky, 20 miles south of Somerset via U.S. 27 and Kentucky Route 700. This site is now U-3 Scenic Area with no cutting permitted. This information was supplied by Mr. Richard Clark, Forest Service, U.S.D.A., Box 727, Carol Road, Winchester, Kentucky, and other foresters at the Winchester office. I planned to see it, but missed it because of bad weather.

There are some large hemlocks and tulip poplars and other hardwoods below the falls where there has never been any cutting. The forest above the falls is second growth.

Evaluation:
The greatest value of this site is the waterfalls, but the bit of virgin timber below the falls should be good. If someone investigates the nearby Rock Creek Natural Area, he should also evaluate this site.

Recommendation:
This site could be investigated further to see if it should be considered as a Natural Landmark. Priority 3+.
Figure 16
Southeastern Kentucky

1. Lilley Cornett Woods
2. Tight Hollow
3. Red River Upper Gorge
4. Rock Creek Natural Area
5. Natural Arch Scenic Area
6. Yahoo Falls Scenic Area
Possible sites in the 170,000-acre area are located in Marshall, Calloway, and Trigg Counties, Kentucky; and Stewart County, Tennessee. The sites are 20 to 60 miles south of Paducah, Kentucky by way of U.S. 62, Kentucky 453, and Tennessee 49. The sites are administered by the Tennessee Valley Authority, P.O. Box 27, Golden Pond, Kentucky. A responsible person of the site is Robert M. Howes, Director, Land Between the Lakes. Land Between the Lakes is used as a major outdoor recreation and conservation education area. When I was investigating potential Natural Landmarks in western Kentucky, I went to see this area, looked at the woods and talked to the people at the T.V.A. office. Mr. Howes was not there at the time, but I have had telephone conversations and letters from him about this matter.

A large part of this area is in forestland of second growth oaks and hickories, some of it more mature than other parts. I saw many areas with trees 12 to 18 inches in diameter and it is quite likely I did not see the best parts. Mr. Howes says there is nothing virgin in the area. Among the oaks I saw were post, white, black, and blackjack, along with several species of hickories.

Evaluation:
Mr. Howes is in the process of selecting certain of the most mature forest sites in the Land Between the Lakes to be set aside as Natural Areas; he has not yet decided exactly which sites. If the best forest sites are as good or better than the ordinary sites I saw, there should be an excellent potential Natural Landmark there. According to Dr. Braun, the usual vegetation that occupies the bulk of the land in the far western sections of Kentucky and Tennessee is oak-hickory; and the unusual consists of mesophytic species in the cooler, damper areas such as small ravines. Let's not neglect proper recognition for the normal and usual vegetation of an area. It would be good if Mr. Howes selected a site containing mainly oak-hickory vegetation on rolling upland and some mesophytic species in a small ravine. Mr. Howes will work with the National Park Service by showing several of the best sites from which the Service can select the most suitable one to consider as a potential Natural Landmark.

Recommendation:
This area should be investigated to see if there is a site in this area suitable for a Natural Landmark. I am sure there will be. Priority 1-.
Figure 17
Map of Western Kentucky

7. Land Between the Lakes
This 22-acre site is located near Bonayer in Barren County, Kentucky, 6 miles west of Glasgow on U.S. 68 (Kentucky 80). It is owned by Mrs. Rice Reed, 112 Love Street, Glasgow, Kentucky. A responsible person at the site is Mr. Porter Reed, Route 1, Glasgow, Kentucky. Land is bounded on one side by a new Interstate Highway. The Forest Stand has not been disturbed for at least 75 years. This information was supplied by Joe E. Winstead, Department of Biology, Western Kentucky University, Bowling Green, Kentucky. In May, 1969, he visited the area with Dr. Willem Meijer, Department of Botany, University of Kentucky and discussed the potential of the forest as a study site.

Those familiar with the site are:
Dr. William Meijer, Department of Botany, University of Kentucky, Lexington
Dr. Kenneth Nicely, Department of Biology, Western Kentucky University
Dr. Catherine Keever, Millersville State College

This particular small forest plot may be the last remaining stand of what was the typical forest cover on the flat lands of the Mississippi Plateau section in the Western Mesophytic Forest as described by Braun (1950). The dominant canopy trees are white oak and tulip poplar which agrees with the general pattern of the region discussed by Braun. Of particular interest may be the gradual shift toward a Beech-Maple forest which preliminary samples seem to indicate by analysis of sapling composition.

The trees of the plot are very large and the oaks and poplars average over 20 inches in DBH. At least 21 different species of hardwoods have been noted in this stand. This is an open forest with mean distance between trees of DBH greater than 4 inches being 10.6 meters. The canopy layer exceeds 100 feet in height.

Although land clearing and extensive logging due to Interstate Highway construction have removed some of the largest trees, the remaining untouched 20 to 22 acres still represents a good example of "Typical" mature forest. Discussion with the owner of the property revealed that this forest had not been disturbed by logging in this century. Casual analysis of tree rings in the highway right-of-way indicated the majority of the trees cut were over 76 years of age.
This site would lend itself to studies of growth and regeneration as well as providing an example of a mature oak forest. Current patterns of succession need to be analyzed as well. The tremendous size of remaining trees and the total board feet would indicate great commercial value. It is doubtful that this forest will remain in existence unless protected by some governmental or private agency. In addition to its value as a research area, the site could also provide educational and recreational “nature” trails in a roadside park.

References:

Evaluation:
I saw this stand and it is a beauty. I wish it were larger and that there was some assurance that it would not be cut. The terrain is nearly flat with a slightly low area in the center that showed signs of standing water at times. Since the largest trees are all about the same age and size, the site may have been cleared of all vegetation at one time. I looked for young, white oaks under the abundant large trees of that species, but found very few. Is white oak climax or is it successional in that part of the deciduous forest? Many people would like to know. Some good research could be done here to answer the question.

Recommendation:
There are so few good forests in central Kentucky that this one should be considered as a potential Natural Landmark. It might not make it, because of its small size and definite lack of protection. Priority 2-.
Figure 18
Bowling Green and Glasgow area in Central Kentucky

8. Bonayer Forest Stand
MARYLAND
I have had trouble finding any potential natural landmarks to recommend in Maryland. Dr. Frederick R. Swan Jr. of 214 East Drive, West Liberty, West Virginia worked on a natural area survey in and near Washington D. C., and has been very helpful in recommending some of the best places he found. Some of these appear to be good sites considering their closeness to the city, but I doubt that they should rank high on the list of potential natural landmarks. Dr. Robert Sigafus of the U.S. Geological Survey and Dr. F. R. Fosberg of the Smithsonian Institution in Washington have seen these sites and should be able to express view on their values. I have seen none of the sites but will give them a doubtful priority judging by the information Dr. Swan sent me.
1. - Blunt Road Woods

This 100-acre site is located in Montgomery County, Maryland, 15 miles from Washington, D.C.; go east on Brink Rd. (Route 420), then south on Blunt Road and park at the first stream crossing (a ford).

It is an excellent example of an oak-hickory forest with an understory of *Nyssa sylvatica* and *Acer rubrum*. It is particularly unusual because the dead chestnuts were not cut (*Castanea*) but were allowed to stand until they fell over. It did not appear to be in immediate danger of destruction.

Evaluation:

It seems to be good woods for an area that close to the city. Priority 2-.

2. - Hoyles Mill Woods

This 200-acre site is located in Montgomery County, Maryland, near Germantown, north of Little Seneca Creek, on Hoyles Mill Road. The owner is unknown.

This area is described by Braun (1950) as an area of serpentine soils supporting some prairie vegetation, such as *Sorghastrum nutans*, *Andropogon scoparius*, and others. This appears to be a fire-maintained community. Due to the absence of fire, the area now supports pole stands of *Quercus*, *Pinus*, *Carya*, *Cercis*, and *Juniperus*.

It is far enough away from Washington to be safe from immediate development.

Evaluation:

I know there is supposed to be some very interesting vegetation on serpentine soil in this part of Pennsylvania and Maryland. This may be the one Dr. Braun tells about. Since the owner is unknown and its preservation status questionable, it will take more research to determine its value as a Natural landmark.

Recommendation:

This site should be investigated to see if it might be suitable and available as a Natural landmark. Priority 2-. 
3. - Quince Orchard Woods

This 100-acre site is located in Montgomery County, Maryland, 15 miles northwest of Washington, D. C., northeast of the junction of Maryland Routes 28 and 124. The site is a Maryland Game Propagation Area.

It is on serpentine soils and the vegetation therefore differs considerably from areas with more fertile soils. The forest community consists of Virginia pine, white oak, Spanish oak, hickory, and red cedar with an understory of Vaccinium stamineum, and Andropogon scoparius and others. It did not appear to be in immediate danger of destruction.

Evaluation:
This site, like Hoyles Mill Woods, is on serpentine soils, and would have unusual vegetation because of that. I think that one of these serpentine sites might be considered but Hoyles Mill seems better from Mr. Swan's description.

Recommendation:
This site does not seem to be a likely candidate as a potential Natural Landmark. Priority 3.

4. - McKee Beshers Marsh

This 200-acre site is located just south of Old River Road in Montgomery County, Maryland, 20 miles northwest of Washington and five miles west of Seneca. It is administered by the Maryland Department of Game and Inland Fish as a Wildlife Management Area.

It is a large freshwater marsh near the Potomac River used extensively by waterfowl. It should not be in immediate danger of destruction.

Evaluation:
There should be some good marshland saved and recognized. This is being saved.

Recommendation:
Ask Dr. Sigafoos and Dr. Fosberg. Priority 2-.
5. - Hawlings River Regional Park (Proposed)

This 1000-acre site is located in Montgomery County, Maryland, 20 to 25 miles north of Washington; go north on State Route 97, then west on State Route 420 past Unity. The site, a proposed regional park, is owned by Montgomery County. Dr. Swan visited and quantitatively sampled this stand (north part) in August 1968 in the course of a natural area survey.

The north end of the proposed Hawlings River Regional Park consists of an excellent oak stand dominated by Quercus prinus. To the south the vegetation grades into white and black oaks and tulip. Damage could come from park development or grazing which continues to the west of the area sampled.

References:


Evaluation:

This vegetation sounds unusually good and it is hoped that, if a park is established the best part will be protected from damage by people.

Recommendation:

This site should be investigated further. Priority 2.
The Maryland State Planning Department published the Catalogue of Natural Areas in Maryland in 1968. This list included forests, streams with stream-bank vegetation geological sites, caves, and other natural areas -- both privately and publically owned. I have studied these records for sites in the oak-chestnut region and have selected 14 of the best ones in order of preference for possible Natural Landmarks. These sites need to be investigated further before judgement can be made as to their suitability as potential Natural Landmarks. I do not have sufficient information to mark maps for them, nor do I dare give priority ratings.

1. Frederick Municipal Forest, Frederick County
2. Patapsco Gorge, Howard County
3. Dan's Mountain, Allegany County
4. Baisman Run Valley, Baltimore County
5. Green Ridge and Town Hill Mountains
6. Middle Patuxent River Valley
7. Susquehanna River Shoreline, Harford County
8. Sheppard - Pratt Forest, Baltimore County
9. Little Patuxent River Valley, Howard County
10. Soldier's Delight, Baltimore County
11. Hoye's Crest (Backbone Mountain), Garrett County
12. Youngiogheny River Valley, Garrett County
13. Patuxent River Valley, Howard County
14. Buzzard Flats, Frederick County

Information about these sites is in the supplementary materials.
Other Sites in Maryland

1. National Park System:
   - Catoctin Mountain Park
   - Chesapeake and Ohio Canal National Historical Park
   - Antietam National Battlefield Site
   - Harpers Ferry National Historical Park

2. Natural Landmarks in Oak-Chestnut Region:
   - Cranesville Swamp Nature Sanctuary
   - Sugar Loaf Mountain

3. There are no Nature Conservancy holdings in the oak-chestnut region.
Figure 19
Map of Portions of Maryland

1. Blunt Road Woods
2. Hoyles Mill Woods
3. Quince Orchard Woods
4. McKee-Beshers Marsh
5. Hawlings River Regional Park (Proposed)
Massachusetts
1. - Acushnet Whitecedar Swamp

This 1800-acre site is located in Bristol County three miles from New Bedford. It may be reached from Boston via State Route 140 to Tarklin Road to Plainsville Road. Mr. Bruce Gullion of the Massachusetts Forest and Parks could give further information and show the site. The Department of Forest and Parks manages the site and plans to preserve it as an example of native vegetation. The following information was gathered by John P. Richardson in 1970 while preparing a detailed report for the Massachusetts Department of Natural Resources pertaining to both the human and natural history of the swamp. His report is available at the Massachusetts Department of Natural Resources.

The Acushnet Cedar Swamp is one of Massachusetts largest, wildest and most impenetrable swamps. There are two large stands of old cedars ranging from 100-150 years old. A few might approach 200 years. Large acreages are covered by dense stands of 25 to 50 year old cedar and hemlock and are increasingly beautiful. Several islands of land within the swamp support a diversified botany and wildlife. Laurel Island supports a growth of 100-125 year old white and pitch pine. (P. strobus, P. rigida); also a grove of very old mountain laurel (K. latifolia) with circumferences up to 17 inches. From the High Hill Road Bridge the vista north over the pond and bog to the big cedars and beyond imparts a true feeling of wilderness. The view is spacious, emotional and wild - full of beauty, interest and meaning. The swamp is an important Massachusetts ecological area situated adjacent to a highly urbanized community. There is an important potential for the development of an exceptional interpretive or environmental appreciation center superior to the Atlantic Whitecedar Swamp and Trail located at the Cape Cod National Seashore. An unusual feature is a dominant and nearly impenetrable undercover of mountain laurel, American holly (I. Opaca), and inkberry holly (I. glabra) along the swamps north shore. Impenetrable stands of mountain laurel are rare along the southern Massachusetts coast. The whitecedars, laurel, hollies, hemlock and white pine make up the virgin Acushnet Swamp forest. The Acushnet Swamps existence depends upon a delicate balance of water. Heavy industrial development to the immediate north includes plans for a large polaroid plant and could conceivably alter the botanical character of the swamp if the water supply or level is measurably disturbed.
Persons familiar with the site are:
Evans Hawes, Office of Commissioner, Department of Natural Resources, 100 Cambridge Street, Boston, Massachusetts
Matthew B. Connolly Jr., Department of Forests and Parks, 100 Cambridge Street, Boston, Massachusetts
R. Terry Walker, Department of Forests and Parks, Planning, 100 Cambridge Street, Boston, Massachusetts

A topographic map with lists and locations of plants and animals is included in supplementary materials.

Evaluation:
This is certainly the best site that has been recommended in Massachusetts. It represents a definite kind of vegetation in the area of which there is little remaining. It is a large area now owned by the state and will be preserved.

Recommendation:
This site seems excellently qualified as a Natural Landmark. Priority 1.

Figure 20
Acushnet Whitecedar Swamp
2. - Mast Island or Halfway Pond Island

This four-acre privately owned site is located in Halfway or Cotuit Pond in Plymouth County about three miles from Plymouth. From Boston go the Southeast Expressway to Route 3, to Myles Standish State Forest. The pond is east of the forest, and west of the Long Pond Road. This information was supplied by John P. Richardson of the Massachusetts Department of Natural Resources. Mr. Matthew B. Connolly Jr. of the Department of Natural Resources is also familiar with the site.

Mast Island lies in Halfway or Cotuit Pond. It is called Mast Island because ships masts were cut there during early Plymouth ship building era. The region surrounding Halfway Pond, including Myles Standish State Forest, has a serious and very destructive forest fire history. The Island appears to have escaped the numerous conflagrations. The region surrounding the pond supports a dense, often inpenetrable growth of pitch pine (P. rigida) and "scrub oak" (Q. ilicifolia). Mast Island supports a totally different botany than the "pine barrens" of the surrounding region and probably is a key to the virgin forest type. No detailed study has been made recording the plant species, tree measurements, ages, etc. of Mast Island. The writer would welcome a chance to do this if the information was needed.

It might be of interest to note that certain heavily wooded kettle holes on the adjacent mainland, near Mast Island, escaped complete destruction by the numerous forest fires. The fires appear to have raced over the top severely damaging but not killing the pitch pine - scrub oak forest on the floor of the kettle hole. Beneath this heavy canopy are many suppressed white pine (P. strobus) and in one even a few hemlock (T. canadensis). Two of these pine, measuring only 2'8" tall and 3'5" tall contained 38 and 42 annual rings. This suppressed undergrowth in a nearly total pitch pine-scrub oak forest adds some weight to the claim that Mast Island represents the region's true climax forest type.

Evaluation: This site is smaller than I would usually recommend but since undisturbed areas are rare in this part of Massachusetts it should be investigated. Priority 2.
Figure 21
Mast Island in Halfway Island
3. - Sandy Neck and Great Marshes

This 6600-acre site is located in Barnstable County, Massachusetts, 70 miles from Boston, Massachusetts and Providence, Rhode Island in the town of Barnstable on State Route 6A. It is owned by the town of Barnstable and private parties. A responsible person at the site is the Chairman, Conservation Commission, Town Hall, Town of Barnstable, Hyannis, Massachusetts. The site is used for recreation, including a public bathing beach, hunting, and fishing; and for commercial shellfishing. This information was supplied by Alfred C. Redfield, Box 106, Woods Hole, Massachusetts who has been familiar with the area since 1908 and has studied the marshland intensively since 1955.

Those familiar with the site are:
Dr. K. O. Emery, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts
Dr. H. L. Sanders, same address
Dr. John Teal, same address
Dr. David C. Grant, Marine Biological Laboratory, Woods Hole, Massachusetts
Mr. B. W. Powell, Stonebridge Road, Wilton, Connecticut
Dean John L. Blum, College of Letters and Science, University of Wisconsin, Milwaukee, Wisconsin
Mr. Lee C. Davis, Main Street, Barnstable, Massachusetts
Mr. Crawford H. Hollidge, Cotuit Road, Marstons Mills, Massachusetts

References:

Evaluation:
This may be quite a suitable place to show some representative types of vegetation found on Cape Cod. Possibly the 6600 acres is too large and someone should work with Dr. Redfield and local ecologists at Woods Hole to select the parts with the best vegetation and the parts least disturbed.
by man. Unless private owners agree to save their lands from damage, it might be well to select a potential Natural Landmark from the publically owned parts which are already being conserved.

Recommendation:
Parts of this site seem quite suitable as a Natural Landmark. It should be further investigated to see which parts would be most desirable. Priority 1-.

Figure 22
Sandy Neck and Great Marshes
Sites in Massachusetts that cannot be recommended at this time.

1. Concord Lands in Middlesex County that was transferred from the Nature Conservancy to Harvard University, and is being used as a field station. Dr. Richard Taylor of Yale, Director, says he is new in that position and needs to study the situation before he would consider recommending this site as a potential Natural Landmark. It might have possibilities later.

2. Several other Nature Conservancy tracts might have possibilities, although I have no information on them:

   a. Beaverbrook Valley, a 90-acre tract in Middlesex County, is a small stream valley with hemlocks and an esher.

   b. Vinal Nature Reserve (Black Pond), a 51-acre tract in Plymouth County, is a typical northern bog surrounded by white cedar.

3. The Bureau of Sport Fisheries and Wildlife administers the Ludlow Griscom Dune Natural Area, a 150-acre tract of exposed coastline dunes located in the Parker River National Wildlife Refuge in Essex County. This Research Natural Area might have some possibility as a potential Natural Landmark, but I have no further information on it.

4. There is one Natural Landmark already in Massachusetts, Gay Head Cliffs.
MISSISSIPPI
1. - Tombigbee State Park

This site, which consists of the largest part of the 822-acre park, is located in Lee County, 3 miles east of Tupelo, Mississippi, just south of U. S. 78. It is owned by the State of Mississippi (S. E. Medlin, Comptroller of Mississippi Park System, 717 Robert Lee Building, Jackson, Mississippi 39201). A responsible person at the site is Mr. George Ayers, State Forestry Office, Tupelo, Mississippi. It is a State Park with limited camping and picnicking facilities. A recent plan for the park is to leave most of it in undisturbed forest. In searching for potential Natural Landmarks in this area, I went to the State Forestry Office. Mr. George Ayers told me about this park and took me to see it.

Those familiar with the site are:
R. C. Rogers, Assistant Comptroller, Mississippi Park System, 717 Robert E. Lee Building, Jackson, Mississippi

This stand is located on rolling upland crossed by several small streams. It is an almost pure hardwood stand that has not been disturbed in the past 40 years. Many of the largest trees are up to 24 inches in diameter. The major trees are oaks (white, post, black jack, scarlet, southern red) and hickories along with sweetgum, black gum, dogwood, red maple, redbud with some willows, sycamore, and cottonwood near the lake and streams; and sassafras, mulberry, and black locust in slightly open areas.

Evaluation:
This site is in the area mapped by Dr. Braun as Western Mesophytic, where mesophytic species, if present at all, occupy ravines and gorges. The usual vegetation on the uplands is very similar to the oak-hickory vegetation found west of this forest region. This park has the most mature stand of oak-hickory type of vegetation in that part of Mississippi. If the state leaves this site as an undisturbed forest, and they say they will, it will soon become very much like the original forests of the area before the white man came. The forest is already climax although not virgin. The administrators of the Mississippi Park System assure me they will cooperate with the National Park Service on this matter.

Recommendation:
This site is suitable as a potential Natural Landmark. Priority 1--
This site, which consists of parts of 1400 acres, is located in Tishomingo State Park, 3 miles southeast of Paden, Mississippi off Mississippi Highway 25. It is owned by the State of Mississippi. A responsible person at the site is the local park attendant and S. E. Medlin, Comptroller of State Park System, 711 Robert E. Lee Building, Jackson, Mississippi 39201. It is a State Park with much camping, picnicking, and lake activities. Parts of the park are not used as above. Mr. George Ayers of the State Forest in Tupelo, Mississippi, suggested this park as having some good forests and I went to see it.

Those familiar with the site are:
R. C. Rogers, Assistant Comptroller, Mississippi Park System, 717 Robert E. Lee Building, Jackson, Mississippi 39201

I drove all the roads in the park, but was not impressed with the vegetation. Most of it was young pines under which were numerous picnic tables and camping cabins. There is a large lake around which the camping facilities are clustered. I could see forests across the lake, but could find no roads into them. There was one good hardwood ravine near the roads.

Evaluation:
I saw very little mature good forest land in this park, and what there was seemed overburdened with camping and picnicking facilities. However, I saw only a small part of the total 1400 acres, and there seemed to be good forests across the lake. By preserving a part of these forests -- even if they are young pines -- the State Park System will be able to show this forest region’s normal succession toward climax.

Recommendation:
This site should be investigated further as a possible Natural Landmark. Priority 3.
3. **Daniels Forest**

The best forest site in Mississippi is in Union County near Kownsville, 7 miles NE of New Albany on State Highway 30. The site contains 500 acres in several plots. Mrs. James Swann, 94 years old, told me it had not been cut in her lifetime or that of her father. It belongs to Mrs. Jamie Swann Daniels (Mrs. Clinton Daniels) daughter of Mrs. James Swann. Mrs. Daniels hopes it is never cut, but would not like to prevent the property from being sold or even cut in case of emergency. I tried to persuade her to sell to the Nature Conservancy or some such group. I thought I persuaded her to fill out a paper and let me list the site. She promised to think about it and let me know, but I have heard no more from her. Someone in the state or Federal Government should know about this virgin forest of considerable size. If and when Mrs. Daniels or her heirs (she has no children) sells, it should be bought by someone who would keep it in its virgin state. Both Mrs. Swann and Mrs. Daniels are very anxious that this forest not be cut. If they could be assured of its protection and their own lack of financial want in old age, I believe they might sell the site.

I did not see the forest except from a distance. It is on a series of hills that should contain some small coves. Mr. and Mrs. Daniels told me the following trees were there: oaks overcup, white, southern red, scarlet, northern red, beech, sugar maple, ash, persimmon, black locust, elm, black gum, poplar, redbud.

Recommendation:
I cannot recommend this site as a potential Natural Landmark without the permission of the owner. If some native of Mississippi could make the contacts, it should be investigated. I am sure the site is virgin and contains excellent vegetation. Priority 1.
There is little good forest land left in northern Mississippi. Much of it, especially in the western part, is worn out, badly eroded farmland with scattered patches of black jack oaks -- a "poor land" successional species. The Holly Springs National Forest is largely on this kind of land and there is nothing there worth designating as potential Natural Landmarks. The National Forest people are working hard to get the National Forest and as much of other similar land as possible back into forests. Since most of the land is like this, it makes the very few relatively good forests of the region that much more valuable.

There is already one Natural Landmark, Chestnut Oak Disjunct in the southern part of the Western Mesophytic Region. This Landmark is located in Calhoun County, 16 miles north of Bruce.
Figure 23
Map of Northern Mississippi

1. Tombigbee State Park
2. Tishomingo State Park
3. Daniels Forest
NEW JERSEY
This 25-acre site is located in Warren County, New Jersey, 8 miles SW of Hope, by way of U.S. 46, New Jersey 519, and a local road. It is owned by the State of New Jersey. A responsible person at the site is Joe Truncer, Division of Parks, Forestry and Recreation, Department of Conservation and Economic Development, Trenton, New Jersey. It is a natural area. This information was supplied by Murray Buell, Department of Botany, Rutgers University of New Brunswick, New Jersey, who showed the site to me in the summer of 1970.

Those familiar with the site are:
- Arthur N. Langford, Bishop's University, Lennoxville, Quebec, Canada
- Donald Davidson, Department of Biology, University of Wisconsin, Superior, Wisconsin

This is a hardwood stand on a gently sloping hillside where sugar maple up to 20 inches in diameter is the dominant species. Beech is abundant especially on the lower slopes, and some oaks are present. There is some question whether oaks are really the climax trees in this area because they have very poor reproduction, except for root sprouts. Dr. Buell thinks sugar maple may be a strong part of the real climax vegetation. Data for vegetation of this site is included in supplementary materials.

References:

Evaluation and recommendation:
I saw this stand. It is a very nice tract of woods and interesting because of the large number of big sugar maples. Dr. Buell had a hard time finding it even with a marked topographic map. It is owned by the State of New Jersey and is being preserved. The site may have some possibilities as a Natural Landmark, but I cannot give it a high priority because of its small size. Priority 3.
2.  Laurel Lake, Wawayanda State Park

This 80-acre site is located in Wawayanda State Park, Sussex County, New Jersey, 15 miles southwest of New Milford, New York via State Highway 94. It is owned by the State of New Jersey. A responsible person at the site is Mr. Joseph Turner, Department of Environmental Protection, Trenton, New Jersey. This part of the state park is blocked off from vehicular travel and has foot paths only. This information was supplied by Murray Buell, Department of Botany, Rutgers University, New Brunswick, New Jersey, who showed this to me in the summer of 1970.

Those familiar with the site are:
Mr. David Moore, New Jersey Conservation Foundation, Route 2, Lambertville, New Jersey 08530

This site has a beautiful clear lake surrounded by hemlocks, rhododendrons and laurel. The hills above the lake are a second growth forest largely of oaks more than 12 inches in diameter with some sugar maple and black birch.

Evaluation:
Dr. Buell considers this to be one of the most beautiful spots in northern New Jersey and I agree with him. It is located on top of a small mountain and the lake has had little chance for pollution from the run-off of civilization. There is an abandoned iron foundry in the park and undoubtedly the surrounding hardwood forests were cut for charcoal wood and this has had its effect on the forests.

Recommendation:
This site should be investigated further as a possible Natural Landmark. Priority 2.
3. - Greendell

This 60-acre site is located in Warren County, 2 miles south of Greendell, on the county line; take U. S. 206 from Springdale to Greendell. It is owned by Mr. S. Johnson, 964-68 Dean Street, Brooklyn, New York. It is privately owned, but Mr. Johnson has no plans for disturbing the site. This information was supplied by Murray Buell, Department of Botany, Rutgers University, New Brunswick, New Jersey, who took me to see this place in the summer of 1970.

References:

Evaluation:
I consider this to be the best place Dr. Buell showed me. They say it is 60 acres, but it seemed larger. The ridges consist of limestone blocks, boulders, and ledges covered with many mosses, ferns, and shrubby trees. The slopes have the best forest and largest trees that I saw, dominated by sugar maple, basswoods, ash, tulip poplar, several oaks and hickories. It is not a virgin forest but is reaching climax. There are several marshy ponds in the vales. According to Dr. Pearson the herbaceous vegetation is unusually rich. The site is privately owned, but Mr. Johnson wants to preserve the area. It is excellent vegetation now and will improve if it is not disturbed again.

Recommendation:
This site would make a good Natural Landmark.
Priority 1-.

Further descriptions and vegetational data are with the supplementary materials.
4. William L. Hutcheson Memorial Forest

This 65-acre site is located in Somerset County, New Jersey, 10 miles west of New Brunswick and one mile east of Millstone, via N. J. Highway 514. It is owned by Rutgers University, New Brunswick. Responsible persons at the site are the staff members of the Botany Department, Rutgers University, New Brunswick. Much research is being done in the forest, but nothing that would change or damage the forest. I had heard of this forest for years and visited it in 1970 accompanied by Dr. Murray Buell.

Those familiar with the site are:
The entire faculty of Rutgers' Department of Botany; most ecologists in the East know about this place and have seen it.

The forest is a variant of the oak-hickory forests further south. The dominant trees are white, black and northern red oaks, along with red hickory. The largest trees are about 95 feet tall and have diameters of three to four feet. Dogwood is the major understory tree and maple-leaved viburnum the major shrub. The oaks are reproducing poorly in this stand as in many similar ones in the northeastern part of the United States, and many ecologists doubt if this is a true climax vegetation. Dr. Buell calls attention to the many young sugar maples and predicts that the site may eventually be dominated by maples.

References:
Evaluation:

If there has ever been one forest thoroughly studied, this is it! The Rutgers staff members know every tree and shrub by name and continue to watch for and analyze even minor changes in the forests composition. It may not be virgin as Dr. Monk (1957) suspects, but it is the oldest forest anyone knows of in that area. It may not be climax and may change to another kind of forest when the older oaks die. However, here is a chance for biologists to find the answer on what really is the climax vegetation of this region. The site certainly will continue to be protected and studied.

Recommendation:

This site is qualified to be a potential Natural Landmark. Priority 1.
Figure 24
Map of Northern New Jersey

1. Bursh Sugar
2. Laurel Lake
3. Greendell

4. William L. Hutcheson Memorial Forest
I talked to Mr. Moore last summer. He was in the process of completing a publication on the Natural Areas of New Jersey in which he was describing and classifying all the Natural Areas of the state. He thought he would get this work completed before Christmas and let me use the materials. I wrote to him in December, 1971, but have not heard from him. I presume that, like many of us, he did not get such work done as fast as he hoped. If he sends me this material, I will forward it to the National Park Service.

Mr. David F. Moore, Secretary
Natural Areas Council
Division of Parks
Forestry and Recreation
Department of Conservation and Economic Development
P. O. Box 1889
Trenton, New Jersey 08625

3. Other sites in the Oak-Chestnut part of New Jersey

a. Registered Natural Landmarks
   Great Falls of Patterson
   Great Swamp
   Moggy Hollow Natural Area
   Stone Harbor Bird Sanctuary

b. Eligible Natural Landmarks
   Troy Meadows Sunfish Pond
I have little of value to report from New York. I visited Dr. Raymond Stross of the Biology Department of the State University at Albany and his group was quite willing to help and showed me several sites. Mr. Ralph H. Smith of the Department of Environmental Conservation Wildlife research Laboratory of Delmar, New York 12054, recommended a number of places including parts of certain New York State Parks, but could not give details. I wrote letters seeking information about such places. I heard nothing from most of these, but got good cooperation from administrators of the State Parks, who finally informed me that in their opinion, there were no State Park areas suitable as Natural Landmarks.
1. - West Yaphank Woods

This 150-acre site is located in West Yaphank, Suffolk County, New York, 70 miles from New York City, on the east side of Yaphank-Middle Island Road, (Route 21). The owner of this site is unknown. This information was supplied by Dennis Puleston, Meadow Land, Brookhaven, New York. He has visited this wooded area many times, especially during the spring and fall bird migration seasons. It is one of the finest areas to observe many migratory species and it also is a breeding area for summer residents.

Those familiar with the site are:
Mr. Arthur Cooley, Durkee Lane, East Patchogue, New York
Mr. Henry Halama, Ashley Lane, Shoreham, N. Y.

Evaluation and Recommendation:
Dr. Puleston recommends this site; it probably has fair woods and is a good area for bird study. Priority 3.

Figure 25
West Yaphank Woods
2. - Riverhead Bog

This 18 to 20-acre site is located in Suffolk County, New York, 1/2 mile from Riverhead along the west side of the Moriches-Riverhead road (Route 51). It is owned by Suffolk County. This information was supplied by Dennis Puleston, Meadow Lane, Brookhaven, New York, who visited this area on many occasions, especially in late spring when the bog flowers are in bloom.

Those familiar with the site are:
Mr. Arthur Cooley, Durkee Lane, East Patchogue, New York

Evaluation and Recommendation:
This site seems to be a good, small bog that is under adequate protection. It is probably a bit small to be considered as a Natural Landmark, especially if a larger bog of this kind could be found in the area. Priority 3.

Figure 26
Riverhead Bog
3. - Moriches Bay Islands

This 8 to 10-acre site is located in Moriches Bay, Suffolk County, New York, 80 miles from New York City; the islands can be reached by boat from East Moriches and other villages along Great South Bay. It is owned by Brookhaven Town. This information was supplied by Dennis Puleston, Meadow Lane, Brookhaven, New York, who visited these islands many times to observe migrating shorebirds and the breeding colonies of terns, skimmers and gulls.

Those familiar with the site are:
- Moriches Bay Audubon Society, Center Moriches, New York
- G. S. Raynor, Schultz Road, Manorville, N. Y.
- L. V. Wilcox, Brushy Neck Road, Speonk, N. Y.

Evaluation and Recommendation:
These sites seem to be valuable largely for their bird populations and are not suitable as Natural Landmarks dealing with vegetation. Priority 4.
This 15-20 acre site is located just southeast of Saratoga Springs along State Route 9p on Saratoga Lake. It is owned by Taylor Gaffga, Lake Saratoga, New York and is used for hunting and camping. Dr. R. G. Stross of the Department of Biological Sciences of Southern University of New York at Albany showed me this site. Dr. John Mackiewicz of the same department is familiar with the site.

Snake Hill rises 180 to 200 feet above the lake. The cliff facing the lake shows laminated limestone shale with strong tilting. An area of old trees that supposedly has never been logged contains chestnut oaks in a park-like setting on the west-facing slope above the cliff. On the east and north-facing slopes hemlock and white pines dominate. Some unusually large hop hornbeam and striped maple trees are present in the understory on the north-facing slope.

Evaluation and recommendation:

I saw this site with Dr. Stross. The southwest side looked much like the oak-chestnut rocky hills in Pennsylvania with chestnut oak the dominant tree and red cedar on the thinnest soil at the edges, and some red hickory. The northeast slope has much hemlock, black birch, basswood, and other mesophytic species. If the site was ever lumbered, it had to be many years ago because the largest hemlock trees are 18 inches in diameter. There is some question on the preservation of this site, but it is so rocky that the area would never sell as building lots. The site is smaller that we usually consider for a Natural Landmark. However, the vegetation is typical oak-chestnut at the extreme northern part of the region, so it might be considered as a possible Natural Landmark. Priority 3.
Other Sites in New York

1. Nature Conservancy holdings that might be suitable as Natural Landmarks. However, I have no further information on these sites and no one has recommended them.

   a. Pawling Nature Preserve, 1041 acres in Dutchess County; consists of upland hardwood forest and low swampy woodland; ridge transversed by Appalachian Trail. Open to public.

   b. Gloversville Tract, 940 acres in Fulton County; consists of rolling terrain covered with hardwoods. Conveyed to state; addition to Catskill Forest.

   c. Clausland Mountain, 450 acres, in Rockland County; forested mountain close to New York City; used for nature study. 8 acres owned; remainder an assist by loan to Rockland County. Open to public.

   d. Arthur W. Butler Memorial Sanctuary, 318 acres, in Westchester County; swamp, stream, meadow and upland hardwood forest on rocky ridge. Owned. Open to public.

   e. Thompson Pond, 173 acres, in Dutchess County; shallow glacial lake, notable for its marshy and aquatic vegetation and associated wildlife. Owned. Open to public.

   f. Scarsdale Preserve, 134 acres, in Ulster County; forested, rocky ledges on Shawangunk Ridge. Owned. Open to public.

   g. Stewart Sanctuary, 123 acres, in Rensselaer County; rolling upland with old secondary mixed woods and small swamp. Admission by permission.

   h. Hannacroix Ravine, 103 acres, in Albany County; hemlock-wooded, watercut gorge. Owned. Open to public.

   i. Little Bear Swamp, 90 acres, in Albany County; swampy woodland notable for its 30-acre stand of Rhododendron maximum. Owned. Visitors by permission.

   j. Sunken Forest Preserve, 61 acres, in Suffolk County within Fire Island National Seashore; bay-to-beach segment of Fire Island a half mile long, including beach, sand dunes, and mature barrier-beach forest of holly, oak, pine. Sunken Forest Preserve, Inc.
k. Nichols Preserve, 44 acres, in Westchester County; 5-acre pond surrounded by mixed hardwood forest. Admission by permission.
NORTH CAROLINA
North Carolina

1. Pilot Mountain

This 2145-acre site is located in Surry County, North Carolina, 3 miles southwest of Pilot Mountain, via U.S. 52 and a marked road to park; mailing address, R. D. 1, Pinnacle, North Carolina 27043. It is owned by the state of North Carolina. It is a State Park with a limited picnicking area. Most of it is being left in the natural state except for trails. The State plans eventually to put in some family camping areas. This information was supplied by Carl R. Flinchun, Park Superintendent and Roy G. Sowers Jr., Director, Department of Conservation and Development. Mr. Flinchun's address is R. D. 1, Pinnacle, North Carolina 27043; Mr. Sowers' is Raleigh, North Carolina. I have known this mountain for many years and have read research material about it. Mr. Sowers suggested that it be put on the list of potential Natural Landmarks; I went to see the site again in the summer of 1970, and made lists of plants.

Those familiar with the site are:
Dr. Hollis Rogers, Department of Botany,
U.N.C.G., Greensboro, North Carolina

The top of this pinnacle has never been cut because it is inaccessible to lumbering activities. The first cutting of timber on the lower slopes was in 1961, and it was again lumbered in 1944, after the research done by Ruby Williams. However, the entire mountain is an excellent example of the native vegetation, and since it will never be cut again, the site should sometime in the near future have vegetation similar to that which was there before the advent of the white man. The lumbering was selective for the big trees and the undergrowth is already replacing those taken out. The largest trees are now 12 to 18 inches in diameter. The following is a list of trees and shrubs made on top of the mountain in the still virgin part: chestnut oak, Table mountain pine, Virginia pine, northern red oak, black oak, sourwood, mountain laurel, purple rhododendron, sassafras, witch hazel, blueberries, red maple, black gum, bear oak, chestnut sprouts, galyx, scarlet oak, blackjack oak, buck thorn. The rocky top of the pinnacle and the other high places on the mountain are a mass of color when the mountain laurel and rhododendron bloom in late May.

The pinnacle on this mountain rises with vertical sides several hundred feet above the rest of the mountain and is clearly visible from Winston Salem, 22 miles away. The top of the pinnacle is 2,421 feet above sea level and
1,200 feet above the surrounding countryside. The park road leads to an adjoining high area, but the only way to get to the top of the pinnacle is to climb up a pair of rickety stairs. The park staff plans to replace these stairs with safer ones.

Evaluation:
In searching for potential Natural Landmarks I do not think we should emphasize the unusual vegetation, although some of the relic and unusual stands should be included. Pilot Mountain represents the usual vegetation for much of the lower mountains in the southern Appalachians. If our botanists friends from the western part of the United States were to ask to see a typical stand of oak-chestnut forest with all its minor variations, we could proudly show them Pilot Mountain. Only the part near the top is virgin, but the sides of the mountain have the typical assortment of species, and now that there is assurance that the mountain will never be lumbered again, it will soon be much like the original forests of the region.

Recommendation:
Pilot Mountain is well qualified to be made a Natural Landmark. I give it a priority of 1-.

Reference:

2. - Rocky Face Mountain

This 600-acre site is located in Alexander County, North Carolina, 5 miles northeast of Hiddenite via a local road. It is owned by the Superior Stone Company, Raleigh, North Carolina. A responsible person at the site is Homer M. Keever, 140 Bost Street, Statesville. A short spur at one end of the mountain was quarried in the late 1920's but has not been used since then. There was a fruit orchard on top of the mountain in the last century, but this was abandoned in 1903 and has grown up in pines. My father was raised in the area and used to picnic on the mountain as a youth. I did a Master's thesis on it in 1939-41 and have continued to do research there.
Those familiar with the site are:
Catherine Keever, Department of Biology, Millersville State College, Millersville, Pennsylvania
Dr. Lewis E. Anderson, Botany Department, Duke University, Durham, North Carolina
Dr. Frank McCormack, Botany Department, University of North Carolina, Chapel Hill, North Carolina

I have studied xerarch succession on granite rocks at many places in the Southern United States and think this has the best of such vegetation. The Botany Departments of Duke University and the University of North Carolina have taken their classes there for years to illustrate this kind of vegetation. The entire mountain is much more than 600 acres, but about this much is covered with mosses, lichens, and mats of vegetation in various stages of succession. There are mats of vegetation with few trees on both the north-facing and the south-facing sides of the mountain. The vegetation on the north-facing side is typical of such areas in the higher mountains; and that of the much more extensive semibare portions of the south- and east-facing sides is similar to that of exposed granite rock in the piedmont areas of North Carolina.

The major trees on top of the mountain are Virginia pine. Where the soil is thin and only in crevices on the sides of the mountain, red cedar outnumber the Virginia pines. Chestnut oak and other typical shrubs of the region are found under the pine woods.

Evaluation:
I have seen many of the granite rock outcrops in North Carolina and other places in the south and this is the largest, the least disturbed, and the best vegetation representing xerarch succession that I have ever seen. I talked to the owners of the Superior Stone Company of Raleigh about listing this site as a potential Natural Landmark and have not received a definite answer. However, I do not think they could or would ever quarry the major part of the mountain. I have heard that the stone is of inferior quality for road building, which reduces the chance of it being extensively quarried. There is a good stand of pine on top of the mountain that is of some commercial value. Even if this stand were removed it would not lower the botanical value of the site.
Recommendation:

This site is excellently qualified as a Natural Landmark representing xerarch succession of plants on granite outcrops. Priority 1.

References:


3. Mount Jefferson State Park

This 540-acre site is located in Ashe County, North Carolina, about 10 miles southwest of Jefferson, via U.S. 221. It is administered by the North Carolina State Park Commission. A responsible person at the site is Mr. Jack W. Little, Park Superintendent, P. O. Box 174, Jefferson, North Carolina 28640. It is a State Park classified as a Natural area. There are several picnic tables and some hiking trails at the top of the mountain. I wrote to Mr. Roy Sowers, Director, Department of Conservation and Development, Raleigh, North Carolina to suggest places he thought would be suitable as Natural Landmarks; this is one of the places he suggested. I went to see it. Mr. Little, the Park Superintendent, was not there, but his assistant drove a park jeep and showed me as much as possible.

Those familiar with the site are:

Dr. Arthur Cooper, Department of Botany, North Carolina State University, Raleigh, North Carolina 27607

L. M. Oulton, Department of Botany, Mars Hill College, Mars Hill, North Carolina 28744

Hollis Rogers, Botany Department, University of North Carolina at Greensboro, Greensboro, North Carolina

The mountain, with an elevation of 4,663 feet, affords an excellent view of the lower countryside. The top of the mountain has never been cut and is clearly virgin. The lower slopes have been selectively cut from time to time, but now have trees 12 to 18 inches in diameter; if these slopes are not cut again, as is planned, they will soon show
an excellent example of the typical oak-chestnut vegetation of the region. The top of the mountain is dominated by large northern red oaks with a few white oaks and some yellow birch. There are large showy thickets of purple rhododendron on the open rocky places. Other woody plants more abundant on the slopes are: chestnut oak, basswood, cucumber magnolia, sugar maple, striped maple, black birch, hickories, white ash, black locust, mountain laurel, hydrangea, red maple, blueberries, and several other species of magnolia.

I searched all along the Blue Ridge Parkway for stands of vegetation typical of the oak-chestnut vegetational region that could be compared with this State Park. I feel that this site is much better than anything I saw along the Parkway. If interested persons from the Western United States or other parts of the world wanted to see vegetation typical of most of the mountains in this part of the United States, we could proudly show them this site.

Evaluation:

The vegetation on this site is somewhat similar to that of Pilot Mountain, but it represents another variation of the typical oak-chestnut vegetation. Mount Jefferson is much higher than Pilot Mountain and the dominant species on top is northern red oak. More high-altitude and northern species are present here. Both Pilot Mountain and Mount Jefferson have oak-chestnut vegetation, but Pilot Mountain has resembleances to oak-hickory and Mount Jefferson has more mixed mesophytic species. I think the vegetation on Mount Jefferson is superior to anything along the Blue Ridge Parkway. The vegetation on the top of the mountain is virgin and that on the sides is in late stages of succession (almost climax). The State plans to leave this mountain largely undisturbed and the vegetation should improve with age.

Recommendation:

This site is qualified as a Natural Landmark. I give it a priority of 1-.
4. - Mount Mitchell State Park

This site which consists of 1,484 acres in the park including 1,250 acres that are virgin, is located in Yancy County, 35 miles east of Asheville off the Blue Ridge Parkway on State Route 128. It is owned by the State of North Carolina -- Roy G. Sowers Jr., Director, Department of Conservation and Development, Raleigh, North Carolina. John R. Wilson, Park Superintendent, Burnsville, North Carolina, Box 400, Route 5, is a responsible person at the site. It is a State Park. There are some camping and picnicking facilities away from the best virgin timber on top of the mountain. Except for trails there is no disturbance to the best vegetation. This information was supplied by Jack Caudill, Ranger 2 at Mt. Mitchell, same address as Park Superintendent, in August 1970. I have known Mt. Mitchell from literature and personal observation most of my life.

Those familiar with the site are:
   All the biologists at Duke University, the University of North Carolina, and many other colleges and universities have done botanical work here for many years.

The vegetation on Mt. Mitchell is very similar to that at Clingman's Dome in the Great Smoky Mountains National Park. Red spruce and balsam fir are the two major trees and the smaller woody plants and herbaceous vegetation are typical of this extension of the spruce-fir forests farther north.

The sides of the mountain outside the park have been severely lumbered in the early part of the century, and it was only by intervention of the governor at that time that stopped the lumbering and saved the virgin forest at the top of the mountain. Consequently, the approaches to the mountain are not as beautiful as the approaches to Clingman's Dome. The United States Forest Service administers most of the mountain outside the State Park, and much research has been done by them in the revegetation of this kind of area.

However, Mt. Mitchell is recognized as the highest mountain east of the Rockies, and has received much publicity because of that. I was surprised that it had no national status for its vegetation.

Evaluation:
   The virgin forest on top of Mt. Mitchell is as good as that of Clingman's Dome and slightly higher. Many people visit it each year. It well represents this southern extension of the boreal forest and should have some form of national recognition.
Recommendation:
Mt. Mitchell meets all the requirements for a Natural Landmark. My priority 1.

Figure 28
Mt. Mitchell
Whiteside Mountain and Devil's Den

This site which consists of 100 acres plus Devil's Den is located in Jackson County, 4 miles east of Highlands on U. S. 64 midway between Highlands and Cashiers. It is owned by Whiteside, Inc., Highlands, North Carolina 28741. A responsible person at the site is Richard Jennings, stockholder in Corporation, Cashiers, North Carolina. A toll road was opened to the top of the mountain about 15 years ago but the venture was not profitable and the toll road is now closed, and the road is not kept in repair. The property will be sold to any concern offering enough money to satisfy the stockholders. This information was supplied by Margaretta D. Wood (Mrs. Richard D. Wood) Highlands, North Carolina, in 1970. Whiteside Mountain was owned by Mrs. Wood's grandfather, and then her uncle, S. P. Ravenel. At Mr. Ravenel's death it was sold to anyone who would buy shares in it. Mrs. Ravenel and her family have known the mountain for more than a hundred years.

I have known the mountain since 1943 and have climbed it several times and have been up the toll road a number of times.

Those familiar with the site are:
Dr. Lindsay Olive, Botany Department, University of North Carolina, Chapel Hill, North Carolina
Dr. Ralph Sargent, Highlands, North Carolina
Mr. Malcolm Monroe, Highlands, North Carolina
Mr. Hal S. Dumas, Highlands, North Carolina
Mr. Freeman Jelks, Highlands, North Carolina
Mr. Harold Coolege, Highlands, North Carolina
Dr. James K. Stoddard, Cashiers, North Carolina

Whiteside Mountain is a superb granite outcropping that rises with sheer cliffs 2,000 feet from the valley below. It has many caves and was used by the Cherokee Indians for tribal councils. It has excellent views into four states from its top. The vegetation on the mountain is typical of the oak-chestnut forest which it represents. There has been little disturbance of the vegetation on the mountain.

Devil's Den is not owned by the Whitesides corporation, but is located on the east end of the mountain. Dr. Crouch of Tulane University in New Orleans, Louisiana, owns Devil's Den and the side of the mountain below it toward Cashiers. The lower part of this tract is along the headwaters of the Chattooga River, which is being considered as a Wild and Scenic River.
If Whiteside Mountain is considered as a Natural Landmark, I think it should include Devil's Den.

Evaluation:
I am familiar with the vegetation of the mountain-sides in the Highlands area because I have done considerable research there. The vegetation is typical oak-chestnut vegetation, with chestnut oak, and northern red oak the dominants. This mountain is more known for its view of surrounding country than its vegetation. The Devil's Den is a group of rugged rocks at the cliff-end of Whiteside Mountain where lumbering has been impossible because of the terrain. I doubt if the chances of any public group buying Whiteside is high because of the high price. The Devil's Den and mountain-side below it may be bought by the Forest Service and included in the Chattooga Wild and Scenic River project and could be considered later as a Natural Landmark.

Recommendation:
So far as the vegetation is concerned, this site is qualified to be a Natural Landmark. Priority 2-.

Additional materials are in the supplementary materials.

6. -- The Kelsey Tract

This 162-acre site is located in Macon County, 2 miles northeast of Highlands, on U.S. 64. It is administered by the United States Forest Service, Thomas F. Smith, Deputy Forest Supervisor, United States Forest Service, P. O. Box 2750, Asheville, North Carolina 28802. A responsible person at the site is Henry Wright, local botanist, Highlands, North Carolina. The area is set aside as a Natural Area by the Forest Service. They have recently put in a good trail, under the supervision of Mr. Henry Wright. I wrote to Mr. Smith asking his suggestions about suitable places in the National Forest. He wrote me about this place, and talked further about it when I went to see him. I went to Highlands, and went with Mr. Wright to see the place and took lists of plants there.

Those familiar with the site are:
Henry Wright, Highlands, North Carolina
Dr. Herbert Wagoner, Botany Department, University of Michigan, Ann Arbor, Michigan
Dr. Lindsay Olive, Department of Botany, University of North Carolina, Chapel Hill, North Carolina

The tract is on a small ridge about 4,000 feet high, and overlooks the town of Highlands, which is 3,300 feet in elevation. This stand is not virgin, but there are many large trees of Carolina hemlock that have never been removed from the stand. This species is not widespread and is of unusual botanical interest. Other trees in the stand were Canadian hemlock, chestnut oak, cucumber magnolia, Frasier's magnolia, and red maple. There is much exposed granite with mosses and lichens and table mountain pines. Both purple rhododendron and the great rhododendron are abundant in the tract. Dr. Wagoner taught a two-week course on ferns at the Highlands Biological Laboratory in 1970 and was enthusiastic in his praises of this site because of the large number of ferns he found there.

Evaluation:
The Carolina hemlock is an unusual species and not widespread. There are more individual trees of this species and of a larger size than I have ever seen elsewhere. The stand also has many of the usual cove-type mixed mesophytic trees. Although the stand is not virgin, it is certainly climax and there is no danger of its ever being cut again. It is probably the best stand in that area that is being permanently protected.

Recommendation:
This stand does meet the qualifications to be considered as a Potential Natural Landmark. Priority 2.+

7. Joyce Kilmer Memorial Forest

This 3,840-acre site is located in the Nantahala National Forest, Graham County, North Carolina, 20 miles northwest of Robbinsville, off U.S. 129 on a smaller marked highway. It is administered by the United States Forest Service — Thomas F. Smith, Deputy Forest Supervisor, United States Forest Service, P. O. Box 2750, Asheville, North Carolina 28802. A responsible person at the site is the local Ranger. It is a virgin piece of forest that is being saved with no disturbance except trails. There are camping and picnicking areas a mile or two from the virgin forest.
North Carolina

I saw this forest about ten years ago, after hearing about it for years from Duke botany professors who were doing research there. Mr. Smith of the Forest Service highly recommended this place as a potential Natural Landmark.

Those familiar with the site are:
Dr. Elsie Quarterman, Box 1616, Station B., Vanderbuilt University, Nashville, Tennessee
Dr. J. Dan Pittillo, Department of Biology, Western Carolina University, Cullowhee, North Carolina

This is one of the best mixed mesophytic forest stands I have ever seen! When I was there about ten years ago, Dr. Quarterman and I checked the large trees against those Dr. E. Lucy Braun lists as typical of the mixed mesophytic forest and found practically all of them. Many of the largest trees are four and five feet in diameter, and tower to majestic heights. The hemlocks dominate along the small bubbling stream in the lower parts of the forest and other trees dominate the lower slopes. There are many wide and well-kept paths, with steps and benches in the lower part of the forest near the parking lots. Instead of disturbing the beauty and scientific value of the forest, these paths help, by encouraging people to stay on the paths. The paths and trails on the upper slopes are well marked, but are nothing more than narrow trails. Only the good walkers venture to these upper levels. Typical oak-chestnut vegetation occupies the ridges.

References:

Evaluation:
This is the best tract of virgin forest of the cove type that I have seen in North Carolina. I had heard of its beauties long before I saw it, but still was not prepared for the grandeur of it when I did see it. In the cove the largest trees are more than five feet in diameter and are towering in height. The cove contains most of the trees common in the mixed-mesophytic regions and the ridge sides and tops surrounding the cove show all variations of oak-chestnut vegetation. It is administered by the Forest Service and protected as much as possible. A new super highway is planned to cut through one side of this forest, much to the horror of botanists, but we hope the major part of the forest will not be damaged. Recent information indicates that the road will be located on the route proposed by the conservationists.
Recommendation:
If you do not make but one Natural Landmark in North Carolina, this should be the one! There is nothing better of its kind. Priority 1.

Figure 29
Joyce Kilmer Memorial Forest
(taken from a Sierra Club brochure)
8. - Pearson's Falls Glen

This 308-acre site is located in Polk County, 3 miles north of Tryon, via a gravel road where Pearson's Falls Road leaves U.S. 176. It is owned by the Tryon Garden Club. A responsible person at the site is Miss Elizabeth H. Webster, P. O. Box 1420, Tryon. The Falls Glen is open to the public for a small fee, which is used to pay a caretaker and for upkeep. The yearly attendance exceeds 4,000. This information was supplied by William L. Bancroft, Ranger on the Blue Ridge Parkway, Gillespie Gap Maintenance Area. I have not seen this place. Mr. Bancroft wrote to me about it in response to a form letter I sent to members of the Ecological Society asking for places to recommend as Natural Landmarks.

Those familiar with the site are:
- Oliver Freeman, formerly of the National Arboretum in Washington, D. C., now at Tryon, North Carolina
- C. T. Downer, Tryon, North Carolina

This south-facing, v-shaped valley has long been of particular interest to biologists of the United States. Not only does the valley have vegetation typical of that region with an oak-chestnut vegetation on the ridges and a mixed mesophytic vegetation in the coves and valleys, but it also has many representatives of plants and animals from much farther south. Donald Peatie has long lived in the area and has published numerous articles and books concerned with the vegetation of the region. The booklet in the supplementary materials was written by Dr. Peatie for the Garden Club of Tryon in 1963. I have not heard in some years of Dr. Peatie. If he is still there, he would be the best person to contact about this site. From the general literature and from this booklet, it looks as if the site has strong possibilities as a potential Natural Landmark.

Evaluation:
This site is not virgin, but it was lumbered fifty to sixty years ago and even then not clear-cut; it is now a climax forest that is well protected from further lumbering. It is in an area of unusual interest to biologists because it is the meeting place of northern and southern biota.

Recommendation:
It should be considered as a possible Natural Landmark, and further investigated. Priority 2-.
Areas in the Oak-Chestnut Region Administered by National Park Service

a) The Blue Ridge Parkway
b) The Great Smoky Mountains National Park

Locations in North Carolina that might be suitable as Natural Landmarks and should be further investigated

1) Natural Area managed by United States Forest Service

Black Mountain Natural Area: A 1,300-acre stand of representative virgin growth of red spruce, balsam fir and northern hardwoods set aside so that its characteristics, plant and animal life and soil conditions shall continue to be available for purposes of science, research and education. This site in the Pisgah National Forest has been designated a Research Natural Area.

2) Holdings of Nature Conservancy

Standing Indian Mountain: Clay County. 600 acres. Contains 300 acres of virgin red oak and yellow poplar.
Areas in North Carolina not to be Considered as Potential Natural Landmarks

1) Holdings of The Nature Conservancy

a) Henry M. Wright Preserve. Macon County, 22 acres. Outstanding example of mature conifers, virgin hemlocks. Owned: Gift of Mr. Henry M. Wright; visitors by permission. Mr. Wright does not want this open to the public during his lifetime.


2) Natural Areas and Nature Study Areas in the National Forests.

a) Walking Fern Cove is located near Buck Creek, 2.8 miles from U.S. 64. It is outstanding for the great variety of plants which occur on an area of a few acres. The rare walking fern occurs here. Canada ginger, liverleaf, dutchman's breeches, six or more species of orchids, early phlox, trilliums and many other species of flowering plants occur. Early phlox is of limited occurrence in this area. Cove tree species are well represented. Local botanists do not want this listed as a possible Natural Landmark for fear of destroying the walking fern.

b) Piney Knob Fork is located 5 miles west of Highlands. This area, on both sides of Piney Knob Fork, is northeast facing, steep and very rocky. Vegetation is old growth eastern hemlock, with yellow birch, white pine and dense rhododendron understory. Local botanists do not want this small stand listed for fear of destruction.

c) Walker Cove Research Natural Area: A 53-acre stand of old growth southern Appalachian hardwoods consisting of a mixture of sugar maple (Acer Saccharum Marsh) and associated species. An interesting feature of the stand is the fact that Sapstreak Disease of sugar maple was first reported here. The major portion of the stand consists of trees 20 to 26 inches DBH and 150 to 200 years of age. This site in the Pisgah National Forest has been designated a Research Natural Area.
Figure 30
Map of north-central North Carolina

1) Pilot Mountain
2) Rocky Face Mountain
3) Mt. Jefferson State Park
Figure 31
Map of western North Carolina

4) Mt. Mitchell State Park
5) Whiteside Mountain and Devil's Den
6) Kelsey Tract
7) Joyce Kilmer Memorial Forest
8) Pearson's Falls Glen
9) Chattooga River
1. Rocky Hollow

This 150 to 200 acre site is located in Scioto County, Ohio, 23 miles east of West Union on State Route 125. It is the Shawnee State Forest. Present land use is as a park in the forest. This area has several trails in it. Dr. E. Lucy Braun showed this place to me in the summer of 1970 and gave me further information about it. She and I made lists of plants there.

Those familiar with the site are:
Dr. Richard Durrell, Department of Geology, University of Cincinnati, Cincinnati, Ohio
Dr. Elsie Quarterman, Department of Biology, Vanderbilt University, Nashville, Tennessee

This is a hilltop and hillside with a small ravine containing a permanent stream. The major dominant trees in the ravine are white oak, red oak, beech, with sycamore along the stream and tulip poplar, black walnut, and scarlet oak. Some of the largest trees are 18 inches in diameter. The stand is not virgin but it seems to be approaching climax. Smaller woody plants present are witch hazel, sassafras, white ash, red maple, chestnut sprouts, dogwood, sugar maple, magnolia tripetala, hop-hornbeam, service berry, spice bush, and several species of viburnum. On the north slope, hemlocks and mountain laurel are present. Many ferns and herbaceous plants are on the forest floor.

Evaluation:
I met Dr. E. Lucy Braun in 1950 on an AIBS field trip in this part of Ohio where many visiting ecologists were amazed at the kind of vegetation. I was not particularly impressed because it looked just like "back home" in a mountain cove of the low mountains of North Carolina. I was surprised on this trip (1970) to catch Dr. Braun's attitude toward non-virgin forests. I think she has stopped bewailing the loss of virgin forests and sees hope for the future if we find and save these bits of semi-mature forests that still contain the mixed mesophytic species; this is such a place. Dr. Braun believes that the Ohio State Forests are not adequately protected and if this one were made a Natural Landmark, it would help in its preservation.

Recommendation:
This site should be considered as a potential Natural Landmark. Priority 2.
Figure 32
Rocky Hollow Area
Scioto County, Ohio
150-200 Acres

Rocky Hollow Area, Scioto Co., Ohio
150-200 acres
2. - Fort Hill State Memorial

This site includes most of the Memorial's 1,200 acres; it is located in Highland County, Ohio, 15 miles southeast of Hillsboro. The site is owned by the State of Ohio. It is largely a natural area. This information was supplied from Dr. Braun's 1969 publication and her recommendation. Dr. Richard Durrell, Department of Geology, University of Cincinnati, Cincinnati, Ohio, knows the site.

Fort Hill is at the northern end of the Knobs Border Area of the western-mesophytic region. Selective cutting had taken place before the site was acquired as a State area in 1932. It has a variety of habitats. On the dolomite cliffs and knobs grow Quercus Muhlenbergii, red cedar, dogwood, red bud, white and scarlet oaks, and other widely spaced plants. On the lower slopes is an impoverished mixed mesophytic forest of black and red oak and formerly chestnut. The lower slopes have beech, tulip tree, red oak, and sugar maple. Chestnut oaks are abundant on the shade slopes. Slopes on the north, northeast, and southeast are covered with a mixed mesophytic forest.

References:

Evaluation:
I have not seen this site but Dr. Braun thinks it is good. It does have many variations of topography, parent rocks and plant communities and would give a total picture of the normal vegetation of the region. It is not virgin, but it has not been cut since before 1932 and will not be further disturbed. It is large and permanently protected.

Recommendation:
This site seems to be quite suitable as a Natural Landmark. Priority 1.
3. - C. A. Eulett Preserve

This 300-acre site is located in Adams County, Ohio, 1 mile north of Lynx on a local road off State Route 125. It is owned by the Cincinnati Museum of Natural History. A responsible person at the site is Dr. Richard Durrell, Department of Geology, University of Cincinnati, Cincinnati, Ohio. The land is being preserved. This information was supplied by Dr. E. Lucy Braun, 5956 Salem Road, Mt. Washington, Cincinnati, Ohio 45230, who showed me this site in the summer of 1970.

Dr. Braun described this site thus: "The Wilderness" in Adams County, Ohio, (listed under Knobs Border Area of the Mixed Mesophytic Forest Region) is interesting both botanically and geologically. It centers about a deep gorge or valley rimmed by a series of high dolomite cliffs and promontories. Prairie patches occupy some of the promontories and there is a beautiful prairie on slopes of one ravine not yet acquired. This tributary beautifully illustrates stream capture. In fact, drainage changes of the Illinoian glacial age are clearly shown. I believe the Pachistima canbyi is a relic of Tertiary time when drainage was different — some of it to the Scioto (old Teays) River. The Preserve now includes approximately 300 acres, and could well be doubled or tripled in size; in fact, it could be connected up with Buzzardroost Rock Preserve.

I made a list of dominant trees. The largest ones are 12 to 24 inches in diameter. They were beech, sugar maple, Quercus Michauxii, Thuya accidentalis, black walnut, tulip tree, white and red oak, slippery elm and Pennsylvania ash. Smaller woody plants were witch hazel, hickories, paw-paw, basswood, dogwood, Staphylea, Ostrya, carpinus. I have never seen so many or so big Thuya trees this far south.

On top of the rock cliffs the dominant trees were chestnut oak, and white, black, and post oaks. The site is not virgin and was lumbered in 1940, but it is quite mature and seems to be climax.

Evaluation:
This is the best place Dr. Braun showed me. It is a relatively large tract and is being preserved. It is as typical mixed mesophytic vegetation as I saw that far west and north. Dr. Braun loves those skimpy little patches of prairie in this tract. I was much more impressed with the
beautiful typical mixed mesophytic forest. Dr. Braun and her group would like to see this part given Natural Landmark status now, and later when the missing links of land can be bought, joined up with Buzzardroost Rock for some higher recognition.

Recommendation:
This site is excellently qualified to be a Natural Landmark. Priority 1.
The following seven stands in Ohio were recommended by Dr. Alton Lindsey and are part of the unpublished theme study done for the National Park Service: Beech Maple and Maple Basswood Regions of the Deciduous Forest Formation by Alton H. Lindsey and Linda K. Escobar. 1970. Where evidence is available I have given them priority numbers and marked them on a map.

**L1 Hazelwood Botanical Preserve**

Hamilton County, Ohio
Mason Quadrangle
Sycamore Township
Section 9

75 acres
University of Cincinnati

The tract lies about 16 miles north of Cincinnati on Cornell Road east of Sharonville.

The Preserve was acquired in 1926 primarily due to the presence of a number of boreal species which exist here in a region of climax mesophytic species. Approximately 40 acres of the tract is in forest and 10 in swampland.

The Preserve is traversed in the southwest corner by a main ravine with several smaller tributary ravines entering at approximately right angles. The main ravine and the two larger branches have swampy, flat-bottomed floors and are cut by streams. The angle of the slope of the south bank of the main ravine is relatively steep in comparison with that of the north bank; the slopes and uplands are forested (Segelken, 1929).

Soils in the area are clay loams and silts with a pH range of 6.7-7.7 and were developed over Illinoian and Wisconsin till on the Maysville formation substratum. The area is drained by Cooper Creek.

Tree species in the wooded tract in order of importance are beech, sugar maple, white oak, black cherry, and black walnut. There is also a relic community of Lycopodium. The beech occupies the slopes and upland level portions of the tract. At the western end on the south slope there is beech and sugar maple, tulip and red oak. On the northern slope, beech has sour gum, white oak and tulip tree as associates. Segelken (1929) reports that this stand differs from other forest communities of the Cincinnati region in that it contains a greater percentage of beech.
The understory of the woods is similar in composition to that of the canopy but indicates a trend to a mixed mesophytic type and a lessening of the importance of beech. Associated trees and shrubs in the understory are hop hornbeam, flowering dogwood, maple-leaf viburnum, blue beech, spicebush, hydrangea, sawbriar, smooth carrion flower, greenbriar and wild grape. A complete list of herbaceous species is in the supplementary materials.

The only disturbance in the forested area was limited cutting of the white oak and tulip tree about 100 years ago. There are second growth areas on the south bank of the ravine.

Since 1940 the cultivated area of the Preserve has been allowed to revert to natural vegetation. It has been invaded by poison ivy, blackberry, tulip poplar, and sugar maple. There has been some swamp damage in the low areas due to an adjacent road building project.

Dreyer, W. A., Personal communication, 1970
Herrick, 1962
Segelken, 1929

Keever - Priority 1

1.2 The Cincinnati Nature Center

Clermont County, Ohio 600 acres
Cincinnati Nature Center Inc.

From Cincinnati, travel west on State Route 32 to Tealtown Road. Turn north and the center is located at number 4949 Tealtown Road, Milford.

This large Nature Center contains a Beech-Maple woods on glacial gravels, meadows, fields, and a 4½ acre lake.

In the woods, basswood, red oak, white oak, hickory, and black gum are subdominants and in the wetter areas sycamore and dogwood are included in the understory. There is an abundance of spring-flowering herbaceous species present.

Fauna include deer, fox, skunk, raccoon, opossum, groundhog, shrew, mole and mice. More than 150 species of birds have been spotted in the center, including the pileated woodpecker, pine siskin, and warbler as well as mallards, other ducks, and kingfishers.
Mr. Heger has surveyed the climax beech forest and has included it in his report to the National Park Service.

The Cincinnati Nature Center, undated leaflet

Keever – Priority 2

**L3 Sigrist Woods**

Stark County, Ohio 20-30 acres
Stark Wilderness Center, Inc.

The Wilderness Center is located one mile northwest of Wilmot, Ohio, on U.S. 250.

Although the area lies some 25 miles south of the Beech–Maple Region as mapped by E. Lucy Braun, it does lie at the edge of the glaciated area, and has been recommended for consideration as a National Natural Landmark.

Part of the tract contains a magnificent stand of beech, sugar maple, oak and hickory. There is a 400 year old bur oak that measures 16 feet in circumference and 5 feet d.b.h. The rest of the area includes marshy spots, lakes, creeks, and old fields. This is a productive wildlife habitat, and a list of the vertebrate species found in the Wilderness Center is included in the Appendix.

Trees in Sigrist Woods include white oak, red oak, bur oak, black walnut, black gum, sugar maple, beech, hop hornbeam, flowering dogwood, sycamore, shingle oak, black oak, red maple, slippery elm, blue beech, pignut hickory, shagbark hickory, bitternut hickory, linden, American elm, white ash, black cherry, and sassafras. Elderberry, wild grape, white baneberry, virginia creeper, wood nettle, poison ivy, and an abundance of wild flowers are found here also.

In all, there are five tracts of mature timber in the Center. Sigrist Woods cannot be classified as virgin, since the original owner did some very limited logging, but the area has been disturbed very little, and is one of the best in this part of Ohio. The area is being protected with zeal.
Mr. Herbert Heger, Report to the National Park Service, September 1969
Herrick, 1962

Keever - Priority 2

L4 Cincinnati Waterworks Park

Hamilton County, Ohio
Newport Quadrangle
5400 Kellogg Avenue

The woods lies at the junction of the Little Miami and Ohio Rivers.

This has been reported as a very good example of a mixed mesophytic forest with tall trees and undergrowth. Tree species include beech, white basswood, white ash, sugar maple, black cherry, hackberry, American elm, buckeye, and red oak.

Herrick, 1962
Withrow, 1932

Keever - Priority ?

L5 Villars Chapel Woods

Clinton County, Ohio 500 acres
Blanchester Quadrangle Many owners
Vernon Township

The area lies south of State Route 350 and east of Villars Chapel (junction of State Routes 730 and 350).

The woods consists of red maple, elm and pin oak in the poorly drained areas with some spots of Beech--Maple and some beech and white oak. The area is one of poorly drained silt loams and clays on a mostly level Illinoian till plain.

Herrick, 1962

Keever - Priority ?
L6 Tea Hills

Ashland County, Ohio
Lake and Mohican Townships

From Mohicanville, travel southeast about 2 miles on State Route 179, then north on Rd. 132 about 1 mile to a stream which dissects Tea Hills.

This largely timbered area lies slightly south of the Beech--Maple border as mapped by Braun. It features rugged terrain, a deep gorge, springs and bogs. Herrick (1962) reports that much of the area has never been pastured. Plant species of interest in the area include arbutus, ginseng, and golden seal.

Herrick, 1962

L7 VanSickel Woods

Holmes County, Ohio
Millersburg Quadrangle
Killbuck Township
Section 8

39 acres
Nature Conservancy

The woods can be reached on County Road 48.

This Beech--Maple woods lies on steep and hilly unglaciated sandstone at the edge of the glacial border. The soil has a pH of 5-6. It is a second growth stand including tulip tree, white ash, wild black cherry, dogwood, bitternut hickory, sassafras, and red oak. There is an excellent ground cover of wild flowers and Lycopodium. On the east side of the property is a beautiful waterfall.

The area has been protected for over 60 years from fire and grazing.
These three stands in Ohio were recommended by Dr. Lindsey, but according to my interpretation of the map, they are north of the mixed mesophytic or western mesophytic regions. The descriptions below were taken from the theme study, *Beech-Maple and Maple-Basswood Regions of the Deciduous Forest Formation*, by Lindsey and Escobar, 1970.

### Auten Property

Ashland County, Ohio  
Hanover Township  
Section 22

The tract borders the Mohican State Forest at the junction of Sellers Road and Pine Run Road.

This is a lovely disjunct area which features large specimens of white pine and large oaks. Herrick (1962) reports that the area may never have been cut.

### Clear Fork Gorge Natural Landmark  
(Mohican White Pine—Hemlock Forest)

Ashland County, Ohio  
Perrysville Quadrangle  
Hanover Township  
Section 17

5-6 acres  
Department of Natural Resources  
Division of Parks & Recreation

The stand lies 2-300 yards north of the fire tower in the Mohican State Park.

Part of the Mohican State Forest, this tract was designated a National Natural Landmark in 1967. It consists of a small virgin White Pine—Hemlock remnant.

Herrick, 1962  
Norville Hall, Personal communication, 1970
Hemlock Falls

Richland County, Ohio
Worthington Township

The area is located ½ mile south of the bridge over Clear Fork Creek on Newville-Bunkerhill Road. Follow the old lane north to the Falls area.

Here on sandstone cliffs is a rich flora including hemlock, trailing arbutus, wintergreen, Ilex verticillata and walking fern. The last named species is found a short distance southwest from the bridge.

Herrick 1962

Other Places in the Mixed Mesophytic and Western Mesophytic

1. Existing Natural Landmarks
   Buzzardroost Rock - Lynx Prairie, and Dysart Woods

2. Nature Conservancy holdings not recommended by any of the ecologists of the area, but that might have possibilities.
   a. Edwin H. Davis Memorial, an 88-acre tract in Adams County

   b. Stillfork Swamp, a 61-acre tract in Carroll County
Figure 33
Map of south-central Ohio

1. Rocky Hollow
2. Fort Hill State Memorial
3. C.A. Eulett Preserve
Figure 34
Map of southwestern Ohio

L1. Hazelwood Botanical Preserve
L4. Cincinnati Waterworks
L5. Villars Chapel Woods
PENNSYLVANIA
1. - Florence Jones Reineman Wildlife Sanctuary

This 3600-acre site is located in Cumberland and Perry Counties, Pennsylvania, 8 to 10 miles northwest of Carlisle on State Route 74 to Waggoner's Gap. It is owned by the Girard Trust Bank and J. Wells Henderson, and managed by the Biology Department of Dickinson College. It is preserved as a wildlife sanctuary and research area for Dickinson College. This information was supplied by Dr. Harold Voris, Department of Biology, Dickinson College.

The Florence Jones Reineman Wildlife Sanctuary was established in 1966. Its purpose is to afford a sanctuary for all forms of wildlife and to be a place for scientific investigation. The biology and geology departments have taken special interest in the sanctuary for research and for class use in courses such as Ecology, Invertebrate Zoology, Field Study of Plants and Field Geology. This use of the sanctuary will be enhanced in the near future by the addition of a field laboratory and custodian's home. The trust fund provides for a full-time custodian. About 14 years ago the area was timbered and since that time has been undisturbed. It is now a young, secondary, hardwood forest with most stands about 40 feet in height. The tract lies in the migration route of many species of Falconiform birds and amateur and professional ornithologists alike have for several years used Waggoner's Gap (adjacent on two sides to this sanctuary) for observing the migrations of these birds. Unfortunately, a checklist of the fauna and flora have not yet been prepared.

Students have carried out independent research in Biology and Geology at the sanctuary and reports on this work are kept on file in the biology and geology departments' libraries. None of this work has yet been published in a scientific journal. It is our hope that this wildlife sanctuary will be considered as a Natural Landmark for two practical reasons. It would help insure the preservation of the sanctuary for its stated purposes and handled properly, it would improve public relations between the local residents and the sanctuary. (Prior to the establishment of the sanctuary this tract of land was a popular deer hunting spot.)

Evaluation:
If we are to consider some successional sites, I think this would be quite suitable. It is large, and has excellent protection. It is located on the top and sides of
a ridge where the typical oak-chestnut forests do grow with all their variations. Dr. Voris is a zoologist who is much interested in the animals in this area.

Recommendation:

This site is suitable as a potential Natural Landmark because it is a good example of a successional forest that later will be climax. Priority 1-. 
Figure 35
Florence Jones Reineman Wildlife Sanctuary
2. - Benton Ravine

This 100-acre site is located in Lancaster County, 25 miles south of Lancaster, and 2 miles from Furniss off State Route 272. It is owned by Dr. W. H. Huffnagle, 1514 Newton Road, Lancaster. There is a road through this ravine that is maintained by the Commonwealth of Pennsylvania in return for the owner's agreement to keep the site open to the public. Dr. Huffnagle wants the stand to be left undisturbed. It is being used for biology field trips and for research by Millersville State College and other biologists and nature lovers. One of my plant ecology students showed me this place about 10 years ago, and I have been using it for classwork and research since that time.

Those familiar with the site are:
- Dr. James Parks, Department of Biology, Millersville State College, Millersville, Pennsylvania 17551
- Dr. Robert Ford, Department of Geography, same address.
- Dr. William McIlwaine, Department of Earth and Space Science, same address.

This ravine is about a mile long, and contains an undisturbed forest that is dominated by hemlocks, beech, tulip poplar, black birch, northern red oak, with a few sugar maple, and basswood. Under these large trees grow red maple, dogwood, mountain laurel, rhododendron, paw-paw, chestnut sprouts, and many kinds of ferns and herbaceous plants. So far as anyone knows this 100 acres on the steep sides of the ravine have never been cut.

There are other places near the Susquehanna River in this area that have similar vegetation, but this is the largest, the least disturbed, and the one that has the best chance of escaping destruction. Dr. Huffnagle will never cut it and he is arranging things in his will to prevent its being cut.

I am using it in my present National Science Foundation research as the best example of this kind of vegetation in this part of Pennsylvania. I have completed vegetational analysis in the stand and am continuing research on the autecology of the major species here.
Evaluation:

I may be prejudiced in favor of this site, but I still think it is the best place of its kind in this part of Pennsylvania. It represents a relic vegetation from the time the glaciers were just north of it. It is better than many vegetation sites I saw that are already Natural Landmarks. This 100 acres has had very little disturbance and the site has all assurance of remaining undisturbed.

Recommendation:

This site is fully qualified as a potential Natural Landmark, Priority 1.

3. - Ferncliff Park in Ohiopyle State Park

This 100-acre site is located in Fayette County, 1 mile or less north of Ohiopyle, Pennsylvania via U.S. 40 and State Route 81. It was given to Western Pennsylvania Conservancy by Edgar J. Kaufmann, and later sold to the State. A responsible person at the site is Mr. Charles Rae, Park Superintendent, R.D.1, Ohiopyle, Pennsylvania 15470. This protected peninsula in a loop of the Youghiogheny River is an area from which all picnicking and camping is excluded; only hiking is permitted beyond a parking area at the entrance. This information was supplied by Mr. William C. Forrey, Assistant Director of State Parks, 692 Feller Building, Harrisburg, Pennsylvania 17120. I had a conference with Mr. Forrey asking him for possible sites in the State Park System that could be potential Natural Landmarks. He said this is one of the places with excellent vegetation that has been protected and will continue to be protected. I have not seen it.

Those familiar with the site are:

Dr. Otto E. Jennings, Professor Emeritus, Biological Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania

The area was cut over in 1911, but has not been cut since that time. It is again approaching the type of vegetation that was there originally. From the description of the vegetation in the booklet by Dr. Jennings, it seems that this is an excellent example of the typical vegetation of the mixed mesophytic region of this area. The major dominant tree is white oak, along with black, red, scarlet, and chestnut oaks. Other trees typical of the mixed mesophytic, although not as numerous as the oaks, are beech, sugar maple, cucumber tree,
Pennsylvania

umbrella magnolia, basswood, tulip tree, and hemlock, and chestnut sprouts. Also present are three species of hickory, ironwood, water beech (Carpinus), yellow birch, black birch, sassafras, sycamore, red maple, black locust, striped maple, dogwood, white ash, sourgum, and some other incidental trees. The hemlocks are localized on the south end of the peninsula and the tulip trees are usually young ones along the paths.

In the selection of forest stands for recognition, too often we choose the unusual and ignore the usual. This seems to be a splendid example of the usual vegetation of much of western Pennsylvania, and is the kind of site we should point out as being typical of this part of the United States.

References:

Evaluation:
I have not seen this site, but from the evidence I have, it seems to be an excellent potential Natural Landmark. It is well protected by a loop in the river with only a small access neck. The Bureau of State Parks plans no camping or picnicking facilities — only trails. Although the forest was selectively cut in 1911, the forest is now climax and possibly the best one in that part of Pennsylvania.

Recommendation:
This site seems to meet all the qualifications as a potential Natural Landmark. Priority 1-

Nolde Forest State Park

This site, which consists of certain parts of 644 acres, is located in Berks County, 10 miles south of Reading, at the village of Angelica on State Route 625. It is owned by the Commonwealth of Pennsylvania. A responsible person at the site is Mr. John Weidiger, Route 1, Box 392, Shillington, Pennsylvania 19607. Plans are in progress to make it an environmental education center, with class, laboratory, and field stations for teaching conservation, geology, and ecological biology. There are plans for weekday commuting field trips within a 60 to 90 mile radius, and for overnight living accommodations for up to 250 students. This information was
supplied by Mr. William C. Forrey, Assistant Director of State Parks, 602 Feller Building, Harrisburg, Pennsylvania 17120. Telephone 717-787-6640. I had a conference with Mr. Forrey asking for places in the State Park System that would be suitable as Natural Landmarks, and he suggested this place.

About 1900, Mr. Jacob Nolde, a prosperous hosiery manufacturer, who had originally come from Germany about 1880, began to buy farm land in this area and manage it like the German forests that he had known in Europe. He engaged a German forester and began planting trees, largely gymnosperms, and deriving income from the sale of Christmas trees, nursery stock, firewood, and charcoal. When Mr. Nolde died in 1964, his wife sold the property to the State.

More than half of the estate is now in deciduous forests. Judging from the gently rolling terrain and the elevations between 345 and 945 feet, it could support a forest typical of this part of Pennsylvania, if it is not too severely managed. Much of it is in various states of succession -- from a few old fields to forest lands in which the trees could be as much as 70 years old.

Evaluation:

I would recommend that certain parts of this forest be left without "Forest Management" and these areas could become excellent examples of the different stages of succession. Mr. Forrey seemed open for such suggestions. If the entire forest was managed to conform to the economic needs of the people, I could not suggest it as a Natural Landmark.

I plan to see this place soon, if possible before I finish this report. If the hardwood section has not been overly managed, it may be excellent vegetation typical of this region. If this site is as good as I hope it is, it would qualify as a Natural Landmark in a part of the educational center.

Recommendation:

Priority 2+. 
Pennsylvania

5. - Bear Run Nature Reserve and Brooks Bird Sanctuary

This 1,000 to 2,000-acre site is located in Fayette County, Pennsylvania, 17 miles east of Uniontown; from Uniontown, go southeast on U.S. 40, then northeast on State Route 381 to just north of Ohiopyle. It is owned by Western Pennsylvania Conservancy, 204 Fifth Avenue, Pittsburgh, Pennsylvania. A responsible person at the site is Dr. John Hug, Director, Bear Run Nature Reserve, Ohiopyle. It is a forest preserve and educational center. This information was supplied by F. R. Swan Jr., 214 East View Drive, West Liberty, West Virginia. During the summer of 1969 he visited the area to make recommendations for vegetational management and long-term ecological research.

Those familiar with the site are:
Dr. John Hug, Director, Bear Run Nature Reserve, Ohiopyle, Pennsylvania
Mr. Lowden, Naturalist, same address

Bear Run Nature Reserve contains some old-growth oak stands, abandoned fields and young cutover stands over a wide range of elevation. It is assured of preservation.

References:

Evaluation:
This site is quite near Ohiopyle which I am giving a high priority. Ohiopyle seems to be a better example of mature forest than this one. However, this site too should be considered because it would show early stages of succession along with more mature forests. Often more birds and other animals are present in the younger stands. It is assured of protection.

Recommendation:
This site should be investigated further to see if it is suitable as a Natural Landmark. Priority 2.
6. Western Pennsylvania Conservancy Wild Flower Reserve

This 1,000-acre site is located in Beaver County, Pennsylvania, 20 miles west of Pittsburgh via U.S. 30 and State Route 18 to Raccoon Creek State Park. It is owned by the Western Pennsylvania Conservancy, 204 Fifth Avenue, Pittsburgh, Pennsylvania. It is a forest preserve and educational center. This information was supplied by F. R. Swan, Jr., 214 East View Drive, West Liberty, West Virginia. During the summer of 1969, he visited the area to make recommendations for vegetational management and long-term ecological research.

This area illustrates flood plain, mesic and xeric forest communities and good rock outcrops. It is assured of preservation.

References:

Evaluation:
I have not seen this site, but from what Dr. Swan says, it should be considered as a potential Natural Landmark. It contains a variety of plant communities and if it continues to be protected, it will represent typical vegetation of the region.

Recommendation:
This site should be investigated further to see if it is suitable as a potential Natural Landmark. Priority 2.

7. Jennings Blazing Star Prairie

This 300-acre site is located in Butler County, Pennsylvania, 7 miles south of Slippery Rock on State Route 173. It is owned by the Western Pennsylvania Conservancy, 204 Fifth Avenue, Pittsburgh, Pennsylvania. A responsible person at the site is Dr. Earl Houts, Westminster College. It is a forest and prairie reserve and educational center. This information was supplied by F. R. Swan, Jr., 214 East View Drive, West Liberty, West Virginia 26074. During the summer of 1969, he visited the area to make recommendations for vegetational management and long-term ecological research. Dr. Earl Houts of Westminster College is familiar with the site.
The site contains good examples of oak forest and grassland with some prairie forbs, and few, if any prairie grasses. It is assured of preservation. A terminal moraine of the Wisconsin glaciation runs through the reserve.

References:

Evaluation:
I have not seen this site. Although Dr. Swan recommends this site, he does not seem overly enthusiastic about it. What Dr. Houts thinks is a prairie, Dr. Swan is not sure about because of the lack of prairie grasses. It may be worth considering since it will be protected.

Recommendation:
This site should be investigated further to see if it is suitable as a potential Natural Landmark. Priority 3.

8. - Schollards Run Marsh

This 400-acre site is located in Butler County, Pennsylvania, 14 miles north of New Castle on U.S. 19. It is owned by the Western Pennsylvania Conservancy, 204 Fifth Avenue, Pittsburgh, Pennsylvania. It is a forest and marsh preserve. This information was supplied by F. R. Swan Jr., 214 East View Drive, West Liberty, West Virginia. During the summer of 1969, he visited the area to make recommendations for vegetational management and long-term ecological research.

Schollards Run Marsh is valuable because it is wetland just north of the glacial border and near Pittsburgh. It is assured of preservation.

References:

Evaluation:
I have not seen this marsh, but since it is relatively large and is being preserved it should be considered as a potential Natural Landmark.

Recommendation:
This site should be investigated further to see if it is suitable as a Natural Landmark. Priority 2-.
Mrs. Marilyn Buchauer, a graduate student in the botany department of Rutgers University, New Brunswick, New Jersey, has been doing research on Blue Mountain in Pennsylvania. She has found six sites on the top and sides of this mountain near the Appalachian Trail that she thinks should be considered as Natural Landmarks. All of the sites lie near the county lines of Lehigh, Berks, Northampton, Monroe, Carbon and Schuylkill Counties. I have not seen these sites, but since I know this type of vegetation, I can give some judgement from her description. If anyone would like to investigate these sites, Mrs. Buchauer and her husband would guide a tour to see them. I am including her descriptions of these sites along with my evaluations and recommendations.

9a. - Dans Pulpit State Game Lands

This area is along the Appalachian Trail 1 to 2 miles east of Dans Pulpit in the State Game Lands No. 106, and about 2½ miles west of the Lehigh County – Berks County boundary. It is certainly not unique, and the area west of Dans Pulpit, in the Hawk Mountain Sanctuary and in the area of "The Pinnacle" may be even more scenic. I cannot speak for these areas, however, but I do know that the Dans Pulpit area is forested with sizable trees, mostly red and chestnut oaks reaching up to 20" in d.b.h. Nyssa sylvatica, Sassafras and Acer rubrum are common, and there are scattered Pinus rigida up to at least 12" d.b.h. The area certainly qualifies as a good example of a typical ecological community. Also, scattered lookout areas along the trail, especially Dans Pulpit itself, give very scenic views of the valley below. The forests are almost certainly not climax, probably having been logged in the 1800's, but are a good second growth. We sampled 300 meters of transect in the area last summer. I do not know who owns the land outside of the Game Lands area.

Evaluation and recommendation:
This sounds like much of the typical oak chestnut second growth forests, but not especially good ones. Priority 3.
9b. - Blue Mountain Top

This is a two-mile long area along the Appalachian Trail east of State Route 309. It is a good example of varied stages of forest succession following forest fires, and is a patchwork of 9 year old, 25 year old, and older regrowth. There are scattered scrub oak thickets and stands of Populus grandidentata, P. tremuloides, and Nyssa. Pitch pine, Quercus prinus, and Quercus rubra are also common. About 1½ miles east of State Route 309 (about ½ mile west of a power line crossing), the forest has apparently not been burned or logged for a long time, possibly at least 70 or more years, and is a good second growth stand with fairly large oaks and pines. It is fairly diverse, with Acer rubrum, Hammamelis virginiana, Prunus serotina and Betula Lenta frequent, and with occasional Sassafras, Fagus and Amelanchier. Viburnum acerifolium, Rhododendron maximum, and Kalmia latifolia are the most common shrubs. We sampled 300 meters of transect in the unburned area, and 300 meters in the 25 year old regrowth area. I do not know who owns the land.

Evaluation and recommendation:

This is of interest to botanists, but I would not like to point it out to visitors with pride. It would hardly be suitable as a Natural Landmark because by the time you got a marker up it would change. Priority 5.

9c. - Lehigh Gap

This site, Lehigh Gap, is being mentioned not for its beauty, but for its starkly barren desolation. The Gap is very impressive, and is similar to the Delaware Water Gap on a somewhat smaller scale, and is of geological interest. Otherwise, it does not fit any of the categories you mentioned in your letter to Dr. Buell, unless it could be considered a reminder of our natural heritage despoiled. It could be well worth recognizing as a good example of what the combined forces of fire, logging, pollution, and erosion can accomplish in denuding a formerly majestic landscape. As a public park or monument, it could expose the public to a very important message -- how man's activities can completely disintegrate an ecosystem. Much of the top and slopes of the mountain on the east side of the Gap are owned by the New Jersey Zinc Company, the polluter which has been in Palmerton since 1898.
Pennsylvania

The rest of the land is privately owned, and at least one owner has been unsuccessfully trying to sell his property to the Zinc Company. We sampled the vegetation in five areas in and near the Gap, covering from 280 to 450 meters of transect at each site.

Evaluation and recommendation:

This is a horrid example of mistreatment of our environment. Perhaps we should wave it before the nose of the public, but in some other way than a Natural Landmark. Priority 5.

9d. - Smith Gap

Smith Gap is a small wind gap in the ridge, just south of Kunkletown. There is a dirt road which crosses the mountain at the gap. It is a very beautiful example of the typical woodland community of Blue Mountain. The north slopes are richly covered with black and gray birch, oak, red maple, and occasional striped maple, hemlock, and paper birch (Dr. Buell says the area is one of the most southerly at which he has seen paper birch). The shrub and herb flora is also very varied and lush; it was one of the few places we found Lycopodium and wintergreen. Dr. Buell was so very enthusiastic about the beauty of the woods that he led a second field trip to the area to show it to some of the graduate students in the department. It may already be too late to save Smith Gap, I fear. Most of the land along the dirt road on the north slope, and for a mile or more west along the Appalachian Trail, are owned by Carl Reiche, a realtor who lives in Delaware Water Gap, Pennsylvania. "Lots for Sale" signs, and lot boundary markers, have lined the road and the Appalachian Trail itself for several months now, and it saddens me to report that most of the large paper birch along the road near the ridge top have been cut down in order to widen the road. Since most of the birch grew only along the road, not many are left.

Just west of Reiche's land are State Game Lands, and farther west are about 2,300 acres on the ridge top and north slope owned by George Brands Sr., Route 2, Kunkletown. (Some maps indicate his land as State Game Lands). The woods in the area owned by Brands are very lush, diverse, and attractive. There is a spring on the ridge top which can be reached by a trail running up the south side of the mountain from the town of Delps. Mr. Brands is a very conscience-minded landowner, and wants to keep his tract in one piece,
not fragmented and ruined. He reported to me that on the slopes there are numerous magnificent groves of young hemlocks, "as thick as the hair on a dog's back."

Evaluation and recommendation:
The part being developed as building lots could not be considered as a Natural Landmark. However, the part owned by Mr. Brands has some possibilities and perhaps should be looked at with Mrs. Buchauer. Priority 3.

9e. - Blue Mountain Slope

Much of the forest on the north slope in the vicinity of Smith Gap is probably very beautiful. We know of one particularly lovely area about 1 mile west of Smith Gap, at the base of the mountain just above the Aquashicola Creek. A few acres of the land right on the creek are owned by Mr. Green who lives in Palmerton. His land adjoins that of Mr. Brands, which lies farther upslope.

A visit to this area would be well worth the trip; of all the areas I have seen on Blue Mountain this area unquestionably impressed me the most with its lushness, denseness and diversity, paralleling some of the cove forests in the Smokies. The dense, lush growth is confined to the lower slopes along the creek, where the environment is moist and sheltering. The dominant trees are Betula lenta, Liriodendron tulipifera, and Fraxanus sp. (americana or pensylvanica) which grow extremely tall, and frequently over 12" d.b.h. The birch and ash seem to be reproducing successfully. The shrubs are almost exclusively dense tangles of Lindera benzoin and Rhododendron maximum. The herb flora is very diverse, including Aralia nudicaulis, Viola spp., Dryopteris sp., Impatiens, Galium, Aster, Eupatorium, Trilium, and several others. Limited time prevented us from sampling here because the slope was very steep, the ground slippery, and the vegetation so thick we could move only very slowly and carefully.

About 100 feet higher in elevation the woods open up and are composed predominantly of hemlock, with only scattered Rhododendron, and Aralia the only herb. Some of the hemlocks are very large and very old, suggesting that human disturbance in the area may have been minimal, or at least not very recent.
This area too is threatened; the Army Corps of Engineers plans to build a dam across the Aquashicola Creek just east of Palmerton (in 5 or 10 years). The resultant lake would flood the slopes just described.

Evaluation and recommendation:

This sounds like the mixed mesophytic vegetation that Dr. Braun describes as occupying the valleys and ravines between the ridges. The high abundance of black birch, tulip poplar, and ash indicates to me that it has been heavily lumbered and that this is an older successional stand. I think we should find some good mixed mesophytic vegetation in a valley, but probably not this successional one. Priority 4.

9f. - Fox Gap

The woods along the ridge west of Fox Gap are lush, and mountain springs densely surrounded by ferns are common. The forest composition is similar to that of other ridge top sites described, with the exception of white oak (Q. alba) which is common in the more moist areas near Fox Gap. The trees are quite large, and areas which were not cleared for farms in the late 1800's or early 1900's (all now abandoned) seem to have had minimal disturbance. Most of the land is owned by the Bangor Water Company in Bangor, or the Blue Mountain Consolidated Water Company in Nazareth.

There is a tantalizing story about an area on the wide, flat ridge top between Fox Gap and Wind Gap, which is supposed to have never been logged, and which is claimed to have very, very large trees (several feet in diameter, as the story goes). The area was found by a hermit who spends a lot of time alone out in the forest; this hermit described the area to Mr. Johnson, who lives on the ridge top at Fox Gap and who is part of the staff at the Kirkridge private School, a newly founded institution. The hermit may have been exaggerating considerably, but I do not doubt Mr. Johnson's reporting. The possibility of a virgin stand existing in the area is exciting, and worthy of investigation. We plan to speak with Mr. Johnson again, and try to get a better idea of where the area is supposed to be. We hope to explore the area this spring or early summer, and if we find the "virgin stand" we will let you know.

Evaluation and recommendation:

If there is really any virgin timber in this area it should certainly be investigated as a possible Natural Landmark. Priority 2.
Figure 36
Sites Pennsylvania 9a, b, c, d, e, and f
10. Hemlocks Natural Area

This 67-acre site is located in Perry County, Pennsylvania, 12 miles southwest of Blain, via State Route 274 and Hemlock State Forest Road. It is owned by the Commonwealth of Pennsylvania, Department of Forests and Waters, P.O. Box 1467, Harrisburg, Pennsylvania 17120. A responsible person at the site is the District Forester, Department of Forest and Waters, Blain, Pennsylvania 17006. It is a State Forest Natural area. This information was supplied by Samuel S. Cobb, Director, Bureau of Forestry, Department of Forests and Waters, P.O. Box 1467, Harrisburg, Pennsylvania 17120.

Mr. Cobb has visited the area on numerous occasions since 1943 as Chief of the Division of Forest Protection and as Director, Bureau of Forestry. Mr. F. E. Masland, Jr., of Carlisle, Pennsylvania suggested to Mr. Cobb that this site be recommended as a potential Natural Landmark.

Those familiar with the site are:
- Walter D. Ludwig, Jr., District Forester, Department of Forests and Waters, Blain, Pennsylvania 17006
- George M. German, District Forester, Department of Forests and Waters, P.O. Box 94, Wellsboro, Pennsylvania 16901

The Hemlock State Forest Natural Area consists of 115 acres along both sides of Hemlock Run, 67 acres of which is virgin and would be suitable as a Natural Landmark. The area consists of a narrow band, 1 1/2 miles long and 500 feet wide of very large old growth hemlocks with mixed associated hardwoods located in a narrow stream ravine. The area supports at least 11 commercial tree species including hemlock, yellow birch, red oak, red maple, and chestnut oak. Nearly fifty percent of the hemlock trees are over 24 inches in diameter measured 4 1/2 feet above the ground. Trees with diameters of over 30 inches are common and several trees exceed 40 inches in diameter. The largest diameter measured was a 47-inch hemlock, 109 feet tall and the tallest tree measured was a 38-inch hemlock, 123 feet tall. A ring count of a cross section of a withdrawn hemlock established the age of the older trees at 280 years. As with all such small stands of virgin, or near virgin timber, there is a slow but steady deterioration through occasional mortality of the hemlocks. This stand, because it is in a deep ravine and sheltered from the prevailing storm direction, is less subject to wind damage than most. It is readily accessible since the Hemlock State
Forest Road parallels it on the high side and a trail has been developed up the ravine. This area has been set aside and preserved by the Department of Forests and Waters since it was acquired early in the present century.

References:

Evaluation:
This certainly is an excellent site. I talked to Mr. Cobb about it and he thought it was as good or better than other sites already designated as Natural Landmarks. Mr. Masland is enthusiastic about it and from his experience with the National Park Service, he knows the qualifications of a Potential Natural Landmark.

Recommendation:
This site is well qualified as a potential Natural Landmark. Priority 1.
Figure 3:
Hemlocks Natural Area
This 100-acre site is located in Lancaster County, 25 miles north of Lancaster by way of State Route 501, U.S. 322, and a private road at the county line. It is administered by the Pennsylvania Game Commission, P.O. Box 1567, Harrisburg, Pennsylvania. A responsible person at the site is William Griffin, Dillsburg, Pennsylvania 17019. It is a game management area. I have used this site for field trips and research and have good unpublished data on the forest.

This site represents the best stand of typical oak-chestnut vegetation I have found in Lancaster or adjoining counties. The major tree is chestnut oak, many of them as large as 18 inches in diameter. Other dominant trees are northern red oak, white oak, and chestnut oak. There are many chestnut sprouts present, and mountain laurel, azaleas, and blueberries are the major shrubs. It is not virgin, but is mature and climax.

Evaluation:

This is the best and most typical stand of oak-chestnut vegetation I have found in this area. The Pennsylvania Game Commission has given permission to recommend it as a potential Natural Landmark "so long as the game commission is not bound by any agreement to modify its management objectives and procedures for wildlife." Since I am asking for only about 100 acres of the total tract of 2,285 acres, I hope I can persuade them to do minimal management on this 100 acres. I think this is the kind of place that should be made a Natural Landmark representing the best of typical vegetation.

Recommendation:

However, I would like for other ecologists or Park Service representatives to investigate the site to see what they think of it. Priority 2.
12. **Heart's Content Scenic Area**

This 120-acre site is located in Warren County, 14 miles south of Warren, by way of State Route 337 and County 18. It is in the Allegheny National Forest. A responsible person at the site is Ralph H. F. Freeman, Forest Supervisor, P. O. Box 8, Warren, Pennsylvania 16365. I took field classes here for six years.

Those familiar with the site are:
- Dr. Robert Ford, Department of Geography, Millersville State College
- Dr. Elsie Quarterman, Vanderbilt University, Nashville, Tennessee
- Dr. E. Lucy Braun, Cincinnati, Ohio

This site is on a gently rolling terrain on the Appalachian Plateau. It is quite different from the Tionesta Scenic Area 30 miles to the east. This is a mixed mesophytic forest. Hemlock and beech are the major big trees, but there are also many large trees of red oak, white oak, cucumber tree, sugar maple, red maple, and yellow birch. White pines formerly formed a closed canopy over these trees, but most of the white pines are now dead, or dying. Is it virgin? There is evidence of a big fire here in 1544, and there has been no disturbance yet except to remove parts of fallen logs. It is a Scenic Area and fully protected.

References:

Evaluation:
- I took Dr. Osting to see this stand in 1965. I never saw him so enthusiastic about any other stand in the Eastern United States. He liked it better than the larger Tionesta tract because of the larger variety of big trees. The fact that the pines are dying does not detract from the value of this stand and it certainly proves without doubt that white pines are not and never have been a climax tree.

Recommendation:
- This site is the best one I know in Pennsylvania to be designated a Natural Landmark. Priority 1.

(See the letter from the Regional Forester in Milwaukee in the supplementary materials).
Figure 37
Heart's Content Scenic Area

Pennsylvania
13. - Tionesta Scenic Area

This 2,000-acre site is located in McKean and Warren Counties, Pennsylvania, 10 miles west of Kane, off State Route 66 on a local road. It is in the Allegheny National Forest. A responsible person at the site is Ralph H. Freeman, Forest Supervisor, Allegheny National Forest, Box 847, Warren, Pennsylvania 16365. This Scenic Area has been designated as a Research Natural Area by the Forest Service. The only facilities are hiking trails. It is fully protected and will never be cut or disturbed. I took field classes here for six years.

Those familiar with the site are:
Dr. Robert Ford, Department of Geography,
Millersville State College, Millersville, Pennsylvania
Dr. Elsie Quarterman, Vanderbilt University,
Nashville, Tennessee

The area is a typical stream-dissected high plateau with elevations ranging from 1,500 to 1,900 feet. The forest is virgin except for a few spots where blowdowns have occurred. Hemlocks and beeches make up the largest part of the canopy trees; the hemlocks are up to 400 years old and the beeches up to 300 years old. A very few, very large sugar maples and red maples are present in the canopy, and yellow birch is frequent along the small meandering streams. There are no white pines, oaks, cucumber trees or magnolias as in the Hearts Content Forest, 30 miles to the west. This is a true hemlock–northern hardwood virgin climax stand that is the remnant of the majestic forest that once covered all of northwestern Pennsylvania. The understory and lower layers are composed of young beech and hemlocks with abundant Pennsylvania maple, but few if any sugar and red maples. There is a heavy humus soil with mosses and other small plants on the fallen and rotted logs. The entire forest has a cathedral-like look with a completely closed canopy over somewhat widely spaced, very large trees.

Outside this virgin, 2,000-acre tract there has been extensive lumbering, burning, and lately, forest management. In these successional forests, sugar maple, red maple, ash, and black cherry make up the 40 to 80 year old forests. However hemlocks and beech are appearing below these successional trees indicating that they too could return to a climax state like the virgin Tionesta Scenic Area. However, forest management is deliberately reducing hemlocks and beech and working for the more profitable successional trees.
Pennsylvania

References:

Evaluation:
This is the largest tract of virgin timber in Pennsylvania and adjoining States. I never had a true picture of the hemlock-hardwood forest until I saw this and then I could understand the successional and fragmentary parts of the remainder of that region. It is being protected, but it should also be honored with any other designation that can be given it. Mr. Freeman, the forest supervisor, is in the process of trying to obtain permission from the regional office in Milwaukee, Wisconsin to allow this site to be considered as a potential Natural Landmark.

Recommendation:
This is the best site I know in the hemlock-northern hardwood forest and it is magnificently suited to be designated a Natural Landmark if the officials of the Forest Service give their permission. Priority 1.

Figure 37
Tionesta Scenic Area
Other Places in the oak-chestnut region of Pennsylvania

1. Natural Landmarks

Bear Meadows Natural Area
Box Huckleberry Site
Hawk Mountain Sanctuary
Hickory Run Boulder Field
Snyder-Middleswarth Natural Area
Susquehanna Water Gaps
Tinicum Wildlife Preserve
Wissahickon Valley

2. Nature Conservancy

a. Cranberry Bog Preserve, a 121-acre area in Monroe County, now belonging to Lafayette College is being investigated as a possible Natural Landmark. The officials of the college wanted more time to consider the desirability of recommending this area.
Figure 38
Portions of eastern Pennsylvania

1. Florence Jones Reineman Wildlife Sanctuary
2. Benton Ravine
4. Nolde Forest State Park
10. The Hemlocks Area
11. Cornwall Fire Tower Mountain
Figure 39
Portions of western Pennsylvania

3. Ferncliff Park in Ohiopyle State Park
5. Bear Run Nature Reserve and Brooks Bird Sanctuary
6. Western Pennsylvania Conservancy Wild Flower Reserve
7. Jennings Blazing Star Prairie
8. Schollards Run Marsh
Rhode Island

I have no stands to report as potential Natural Landmarks. I got no answers from any letters.

1. Sites that might be suitable as Natural Landmarks.

   There are three sites listed as Nature Conservancy related in Rhode Island, two of which might have a slight possibility as potential Natural Landmarks, but I could get no information on them.

   a. Fogland Marsh, a 48-acre tract in Newport County, noted as a frog hatchery.

   b. Miller Memorial Tract, a 50-acre tract in Washington County, is an upland forest and marsh belonging to the Audubon Society.

2. There are no Natural Landmarks in Rhode Island.
TENNESSEE
l. - **Savage Gulf (Werner Big Timber)**

This 5,000-acre site, of which 1500-2000 acres are a virgin forest, is located in Grundy County, Tennessee, near Beersheba Springs. The site may be reached via U.S. 70S and Tennessee 56 or Interstate 24 and Tennessee 56. It is owned by the Werner Lumber Company of Tracy City, Tennessee and is being held for cutting. This information was supplied by Elsie Quarterman, Box 1616, Station B., Vanderbilt University, Nashville, Tennessee, 37203, in September, 1970.

Those familiar with the site are:
Mr. Mack Prichard, Tennessee Department,
Conservation Park Naturalist, West End Avenue,
Nashville, Tennessee.
Mr. Herman Baggenstoss, Tracy City, Tennessee

**Description and Evaluation:**

Several years ago I took a trip to Savage Gulf with some members of the Biology Department of Vanderbilt University and the Middle Tennessee Conservancy Council. Mr. Mack Prichard, the Park Naturalist for the Tennessee State Parks was leading the group, and was then, and has continued to work for the preservation of this forest. When I started this theme study for the National Park Service on potential Natural Landmarks, I remembered this forest as probably the largest and best virgin forest left in the Mixed Mesophytic region. As my work progressed during the past winter and summer, I became more fully convinced that there is nothing better of its kind in the entire Eastern United States. Last summer I spent an entire day with Dr. Quarterman and Mack Prichard in Savage Gulf examining it more closely. We made lists of the dominant trees and found almost all of the species that Dr. Braun lists for the Mixed Mesophytic region. Most of these trees were from three to six feet in diameter and so tall one had to lie on one's back to see the top. The entire forest has the appearance of the rain forest I saw in the State of Washington except for the different species, with the trees closely spaced and about evenly distributed as to species. There were a few more chestnut oaks near the top. Basswood seemed to be the most abundant species, but only slightly more than others. The ground cover of herbaceous plants, mosses, and ferns was so dense one could not walk without stepping on them. One dripping, huge rock face was covered with the most dense cover of liverworts I have ever seen in one place.
There were no paths in this virgin forest and we entered over the rocks in a small stream that headed in the upper part of the Gulf and ran into Savage Creek. Mr. Prichard tells me that there is an old school house near the convergence of the three creeks, and from there a trail leads to the edge of the virgin forest. Some people walk into the area from this point. Mr. Prichard was enthusiastic about the waterfalls, the caves, and the appearing and disappearing stream. I liked that too, but being a botanist I was all eyes for the big trees and the rich herbaceous flora.

Savage Gulf should certainly be made a Natural Landmark or more. Mr. Prichard and the Middle Tennessee Conservancy would like to see Savage Gulf become the center of a much larger area owned and controlled by either the National Government or the State of Tennessee. There are two other Gulfs that unite with Savage Gulf near the old school house. These two have been lumbered out from time to time and have a somewhat different vegetation, because of the cutting. They are also very interesting botanically and have more shade-intolerant species not found in Savage Gulf. Besides these two non-virgin area, he would like to include part of the plateau, which is now largely pines, with one stand of very big, old pine trees. The part on the map outlined in red is the area Mr. Prichard would like to see owned by the state or nation.

The difficulty of preventing Savage Gulf from being cut is the high value of the timber in it. The Warner Company is asking two and a half million dollars for that part. Mr. Prichard hopes it can be bought for somewhat less than that. Mr. Prichard hopes that the State can get some money to help with the purchase before the company does cut it.

This summer I saw Lilley Cornett Woods near Hazzard, Kentucky, a 500-acre virgin tract, and it is a truly beautiful stand. I consider it the second best stand I saw, but it lacks much of being as good as Savage Gulf. The trees are not as large, or as dense as those of Savage Gulf and the herbaceous flora was far less abundant.

The name Savage comes from the name of the family that originally owned the land. It is very appropriate in its usual meaning for such a place. The word "Gulf" is Old English, meaning "a deep hollow, chasm, or abyss" and is commonly used by the local people for such places.
Recommendation:

I give Savage Gulf the highest priority for a Natural Landmark (17) of any site in the entire Eastern Deciduous Forest and hope that some financial arrangement can be made to save it.

(See Appendix for detailed descriptions and evaluations of this site by other persons).
In answer to my letter concerning potential Natural Landmarks, Dr. Don Caplenor of the Botany Department at Tennessee Technological University at Cookeville, Tennessee, sent me information on five sites that he uses as field trip stations and research and suggested that they could be considered as natural Landmarks. In July 1970, Dr. Caplenor moved to an administrative position at Auburn University and is no longer at Tennessee Technological University. Mr. P. L. Hollister, of the Botany Department at Tennessee Technological University knows about these places and helped Dr. Caplenor prepare the materials. He would be glad to go with anyone who is interested to see these places and give further information about them.

The following five sites are those recommended by Dr. Caplenor.

2. Window Cliffs
3. Mill Creek Area
4. Overcup Oak Swamp
5. Stamps Hollow
6. Taylor’s Creek Falls and Fancher’s Falls
This 200-acre site is located in Putnam County, Tennessee, 10 miles southwest of Cookeville, via State Highway 42. It is owned by Joe Scott, R. D. 2, Cookeville, Tennessee 38501. Any questions concerning this site may be referred to P. L. Hollister, Department of Botany, Tennessee Technological University, Cookeville, Tennessee. This information was supplied by Don Caplenor, Department of Botany, Tennessee Technological University, Cookeville, Tennessee. This site has been used for college field trips and research.

This stand is a relict stand of Thuja occidentalis which is only slightly north of the southern-most stand of the species in North America, and the only known stand on the Highland Rim Province. There are two natural bridges in a limestone promontory produced by "ox-bowings" of a medium-sized creek. While not large, the "windows" and the associated "umbrella" provide a spectacular view. In the general area are good examples of relict hemlock-dominated forest, rare on the Highland Rim, and areas undergoing secondary succession after various degrees of disturbance. There is no published data.

Woody plant listed from Dr. Caplenor's field notes.

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</table>
Evaluation:

This seems to be one of the best sites recommended by Dr. Caplenor and Mr. Hollister. I have not seen it, but I know the general region. The species list indicates a stand with typical mixed mesophytic species. Since it is privately owned and under no special protection, considering this site as a potential Natural Landmark might be the impetus needed to preserve it.

Recommendation:

This site should be further investigated. Priority 3.

3. - Mill Creek Area

This 20-acre site is located in Putnam County, Tennessee, about 12 miles north of Cookeville, west of State Highway 136 at the Putnam-Overton County line. Questions concerning this site should be sent to P. L. Hollister who may be reached at the Botany Department, Tennessee Technological University, Cookeville, Tennessee. This site is used for college field trips and research.

This is the best example of a semi-virgin hemlock-dominated tract on the Highland Rim Province known to me. The hemlocks are large and well-preserved. There are two species of plants here which have not yet been reported from the Highland Rim. These are Viburnum dentatum and Magnolia macrophylla.

For woody species, see fuller list below.

Tsuga canadensis
Liriodendron tulipifera
Carpinus caroliniana
Kalmia latifolia
Cornus florida
Oxydendrum arboreum
Magnolia macrophylla
Magnolia tripelata
Acer saccharum
Lindera Benzoin
Fagus grandifolia
Acer rubrum
Stewartia ovata
Euonymous americanus
Quercus alba
Asimina triloba
Quercus rubra
Cercis canadensis
Bignonia capreolata
Ostrya virginiana
Quercus velutina
Nyssa sylvatica
Hamamelis virginiana
Carya tomentosa
Carya cordiformis
Viburnum dentatum
Evaluation:
Since this place is semi-virgin it is of more value than other non-virgin places this small.

Recommendation:
This should be investigated as a potential Natural Landmark. Priority 2.

4. Overcup Oak Swamp

This 100-acre site is located in Putnam County, Tennessee, 10 miles south of Cookeville, on both sides of State Highway 42. It is owned by Herschell Lee and J. W. Carter. This land is a swamp forest. It has been used for botany field trips.

The site contains some Quercus Lyrata and other species characteristic of swampland of the Eastern Highland Rim. Quercus lyrata is essentially a taxon of the Gulf and Atlantic Coastal Plains. It is occasionally found, withQuercus Phellos, as here, in swamplands on the Eastern Highland Rim. Edges have already been cleared.

Evaluation:
I have not seen this site but doubt that it is of Natural Landmark quality. It contains some species not common in that area and would be of local interest and worth protecting by local groups. However, it should be given a low priority on the list of potential Natural Landmarks.

Recommendation:
This site should not be considered as a potential Natural Landmark at this time. Priority 4.
5. - Stamps Hollow

This 5-50 acre site is on the western escarpment of the Cumberland Plateau overlooking Bee Rock in Putnam County, 2 miles southwest of Monterey off Interstate 40. It is owned by James Walker, Sr. It is a rare (locally) exposure of Sewanee Conglomerate (sandstone) overlooking a gorge with a waterfall. The stream sinks at the base of the escarpment where there is very lush vegetation, mostly ferns of several species. It is an excellent habitat for salamanders.

Evaluation:
This site seems to be largely of geological interest and a good location for many ferns.

Recommendation:
This is not suitable as a potential Natural Landmark. Priority 4.

6. - Taylor's Creek Falls and Fancher's Falls

This 50-acre site is located about 18 miles southwest of Cookeville. These are falls some 100 feet high dropping into the headwaters of Center Hill Lake. The vegetation of the gorges have been relatively undisturbed in recent years, and are well covered with vegetation typical of the area. It is owned by Donald Fancher of Sparta.

Evaluation:
This place is good for local college field trips but probably not of the size and quality to be considered as a Natural Landmark.

Recommendation:
This site should not be considered as a Natural Landmark at this time. Priority 4.
This 50-100 acre site is located in Coffee County, Tennessee, 3.5 miles south of Manchester on U.S. Highway 41. It is owned by Mrs. Dave King of Manchester. This land is too wet for farming and has been left unused. Recently there has been some ditches dug in relation to a highway that are draining and destroying the prairie vegetation. Mack Prichard, of the Tennessee Division of State Parks, would like to see the state buy this site when money is available. This information was supplied by Dr. Elsie Quarterman, whose address is Box 1616, Station B, Vanderbilt University, Nashville, Tennessee, 37203, in October 1970.

Those familiar with the site are:
Dr. Hal DeSelms, Department of Botany, University of Tennessee, Knoxville, Tennessee 37916
Dr. Don Caplenor, Department of Botany, Tennessee Technological University, Cookeville, Tennessee
P. L. Hollister, Department of Botany, Tennessee Technological University, Cookeville, Tennessee
Dr. Calvin McMillan, Department of Botany, University of Texas, Austin, Texas
Dr. A. J. Sharp, Botany Department, University of Tennessee, Knoxville
Dr. E. E. C. Clebesh, Botany Department, University of Tennessee, Knoxville

Semi-technical knowledge:
Jack Huffman, 200 Oakdale, Manchester, Tennessee

Popular knowledge:
Carey Waldrip, Manchester, Tennessee
Owner: D. King, 212 West High, Manchester, Tennessee

This is one of the few prairie relics left this far south. It is dominated by Andropogon geradi, A. scorparium, Sorgastrum nutans, and Panicum virgatum. It also includes many coastal plain species, such as Rhexia, Habinaria, Xyris, etc. It appears to be a relic on the northward migration route of Andropogon and perhaps of other species. Dr. Calvin McMillan of the Botany Department of the University of Texas, at Austin, Texas, saw this once and was struck by the remarkable similarities of this place to places in the prairies further west.
Sweet gum and red maple are invading the site. If the site were burned occasionally, it could remain as prairie vegetation.

History: A natural prairie opening in the barrens was present in the survey of 1807 in this area. Topography: 1-2 percent slope southward to stream. Geology: Cherty Mississippian limestones overlain by loess. Soils: Dickson, Lawrence, Guthrie, a pan at 12-24 in. Flora: 280 taxa with good prairie and Coastal Palin representation. Sole locality for certain state plant records and type locality for Oenothera tetragona var. Sharpii Munz.

References:

Evaluation:
According to all the botanists in east Tennessee, this is the best prairie relic left in Tennessee and it is in danger of being destroyed by excess drainage. Mr. Prichard, the State Park Naturalist, knows of its value and wants the state to acquire this site. I believe if this site were made an eligible Natural Landmark, the State might buy and preserve it. Dr. DeSelm would like for the State to buy about 600 acres surrounding the present open area and manage it so the prairie vegetation would spread. Even if this does not happen, the 50 to 100 acres now in the site shows an excellent representation of this relic vegetation.

Recommendation:
This site should be made eligible for Natural Landmark status as soon as possible, so that the State of Tennessee would buy it and stop the drainage that is ruining the site. Priority 1-.
8. - Cedar Glades in Cedars of Lebanon State Forest

This 1100-acre site is located in Wilson County, Tennessee, 10 miles south of Lebanon, on U.S. 231. It is owned by The State of Tennessee and managed by the Department of Conservation, Division of Forestry, 2611 West End Avenue, Nashville, Tennessee. A responsible person at the site is the Naturalist whose address is Cedars of Lebanon State Park, Lebanon, Tennessee, 37087. This land is a State Forest used for timber production and certain types of hunting. This information was supplied by Elsie Quarterman, Box 1616, Station B, Vanderbilt University, Nashville, Tennessee, 37203. Since about 1945, she has visited the site at intervals with classes and graduate students doing research in the area. Part of her own doctoral dissertation was done there.

Those familiar with the site are:
Mack Pritchard, Park Naturalist, Tennessee Department of Conservation, 2611 West End Avenue, Nashville, Tennessee 37203
Dr. Jack Sharp, Department of Botany, University of Tennessee, Knoxville, Tennessee

An extensive bibliography for this area is in supplementary materials. See appendix for detailed description.

Evaluation:
Botanists have been interested in the Cedar Glades in Tennessee for more than a hundred years and research has continued there by botanists at Vanderbilt University and other local colleges and universities. The vegetation is an excellent example of xerarch succession and the effects of an unusual habitat on preservation of certain species and evolution of others. Dr. Quarterman has worked in these habitats since 1943 and has seen many of her best sites destroyed by real estate developments near towns, and by recreation developments near streams. The only good glades now left are in the Cedars of Lebanon State Park and Forest. The State Forest people were at a loss on what to do with their part of the glades because it is certainly unproductive from a forestry viewpoint. They seemed delighted and cooperative when they learned that Dr. Quarterman was looking for some good glades to set aside for research and study. They offered to set aside any amount of the glades that she wanted. It is this part that is being recommended as a potential Natural Landmark. This vegetation is well known to biologists and of particular interest to them, and is the best of what is left. Now the State of Tennessee has assured its continual protection.
Recommendation:
This site is exceedingly well qualified as a potential Natural Landmark. Priority 1.

Figure 40
Cedar Glades in Cedars of Lebanon State Forest
10. - Devil's Hole Gorge

This 300-acre site is located in Rhea County, Tennessee, 6 miles north of Spring City on State Route 68 and left on a gravel road to the site which is 0.3 miles west of Cumberland escarpment. It is owned by the William Jennings Bryan College, Dayton, Tennessee. It is an educational reserve. This information was supplied by Dr. H. R. DeSelm, 408 10th Street, University of Tennessee, Knoxville, Tennessee, who has been there several times and learned of it from R. E. Shanks and Mrs. Lou Woughter who began the research there. The Biology Staff, William Jennings Bryan College, would show this site.

Topography: Gently rolling, upland Cumberland Plateau surface cut by precipitous gorge: 900-1500 feet range.

Geology: Horizontal Pennsylvanian sandstone and shale

Flora: Unknown but must be 200-400 vascular taxa

Soils: Unknown

Vegetation: Uplands-mixed oaks, chiefly white, black and chestnut oaks, with willow oak and red maple in depressions. The Gorge is typical of the hemlock-mixed mesophytic with white pine; a Rhododendron understory is typical.

Evaluation:

I have not seen this site but it sounds good as a potential Natural Landmark. The species lists are those of the typical mixed mesophytic forest; it is relatively large and belongs to a college that is preserving it. I cannot tell from these descriptions whether it is virgin, but it probably is not.

Recommendation:

This site should be investigated to see if it is suitable for a potential Natural Landmark. Priority 2.
11. - Frazier's Woods

This 100-acre site is located in Knox County, Tennessee, 10 miles northeast of Knoxville; go west from Knoxville on Boyd Bridge Road; east on Thorngrove Drive; south on Drinnen Road; east on Kodak Road; and south on Frazier Lane. It is a reserve owned by R.B. and Margaret Frazier. This information was supplied by H.R. DeSelm who learned of this site from W.H. Martin who knows Mr. Frazier and the site. W.H. Martin teaches in the General Science Studies, Eastern Kentucky University, Richmond, Kentucky.

Geology: Site has mixed high terrace above the French Broad River and shaley knobs protruding. Bedrock is Ottossee shale and Bays Formation partly overlain by terrace.

Soils: Waynesboro and Bland Series

Flora: not known

Vegetation: Low coves with mixed mesophytic forest of beech, tulip poplar, buckeye, basswood, white oak, northern red oak, and sugar maple. Open slopes with southern red oak - black oak - tulip poplar forest, and ridges with southern red oak - scarlet oak and Virginia and shortleaf pine stands. Poplars to 51 in. dbh.

Evaluation:

I have not seen this stand but it seems to have some possibilities as a Natural Landmark. The large yellow poplars indicate that it may have been well lumbered about the turn of the century and is now in late stages of succession. It seems to contain enough variety of terrain to include all the variations of the oak-chestnut forests in a state approaching climax. Since it is already a "preserve" it probably will not be lumbered again.

Recommendation:

This site should be investigated further as a possible Natural Landmark. Priority 2.
This 250-acre site is located in Franklin County 2.5 miles northwest of Sewanee, via a gravel road. It is a forest teaching reserve owned by the University of the South, Sewanee. This information was supplied by Dr. G. Ramseaur, the University of the South. Dr. Ramseaur knows the area well and uses it in teaching.

Those familiar with the site are:
- Dr. G. Ramseaur, University of the South, Sewanee
- Mr. A. L. Mignery, Forest Service Laboratory, Sewanee

Topography: Steep-sided cove of Dick Creek flowing north and northeast. Side slopes are east, northeast, north and northwest facing. Elevation 1100-1900 feet.

Geology: Upper one-third, Pennsylvanian sandstones and shales. Lower two-thirds, Mississippian limestones

Soils: Muskingum and Jefferson materials

Flora: Size unknown but probably 200-400 taxa.

Vegetation: Prime oak hickory and mixed mesophytic vegetation. Some black walnut, cherry and tulip poplar removed in 1906-1907. Except for this the stand is virgin and is probably one of two or three still existent.

Dr. Ramseaur has recently told Dr. LeSelm that there is danger that the Forestry Department of University of the South, Sewanee may cut this forest.

References:

Evaluation:
I have not seen this site but from what Dr. DeSelm says, it is exactly what we are looking for as a Natural Landmark, large virgin, and typical of the region. It should be preserved in its virgin state. There may be a danger that the University will cut it for the cash.
Recommendation:

I think this should be investigated as soon as possible and designated as a potential Natural Landmark in hopes that this will help the University to decide not to cut it; Priority 1.

Figure 41
12. Thumping Dick

13. - McNulty Woods

This 20-acre site is located in Bolivar, Hardeman County. The woods are located on the south edge of town behind Names Cherry on State Route 125. It is a reserve owned by Joseph McNulty. This information was supplied by H. R. DeSelm, 408 10th Street, University of Tennessee, Knoxville, Tennessee, who gained this information through a conversation and student report from Mr. Richard Emerson, and consultation with Mr. W. L. Shelby.

Those familiar with the site are:
R. Emerson, State Experiment Station, Jackson, Tennessee
W. L. Shelby, Soil Conservation Service, USDA, Bolivar, Tennessee

Dissected upland above Hatchie River Bottom

Geology: Loess over Claiborne-Wilcox Tertiary clay and lignite
Soils: Lexington and Ruston series with E and F slopes
Flora: unknown

Vegetation: 90 percent of the basal area is white oak (43.7%) southern red oak (40%) and sycamore (7.5%). About 5 percent is split among cedar, winged elm and white ash. Eleven other tree taxa occur.
This may be the only white oak stand in middle and western Tennessee that has trees to 50 inches dbh.

**Evaluation:**
I was able to find very little good forest lands in western Tennessee. I have not see this site, but it seems to be an old and undisturbed stand and even one this small might warrant further investigation.

**Recommendation:**
This stand should be investigated further to see if it might qualify as a potential Natural Landmark. Priority 2-. 

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Figure 42
13. McNulty Woods
14. Mascot Cedar Glade and Oak Forest

This 60-acre site is located in Knox County, 1.5 miles east of Mascot; take U.S. 11W north from Knoxville, left on Mascot Road, through Mascot. It is owned by the American Zinc Company. A responsible person at the site is M. G. Langley, Manager, Headquarters, American Zinc Company, Mascot. The site is now a forest and potential deep pit or open pit mine reserve. This information was supplied by H. R. DeSelm, 408 10th Street, University of Tennessee, Knoxville, Botany Department, who learned of it through talks with Mr. Langley.

Dr. A. J. Sharp, Botany Department, University of Tennessee, Knoxville, Tennessee and Dr. R. R. Schmoller, Zoology Department, University of Tennessee, Knoxville, Tennessee are also familiar with the site.

Great Valley of East Tennessee representative of the Middle Tennessee cedar glades.

Topography: upperslope, west facing slope, gently convex

Geology: gently folded Lenoir limestone

Soils: near Talbot series but in most extreme area absent to very shallow

Flora: 243 vascular taxa, 1 alga, 8 lichens, 20 bryophytes; moderate similarity to Middle Tennessee glade flora, high similarity to Oak Ridge barren flora.

Vegetation: zones pass from lichen-moss with 1 cm of soil to and herbaceous zone (mean 4 cm, soil) to an herb, (Sporobolus) moss ecotone (mean 20 cm, soil) to a cedar forest (mean 16 cm, soil) to a cedar-oak forest (yellow and shumard oaks) mean 33 cm, soil. Excellent example of xerosere.

References:
Finn, L. L. 1968. Vegetation of a cedar glade area near Mascot, Tennessee and observations on the autecology of three Arenaria taxa. M. S. Theses, University of Tennessee, Knoxville.

Evaluation:
This site is probably the best of its kind in eastern Tennessee and represents a kind of vegetation that is of interest to many botanists. If local biologists could
persuade the owners to avoid further destruction by mining it might be considered as a possible Natural Landmark.

Recommendation:
This site should be further investigated to see if it meets the requirements as a potential Natural Landmark. Priority 2-.

15. - Hackman White Oak Stand

This 5-acre site is located in Knox County, Tennessee, 4.5 miles west of west edge of Knoxville; west from Knoxville on U.S. Route 70 for 4.5 miles to Lovell road, north on Lovell to Simmons Road; continue to I-40. It is owned by Ester V. Hackman, P.O. Box 367, Corcoran, California. This information was supplied by H. R. DeSelm, 408 10th Street, University of Tennessee, Knoxville, who knows of this from personal knowledge and notes from W. H. Martin.

Topography: Level to gently sloping

Geology: Upturned beds of Nolichucky Shale

Soils: Sequoia silt loam and silty clay loams and Melvin silt loam and Dandridge-Litz series.

Flora: Unknown

Vegetation: A prime white oak-black oak-post oak-mockernut hickory forest typical of Great Valley calcareous shale sites. Probably has experienced some selection as evidenced by pine and cedar. This is very close to Knoxville and adjacent to I-40; such sites are being developed rapidly for light industry.

Evaluation and recommendation:
This stand is good for class study and research, but not large enough or undisturbed enough to be considered as a Natural Landmark. Priority 5.
This 12-acre site is located in Knox County, Tennessee, 3 miles southeast of the edge of Knoxville; travel south from Knoxville on U.S. Route 441, then north on John Sevier Highway to forest which is 0.6 miles north of Throngrove Pike Intersection. It is owned by Kenneth Vann, P.O., Box 274, Knoxville. The west half is heavily grazed, whereas the east half is in a reserve. This information was supplied by H. R. DeSelm. This area was found by W. H. Martin; Dr. DeSelm has been there three times.

This is a rare swamp forest site on a primarily mountainous landscape whose level land was put into cultivation over a century ago.

Geology: Large terrace over Ottossee Shale

Soils: Lindside and Melvin silt loams

Flora: unknown

Vegetation: Swamp forest-dominated by willow oak, white oak, shumard oak, black and sweet gum. The area west of the road is pastured but contains cane; the area east of the road has missing size classes (especially 5-12 in.) and a cane and honeysuckle understory.

Evaluation: This is the kind of place that should be used in teaching and research but because of the small size and successional nature is not suitable for a Natural Landmark.

Recommendation: This site is not suitable as a Natural Landmark.

Priority 5.
17. - Browder Woods

This 160-acre site is located in Loudon County, 1.5 miles southwest of Lenoir City; drive south from Lenoir City on U.S. Route 11 to Huntsville Hollow Road, then due south into forest. It is a farmwoods owned by Mr. John Browder, Loudon Pike, Lenoir City. This information was supplied by H. R. DeSelm, who learned of it through conversation with and notes from W. H. Martin who has worked in the woods and knows Mr. Browder.

Dissected terrace in Browder Bend of Tennessee River

Topography: sharply sloping ridge-draw

Geology: Holston Formation buried under river terrace

Soils: Waynesboro and Cumberland series

Flora: unknown

Vegetation: White oak forest in which five other oaks (northern red, scarlet, southern red, black and post) and tulip poplar are the most important other tree dominants. A rare remnant white oak forest once widespread in the Great Valley.

Evaluation:

Mr. Martin and Dr. DeSelm think this site has possibilities as a Natural Landmark. It seems large enough and it does represent a remnant of typical vegetation of the area. Since it is privately owned, there may be trouble protecting it. However, if it is as good as Martin and DeSelm think, even the consideration of it as a potential Natural Landmark might help preserve it.

Recommendation:

This site should be investigated further as a potential Natural Landmark. Priority 2-.
Other Sites in Tennessee not Recommended

1. The two former holdings of the Nature Conservancy
   a. No Business Ridge - Unicoi County
   b. Weaver Bend - Cocke County; have both been conveyed to the Forest Service which did not recommend them as Natural Landmarks.

2. Bluebell Island, a 5 acre island in Franklin, Tennessee recommended by Dr. DeSelm.

3. Reelfoot Lake is already a Natural Landmark.

4. The Great Smoky Mountains National Park contains the best Natural vegetation in the southern Appalachians.
Figure 43
Map of east-central Tennessee

1 - Savage Gulf
2 - Window Cliffs
3 - Mill Creek Area
4 - Overcup Oak Swamp
5 - Stamps Hollow
6 - Taylor's Creek Falls and Fancher's Falls
7 - May Prairie
8 - Cedar Glades
Figure 45
Map of Eastern Tennessee

10. Devil's Hole Gorge
11. Frazier's Woods
14. Mascot Cedar Glade and Oak Forest
15. Hackman White Oak Stand
16. Van Swamp Forest
17. Browder Woods
VIRGINIA
Virginia
Figure 46
Sweet Briar College Woods
1. - Sweet Briar College Woods

This 321-acre site is located in Amherst County, Virginia, 3 miles south of Amherst on U.S. 29. It is owned by Sweet Briar College. A responsible person at the site is Miss Elizabeth Sprague, Department of Biology, Sweet Briar College, Sweet Briar, Virginia. The land is used as study and research areas by faculty and students. This information was supplied by Elizabeth Sprague. I visited Sweet Briar in the summer of 1970 and saw the site and met other members of the Biology Department who proudly showed me the study areas.

The best part is the 40-acre plot near the campus that is dominated by very big white oak trees 200 to 420 years old. This part, which has never been cut for lumber and may be virgin is located on gently rolling terrain with several small streams. Beech, tulip poplar, northern red oak, and red hickories are also present as large trees. The 11-acre plot behind the science building has the same species as the old stand, but the trees are smaller and there are more successional species present. The Ecological Studies Preserve of 250 acres is located several miles from the main campus on a relatively steep slope of a creek and has second-growth beeches, sweet gum, white oaks, hickories, and other trees of about 12 inches diameter. The college also owns a complete mountain of more than 800 acres but does not suggest this as a Natural Landmark because it has been lumbered severely and will be again.

Evaluation:
This is an excellent site to show typical vegetation of the lower elevations of the oak-chestnut forests in Virginia. The different plots show most stages of secondary succession following cutting up to the 40-acre, virgin, white oak-beech stand. I wish I could show my friends of the western U.S. and Europe this typical vegetation of the region. The College has promised the Biology Department that these plots totalling more than 300 acres will not be cut and can be held in their natural state for research and study.

Recommendation:
The Sweet Briar College Woods are excellently suitable as a potential Natural Landmark. Priority 1.
2. - Charles C. Stierly Natural Area is in the oak-hickory region. Material was sent to Dr. Arthur Cooper.

3. - Goshen Pass Natural Area

This 900-acre site is located in Rockbridge County, Virginia, 4 miles southeast of the village of Goshen and 10 miles north of Lexington via Virginia Route 39 which winds through Goshen Pass. The Maury River flows between Route 39 and the Natural Area which has no public road access. It is a Natural Area owned by the State and under the supervision of the Division of Parks; Mr. W. M. Wilson is at the site. The Goshen Pass Natural Area protects the beauty of the pass and is an example of an undisturbed biological community. Parts are used for recreation and rental cottages. This information was supplied by Ben H. Bolen, Commissioner, Division of Parks, 501 Southern States Building, 7th and Main Streets, Richmond, Virginia 23219.

Those familiar with the site are:
Marc Sagan, Park Planner, National Park Service, Harpers Ferry Center, West Virginia
Stanley W. Abbott, 230 Queens Drive West, Williamsburg, Virginia 23185
R. H. Cross, Jr., Box 1642, Richmond, Virginia
George W. Dean, P.O. Box 3347, Charlottesville, Virginia
J. J. Murray, Department of Biology, University of Virginia, Charlottesville, Virginia
Dr. R. P. Carroll, Millboro Springs, Virginia

Evaluation:
I have not seen this site, but it sounds typical of the very rocky parts of the oak-chestnut regions. The vegetation seems stunted and skimpy, but that is normal for such areas.

Recommendation:
This site should be investigated further as a potential Natural Landmark. Priority 2.
4. - Mountain Lake Scenic Area and Biological Station

This 3000-acre site is located near Pembroke, Giles County, Virginia, 15 miles northeast of Pearisburg via U.S. Route 460 and State Route 700. The Forest Service administers the 1,540 acre Scenic Area which is in the Jefferson National Forest. The Biological Station is controlled and operated by the University of Virginia as a summer school and research laboratory for all types of biological studies. A responsible person at the site is Mr. Carlton Hite, Mt. Lake Biological Station, Pembroke, Virginia 24136. This information was supplied by Dr. Robert K. Burns, 102 North Second Street, Bridgewater, Virginia, who has been familiar with this area since 1940. He taught at the Biological Station in the summer school and subsequently spent summer vacations there, carrying on research and nature study.

Those familiar with the site are:
Dr. James J. Murray Jr., University of Virginia, Charlottesville, Virginia
Dr. James L. Riospel, same address
Dr. Harry G. M. Jopon, Bridgewater College, Bridgewater, Virginia

The general area lies near the boundary between the Ridge and Valley and the Appalachian Plateau Provinces. It is typical middle Appalachian topography. The site has long been in use as a natural reserve and study area by the University of Virginia. Since much of the acreage is with National Forest, the area has long been protected against fire, unregulated lumbering, and hunting. At present it is a well-advanced secondary forest, mainly deciduous, but with local areas of coniferous trees, some representing virgin survivals. Except for the ever-present chance of accidental fire the site is not immediately vulnerable to injury or deterioration. However, there is increasing danger of overbrowse by a too large population of deer which have caused a considerable damage to the native flora.

Evaluation:
I saw these sites. They were cut about 50 years ago and now are covered with a second growth containing the species typical of oak-chestnut forests. The largest trees, about 12 inches in diameter, are white oak, northern red oak, chestnut oak, and yellow birch with an undergrowth of Rhodon-dendron nudiflora, huckleberries, blueberries, flame azalea, abundant chestnut sprouts, red maple, basswood, cucumber magnolia, and young oaks and hickories, and other species.
Dr. Burns told me that there were hemlocks and more mesic species in the coves and ravines down the mountain. This forest is typical of the secondary oak-chestnut vegetation on the mountains and good for taxonomic and ecological study and research. However, the site has a long way to go to return to a forest similar to the original ones. Yet it is being protected, and will improve with age and lack of disturbance.

Recommendation:
This stand lacks much of what I would like to see as a Natural Landmark now, but might be investigated further and later. Priority 2.

5. - Eakin Park Floodplain Forest

This 200-acre site is located along Accotink Creek in Fairfax County, Virginia, 16 miles west of Washington, D.C., between U.S. 50 and State 236 on both sides of Prosperity Ave. (State 699). It is a county park owned by Fairfax County. This information was supplied by Frederick R. Swan, Jr., 214 East View Drive, West Liberty, West Virginia. He visited the forest in the course of a natural area survey.

Those familiar with the site are:
Dr. F. R. Fosberg, Smithsonian Institute, Washington, D.C.

This is an excellent example of a floodplain forest along a small stream with large river birch, sycamore, ash, Populus deltoids, Carpinus, Liquidambar, Quercus palustris, Acer rubrum, Juglans nigra. There is no danger of destruction other than from park development.

Evaluation:
Dr. Swann has investigated most of the wooded areas in the vicinity of Washington and he recommends this one. I have not seen it.

Recommendation:
This site should be investigated further to see if it is suitable for a Natural Landmark. Priority 2.
This 5,000-acre site is located in the George Washington National Forest, Allegheny County, Virginia, 15 miles northwest of Lexington on U.S. 60. It is administered by the U.S. Forest Service. A responsible person at the site is the District Ranger. This information was supplied by Harry G. M. Jopson. He had the opportunity to make a trip through the Rich Hole during June of a recent summer, in the company of several foresters of the George Washington National Forest professional staff.

Those familiar with the site are:
- H. M. Leon Powell, 124 North Lexington Street, Covington, Virginia 24426
- Mr. Milford Howard, Bridgewater, Virginia 22812 (former superintendent, George Washington National Forest)

The Rich Hole is a cove or "hollow" with a fine stand of virgin hardwoods, including some tulip poplar and old sugar maples of remarkable size. There are not many such stands left in the George Washington National Forest, or in the neighboring region. As the plot is also adjacent to the Rockbridge Alum Springs laboratory of the Biology Department of Virginia Polytechnic Institute and State University, the Department is projecting a field station program of undergraduate education in ecology and field aspects of biology for the unit; thus, the Rich Hole site becomes doubly significant. It could be a magnificent adjunct to such a program if maintained in its present condition. If it were to be logged over, the great values residing in it would be lost, which would be tragic. Preservation of this unit is both practical and esthetically desirable.

Evaluation:
I have not seen this site and opinions of its vegetation vary. Mr. Jopson says it is a fine stand of virgin hardwoods. The group of biologists at Mountain Lake said there was little understory and they thought it had been pastured. However, I know it is normal for a virgin stand of big trees to have little understory, so this could be virgin. The Mountain Lake group said that it was successional with much tulip poplar and black locust. They may all be right if they were seeing different parts of this 5000 acre tract. Mr. Bolen of the Virginia Division of Parks has not recommended this place but he promised to send me more sites.

Recommendation:
This site should be investigated further to see if it is suitable for a Natural Landmark. Priority 2.
7. - Burling Woods

This 200-acre site is located in Fairfax County, Virginia, 10 miles northwest of Washington via Interstate 495 to Georgetown Pike. The site is 1/10 miles west of I-495. The owner is unknown. The forest and former estate was originally owned by Mr. Burling, who died in 1964. This information was supplied by Dr. R. Sigafoos, U.S. Geological Survey, Washington, D.C. In July 1968, Dr. Sigafoos told Dr. Swann about this site. Dr. Swann visited it and sampled a portion as part of a natural area survey.

Those familiar with the site are:
- Dr. F. R. Fosberg, Smithsonian Institute, Washington, D.C.

It contains more species and older trees than most stands in the region. A hemlock stand exists near the mouth of Scott Run. There are 17 tree species and 54 ground layer species. It is immediately threatened by a subdivision for building lots by the present owners.

References:

Evaluation:
Mr. Swan thinks this is one of the best places in the Washington area. I have not seen it. However, he thinks there is little chance of saving this from real estate developers. Is it worth fighting for? This site should be evaluated soon.

Recommendation: Priority 2.
Areas in Virginia presently under some kind of protection but not recommended as Potential Natural Landmarks at this time. (A map in the supplementary materials shows these stands).

1. Held by Nature Conservancy

   a. Mountain Meadow Preserve -- 40 acres located in Carroll County. The area is wooded and hilly -- 60% of the area is covered with white pine plantation trees 40 years old. The area is open to public and is presently owned by The Nature Conservancy. Too young and too small for a Natural Landmark.

   b. Lucas Woods -- 28 acres of forest with rich assortment of herbaceous flora at 2600 feet on the Great North Mountain. Located in Frederick County. The forest is open to the public and presently owned by the Nature Conservancy. The Mountain Lake biologists knew this but did not recommend it.

   c. Lick Creek Natural Area -- 863 acres in Smyth and Bland counties. Acquired in 1960 by Old Dominion Foundation through Nature Conservancy, Inc. Mature forest with two trout streams. Conveyed to the state of Virginia. This may be a good site.

   d. Wildcat Mountain -- 633 acres in Fauquier County; consists of the entire west side of mountain; eastern deciduous forest; and wide range of animal life. The mountain is visited only by permission and is presently owned by the Nature Conservancy. This could be good. I could get no information on it.

2. Other State, federal, and local agencies:

Laurel Bed Creek -- This area is part of the Clinch Mountain Wildlife Management Area which is administered by the State Commission of Game and Inland Fisheries. Includes high elevation, 4699 feet above sea level, and therefore vegetation which is typically Canadian. The Laurel Bed is located along Laurel Bed Creek and contains about 100 acres.

3. Administered by Forest Service, USDA. Some of these sites may be good, but were not recommended by Mr. Bolen of the National Forest office in Harrisonburg, Virginia.
a. Little Stony Creek Natural Area — Includes "the Cascades" which are highly scenic. The Cascades and a 300-foot strip of land on each side of the stream for approximately 2.5 miles below is managed by the U.S. Forest Service as a natural area. This management area includes about 1,000 acres. Little Stony Creek is a native trout stream. The entire watershed of Little Stony Creek should be kept in its natural state.

b. Little Laurel Run — Rockingham County, in George Washington National Forest. The Forest Service has designated 610 acres of this site as a Research Natural Area. Listed by Society of American Foresters for 150 years; white pine and 80-year old scarlet oak. 2,000 acres are suitable for a natural area.

c. Ramsey's Draft — Augusta County, in George Washington National Forest. The Forest Service has designated 283 acres as a Research Natural Area. Listed by Society of American Foresters for 150 years; poplar. All 6,000 acres of the area are suitable for natural area or wilderness area status.

d. Warm Springs Mountain Dolly Ann Area — The area is located in Bath County in the watershed of Pounding Mill Creek. It includes some climax timber and associated vegetation and wildlife. The area is highly scenic. This area is managed by the U.S. Forest Service.

e. St. Mary's River Area — This area in Augusta County is highly scenic and lies in a forested mountain hollow of unusual geologic interest. This includes extensive rock slides of quartzite and angular rock. Presently managed by the U.S. Forest Service.

4. National Parks

a. Shenandoah National Park
b. Blue Ridge Parkway
c. Cumberland Gap National Historical Park

5. There are now no Natural Landmarks in the oak-chestnut part of Virginia.
Figure 48
Map of West-central Virginia

1. Sweet Briar College Woods
3. Goshen Pass Natural Area
4. Mountain Lake Scenic Area and Station
6. Rich Hole
I went to the office of the Monongahela National Forest in Elkins, West Virginia and inquired about sites suitable for potential natural landmarks. Mr. John N. Ballantine and others of the staff there were very cooperative and selected seven of the best areas in the forest. They are:

1. Shavers Mountain Spruce Patch
2. Fannie Bennett Hemlock Tract
3. North Fork Mountain Spruce Knob
4. Gaudineer Scenic Area
5. Cranberry Glades Botanical Area
6. Falls of Hills Creek Scenic Area
7. Virgin White Pine Stand

Members of the Botany staff at the University of West Virginia at Morgantown, West Virginia have done much botanical research in the National Forest. They are: Dr. Earl Core, Dr. Charles Bear and Dr. Maurice Brooks. Eugene Hutton, M.D., of Elkins, West Virginia is also familiar with these sites.

The location, description, evaluation and recommendations for these seven stands follows.

1. Shavers Mountain Spruce Patch

This 100-acre site is located in the Monongahela National Forest in Randolph County, West Virginia 14 miles northeast of Elkins. From Elkins, take U.S. 33 east 12 miles, then State Route 12 north 4½ miles; Forest Service road 162 north one mile and then hike northwest 2 miles to the site. Mr. Harry Mahoney is the District Ranger at the site and may be contacted at the Forestry office at Parsons, West Virginia.

This is a virgin stand of spruce and hemlock with the largest trees about 30 inches in diameter. The elevation of the site is above 3,000 feet. Much rhododendron is present.

Evaluation:
I have not seen this site, but Mr. Ballentine says it is one of the best sites in the National Forest. Spruce forests in the Appalachians represent a relic vegetation of glacial times and has not been abundant since the retreat of the glaciers. Any remaining virgin stand, however small, should be saved and recognized.

Recommendation:
The Shaver's Mountain Spruce Patch is qualified for inclusion in the Registry of Natural Landmarks with a priority of 1.
2. - Fannie Bennett Hemlock Tract

This 59-acre tract is located in the Monongahela National Forest in Pendleton County, West Virginia. The site is 2½ miles northeast of Cherry Grove via State Route 28 and secondary road 28/10. Thomas K. Hubbard is the District Ranger in Petersburg, West Virginia and could show this stand. This is a hemlock-white oak stand near Spruce Knob.

Evaluation:
I have not seen this site, but Mr. Ballantyne says it is good. Apparently it is not virgin, but is mature and old and with the white oak and hemlock represents one typical kind of mixed mesophytic forest.

Recommendation:
This site certainly should be investigated as a possible Natural Landmark. From the evidence I have, I would give it a priority of 2.

3. - North Fork Mountain Spruce Knob

This 2279-acre site is located in Pendleton County, in the Monongahela National Forest, nine miles west of Franklin on U.S. 33. Mr. Thomas K. Hubbard of Petersburg is the District Ranger (Telephone: 304-257-7111) and could show this site to investigators.

This stand is in rugged mountain country capped by hard Tuscarora quartzite. The forest is the southernmost stand of red pine and paper birch in the United States.

Evaluation:
I have not seen this site. Mr. Ballantyne says it is unique and different for the region. With the red pine and paper birch, it represents a kind of vegetation that now is common no further south than the Great Lakes and New England and is a relic of vegetation that occupied much of this area during the Pleistocene Epoch. They do not claim this is a virgin stand.

Recommendation:
This site should be investigated as a possible Natural Landmark. Priority 2.
4. - Gaudinier Scenic Area

This 140 acre site is located in Monongahela National Forest, Randolph County, West Virginia. Take U.S. 250 four miles west of Durbin, then 1 1/2 miles on Forest Service road number 27. Mr. Garlord C. Yost of Barton, West Virginia (Telephone: 304-456-4635) is the District Ranger and would show this site to investigators.

Approximately 50 acres of the Scenic Area is typical of and considered part of, the virgin red spruce type that originally occupied large portions of the highland areas of West Virginia. The composition of this impressive timber stand consists of virgin and second growth red spruce, yellow birch, beech, red maple, sugar maple, and other hardwood species. Individual trees range up to 40 inches in diameter at breast height and 300 years of age. The remaining 90 acres has had some cutting, mainly salvage of blow-down, with most of the original growth still standing.

Evaluation:

I saw this stand and so far as I can tell it is virgin and beautiful. The U.S. Forest Service has put well-marked hiking trails through this forest with occasional rustic log benches in such a way that people could enjoy it without harming it. It is an excellent example of the original forest of high altitudes in West Virginia. This was the best site I saw in West Virginia.

Recommendation:

This site is exceedingly well qualified to be a Natural Landmark. I would give it a priority of 1.

5. - Cranberry Glades Botanical Area

This 750-acre site is located in Monongahela National Forest, Pocohontas County, West Virginia, six miles west of Mill Point on State Route 39. Mr. Merle L. McManigle, the District Ranger, of Richwood, West Virginia (Telephone 304-846-6558) could show this site to investigators.

The Cranberry Glades encompass approximately 750 acres, of which 120 acres are open bog, 280 acres are dense shrubs, and the remainder consists of bog or northern hardwood forest. The appearance of the Glades is likened to
Arctic tundra. The soil is mainly sphagnum and sedge peat to a depth of as much as 11 feet, underlain with algal ooze and clay. The water table fluctuates greatly but is rarely more that 12" below the surface.

Evaluation:
I saw this site and was very much impressed with the vegetation and the care the Forest Service is giving it. It seems to be well known to many botanists and ecologists in the Eastern United States and many of them suggested it to me as a Natural Landmark. The Forest Service has built more than a mile of boardwalks through the wooded and shrubbery areas and over the open bog where it would be impossible for amateurs to hike without such walks. The site is similar in some respects to the Cranesville Swamp about 150 miles north that has already been designated a Natural Landmark; but Cranberry Glades is larger, at a higher elevation, less disturbed and more accessible to the public. It represents a relic of the vegetation of the area in glacial times. I have seen a number of such bogs in the eastern deciduous forest and this seems to me to be the best one.

Recommendation:
This site is well qualified for inclusion in the Registry of Natural Landmarks. Priority 1.

6. - Falls of Hills Creek Scenic Area

This 114-acre site is located in Monongahela National Forest, Pocahontas County West Virginia, 20 miles east of Richwood on State Route 39. Mr. Merle L. McManigle of Richwood, West Virginia (Telephone 304-846-6558) is the District Ranger and could show this site to investigators.

The area occupies rugged terrain ranging from 3,800 to 2,850 feet in elevation. The stream drops sharply, losing about 500 feet elevation in one mile. The main attraction is a series of 3 waterfalls of 20, 45, and 65 feet in height. These falls lie within 1,700 feet of each other. Steep slopes, along each side of the stream, occupy about 48 percent of the area; moderate slopes occupy about 28 percent, and the remainder being gentle or flat. The timber on the steep slopes does not appear to have been cut and is mixed hardwood and hemlock. Large trees of over 26 inches DBH are common. The areas on the moderate slopes are in second growth hardwood of small, pole-size threes mixed with large, overmature, and
decadent residuals. Timber on the flattest land varies from small hardwoods and spruce and hemlock growing under swampy conditions, to large, overmature trees on the drier ground. The ground cover on approximately 50 percent of the area consists of a heavy growth of rhododendron, while the remainder of the area has low hardwood brush of varying density.

Evaluation:
I saw this site and the falls are impressive, but the vegetation is not virgin and occupies only the moderate to steep slopes along the stream. The forest does contain the species typical of the area: sugar maple, beech, magnolias, hemlock, yellow birch, red oaks, striped maple, rhododendrons, viburnums, with hazel, etc. There are some old trees (especially hemlocks) in hard-to-lumber places but most of the less steep slopes obviously have been lumbered some years ago. The Forest Service plans no future lumbering and eventually the forest surrounding the falls will resemble the original forests. There are good trails with steps and benches all the way to the lower falls.

Recommendation:
This site should be considered as a possible Natural Landmark. I give it a priority of 2–.

7. - Virgin White Pine Stand

This 150-acre site is located in Monongahela National Forest in Greenbrier County, West Virginia 1½ miles northwest of Neola via State Secondary Road 14. Mr. William T. Svenson of White Sulphur Springs, West Virginia (Telephone 304-536-2144) is the District Ranger and could show this site to investigators.

This is a virgin stand of white pine with hardwood undergrowth.

Evaluation:
I have not seen this stand. There are some very old white pine forests in the eastern part of North America in which the trees live to be more than three hundred years old before they eventually die. Since this species is shade intolerant, it does not reproduce in a closed forest and such a forest will be replaced by the climax vegetation of the region. By my definition a pine stand cannot be virgin. Some catastrophe such as an intense forest fire, destroyed the
vegetation and then the pines followed and will remain for one tree generation. There is no hope of holding such forests "forever." They are beautiful while they last and are useful in studying succession and in determining climax vegetation of the area.

Recommendation:

If this is given the status of Natural Landmark, it should be clearly understood that it is a successional stand. I give it a priority of 3.

8. Tomlinson Run State Park

This 1401-acre site is located in Hancock County, West Virginia, four miles northeast of New Cumberland on State Route 8. It is owned by the State of West Virginia. A responsible person at the site is Mr. N. T. Holbrook, Superintendent, Box 97, New Manchester, West Virginia. The land is used for recreation, game, and refuge. This information was supplied by Dr. Rose Cerroni, College of Steubenville, Steubenville, Ohio, in August 1970. Rose Cerroni is a native of Weirton, West Virginia, nine miles from the State Park and has visited the park many times.

Those familiar with the site are:

Mr. Oliver Johnson (County Agriculture Extension Agent) 175 Alta Street, Weirton, West Virginia.

The topography consists of steep hills and valleys with an elevation range from 700 feet to 1,200 feet above sea level. The site contains typical flora and fauna except the bear and wildcat. The wilderness area in the Park features heavily forested hills. The species list includes beech, butternut, cucumber, basswood, 10 species of oaks, yellow poplar, black gum, hemlock, 3 species of hickories, chestnut, and many shrubby and successional species.

References:

Hancock Co. Nature Committee. 1967. Nature Guide and Record of Tomlinson Run State Park. Hancock County Cooperative Extension Service Appalachian Center West Virginia University. This is included in the supplementary materials.

Evaluation:

I did not see this area. The species lists indicate that this area contains most of the climax species typical of
the mixed mesophytic region as well as many successional species. The park has a so-called wilderness area set aside with as little disturbance planned as possible; thus, it will be protected and could return to a climax forest.

Recommendation:
This site should be investigated as a possible Natural Landmark. From the information I have, I would give it a 2- priority.

9. - Bethany College Woods

This 100-acre site is located in Brooke County, West Virginia, 7 miles south of Wellsburg on State Route 67, or 17 miles north of Wheeling on State Route 88. It is owned by Bethany College, Bethany, West Virginia. Professor James Sawtell and Dr. A. R. Buckelew are responsible persons at the site; they may be reached at Department of Biology, Bethany College. The land is being used for a College Arboretum. This information was supplied by Frederick R. Swan, Jr., 214 East View Drive, West Liberty State College, West Liberty, West Virginia. Knowledge of the site was gained through an informal field trip through the area by Dr. Swan.

Bethany College Woods is about the only nearly virgin white oak-beech woods in the Northern Panhandle of West Virginia. The woods were a part of the property of Alexander Campbell, founder of Bethany College, and has had very few trees removed. Considerable ecological data has been collected by Bethany College Biologists on this site and permanent sampling plots have been established. It should continue to be used as a study area and probably is not too vulnerable to destruction.

Evaluation:
I have not seen this site, but from Dr. Swan's description, it sounds quite good. According to all the literature, the white oak-beech forests were the widespread and usual virgin forest of this region. It is interesting to point out the relics and unusual vegetational fragments of vegetation, but much more important to save and give special recognition to our best examples of the normal, usual, and formerly widespread vegetation. Stands of this size that are essentially virgin are hard to find. Its use in research should be encouraged as it will not harm the vegetation.
Recommendation:

I recommend that this site be strongly considered as a potential Natural Landmark. I would give it a priority of 1.

10. Oglebay Park

This 50-100 acre site is located in Ohio County, West Virginia, 3 miles north of Wheeling on State Route 88. The site is owned by the Wheeling Park Commission. Mr. Earl Gaynor, Oglebay Park is a responsible person at the site. The land is a City Park Forest. This information was supplied by Frederick R. Swan, Jr., 214 East View Drive, West Liberty State College, West Liberty, West Virginia 26074. The Swans used it for family outings on weekends.

Those familiar with the site are:
Professor James Sawtell, Department of Biology, Bethany College, Bethany, West Virginia
Professor M. H. Berry, Department of Biology, West Liberty State College, West Liberty, West Virginia

It is a second growth Quercus-Prunus-Ulmus forest with understory of Tsuga canadensis. There are excellent stands of spring ephemerals and true shade plants. This stand is on a long west-facing slope between State Route 88 and GC&P road. It should be safe from destruction.

Evaluation:

I have not seen this stand. It seems to be an excellent site for local research and pleasure. However, because of its small size and the importance of Prunus and Ulmus species indicating that it has been disturbed or opened recently, I could not give it a high priority.

Recommendation:

It is probably not worth considering as a Natural Landmark at this time. Priority 4.
Figure 50
Map duplicated from Monongahela National Forest map West Virginia 1970

1) Shaver's Mountain Spruce Patch
2) Fannie Bennett Hemlock Tract
3) North Fork Mountain Spruce Knob
4) Gaudineer Scenic Area
Figure 49
Map duplicated from Monongahela National Forest West Virginia 1970 Map.

5) Cranberry Glades Botanical Area
6) Falls of Hills Creek Scenic Area
7) Virgin White Pine Stand
Figure 51
Map of northern West Virginia

8. Tomlinson Run State Park
9. Bethany College Woods
10. Oglebay Park
Areas in West Virginia being conserved, but not recommended as Potential Natural Landmarks

A. By Nature Conservancy

The Yankauer Preserve, Berkeley County, 107 acres. Abandoned farmland rapidly returning to the natural oak forest. Situated on high bluff above the Potomac River. Dr. Charles Bear, President of West Virginia Nature Conservancy does not recommend this as a Natural Landmark because it consists largely of old fields.

The Murphy Preserve, Ritchie County, 276 acres. Mixed Hardwood and oak forests with associated, typical West Virginia understory and abundant wild flowers. Contact - Wayne England, Biology, Salem College. Successional oaks in ridges. Dr. Bear does not recommend this as a Natural Landmark.

Natural Areas Willed to Nature Conservancy

Old Hemlock, Preston County, 250 acres. Virgin hemlock forest surrounded by mature hardwoods and open fields with excellent wildlife cover. Willed by Mr. and Mrs. George Evans, for future preservation.

1964 Beartown, Pocahontas County, 72 acres. Rock City to become a State park or natural area. In process of transfer to West Virginia Department of Natural Resources. This is now a State park, used largely for recreation.

Natural Landmarks of West Virginia

1) Cranesville Swamp Nature Sanctuary, Preston County, total 294 acres. "Boreal" swamp and bog includes red spruce forest, northern swamp forest, sphagnum-cranberry bogs, sedge meadows, and eastern larch (Tamarack). Also many representatives of boreal flora and fauna. A natural laboratory. Contact - Roland Guthrie, Biology, West Virginia University.

2) Cathedral Park, Preston County. 4 miles west of U.S. 219 on U.S. 50. Virgin Hemlocks.
Table V
STANDS ARRANGED BY STATES

Vegetational Regions: OC - Oak Chestnut; MM - Mixed Mesophytic; WM - Western Mesophytic

Size: Usually in approximate acres

Map number as on accompanying maps

Priority:
1. Well qualified as potential Natural Landmark
2. Not as well qualified as priority 1, but better or as good as some present Natural Landmarks, or has strong possibilities if further investigated.
3, 4, 5. Less desirable in descending order

A. ALABAMA

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<td>mixed hardwoods and hemlock</td>
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<td>Dismal Wonder Gardens</td>
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<td>mixed hardwoods with hemlock</td>
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<td>all variations</td>
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<td>northern hardwoods and hemlocks</td>
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<td>hardwoods under mature pines</td>
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<td>ravines and flood plains</td>
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<td>flood plain forest</td>
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<td>Hemmer Woods</td>
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### F. KENTUCKY

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<tr>
<td>Lilley Cornett Woods</td>
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<td>Red River, Upper Gorge</td>
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### F. KENTUCKY

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<tr>
<td>Rock Creek Natural Area</td>
<td>MM</td>
<td>4</td>
<td>hemlock and hardwoods</td>
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<td>Land Between the Lakes</td>
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<td>Bonayer Forest Stand</td>
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<td>white oak and other hardwoods</td>
<td>22</td>
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<td>Yahoo Falls Scenic Area</td>
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<td>Natural Arch Scenic Area</td>
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<td>Hawlings River Regional Park (Proposed)</td>
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<td>Hoyles Mill Woods</td>
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<td>Quince Orchard Woods</td>
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<td>Blunt Road Woods</td>
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### H. MASSACHUSETTS

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<td>Acushnet White-cedar Swamp</td>
<td>OC</td>
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<td>Sandy Neck and Great Marshes</td>
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<td>sand dunes and marshes</td>
<td>parts of 6600</td>
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<td>Mast Island</td>
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<td>unburned hardwoods</td>
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### I. MISSISSIPPI

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<td>Daniels Forest</td>
<td>WM</td>
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<td>oaks, hickories and mesophytic trees</td>
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<td>Tombigbee State Park</td>
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<td>Tishomingo State Park</td>
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<td>pines with hardwoods</td>
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### J. NEW JERSEY

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<td>Greendell</td>
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### J. NEW JERSEY

<table>
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<tr>
<td>Laurel Lake, Wawayanda State Park</td>
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<td>oak chestnut on slopes, hemlock at lake</td>
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<td>2</td>
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<td>Bursh Sugar</td>
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<td>sugar maple</td>
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### K. NEW YORK

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<tr>
<td>West Yaphank Woods</td>
<td>OC</td>
<td>1</td>
<td>oak hickory</td>
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<td>3+</td>
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<td>Riverhead Bog</td>
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<td>bog</td>
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<tr>
<td>Snake Hill</td>
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<td>oak chestnut and northern hardwoods</td>
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<td>Moriches Bay Islands</td>
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### L. NORTH CAROLINA

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<td>Joyce Kilmer Memorial Forest</td>
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<td>mixed mesophytic</td>
<td>3840</td>
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<td>Mt. Mitchell State Park</td>
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<td>spruce fir</td>
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<td>Pilot Mountain</td>
<td>OC</td>
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<td>oak chestnut with rocky outcrop</td>
<td>parts of</td>
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#### Notes:
- OC likely stands for Orchard County.
## L. NORTH CAROLINA

<table>
<thead>
<tr>
<th>Stand</th>
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<td>oak chestnut with rocky outcrops</td>
<td>540</td>
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<td>188</td>
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<tr>
<td>Rocky Face Mountain</td>
<td>OC</td>
<td>2</td>
<td>xerarch succession on granite outcrops</td>
<td>1800</td>
<td>1</td>
<td>186</td>
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<tr>
<td>Kelsey Tract at Highlands</td>
<td>OC</td>
<td>6</td>
<td>hemlocks and cove hardwoods</td>
<td>162</td>
<td>2+</td>
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<td>Pearson's Falls Glen</td>
<td>OC</td>
<td>8</td>
<td>ravine vegetation</td>
<td>308</td>
<td>2-</td>
<td>197</td>
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<tr>
<td>Whiteside Mountain and Devil's Den</td>
<td>OC</td>
<td>5</td>
<td>oak chestnut and cove species</td>
<td>300+</td>
<td>2-</td>
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## M. OHIO

<table>
<thead>
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<td>C. A. Eulett Preserve</td>
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<td>mixed mesophytic with variations</td>
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<tr>
<td>Hazelwood Botanical Preserve</td>
<td>WM</td>
<td>L1</td>
<td>mesic hardwoods</td>
<td>75</td>
<td>1</td>
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<td>Cincinnati Nature Center</td>
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<td>L2</td>
<td>mixed hardwoods</td>
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**M. OHIO**

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<tbody>
<tr>
<td>Sigrist Woods</td>
<td>WM</td>
<td>L3</td>
<td>beech, maple oaks, hickories</td>
<td>20-30</td>
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<td>mixed hardwoods with hemlock</td>
<td>150-200</td>
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<td>Van Sickel Woods</td>
<td>WM</td>
<td>L7</td>
<td>successional</td>
<td>39</td>
<td>?</td>
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<td>L4</td>
<td>mixed mesophytic</td>
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<td>Villars Chapel Woods</td>
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<td>L5</td>
<td>hardwoods</td>
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**N. PENNSYLVANIA**

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<tr>
<td>Heart's Content Scenic Area</td>
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<td>12</td>
<td>beech, hemlock and other hardwoods</td>
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<td>Benton Ravine</td>
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<tr>
<td>The Hemlocks Area</td>
<td>OC</td>
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<td>3600</td>
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<td>3</td>
<td>mesic hardwoods</td>
<td>100</td>
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<td>hardwoods and planted evergreens</td>
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<td>Bear Run Nature MM Reserve and Brooks Bird Sanctuary</td>
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<td>successional and mature woods</td>
<td>1000 to 2000</td>
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<td>OC</td>
<td>9f</td>
<td>oak chestnut</td>
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<td>oak chestnut</td>
<td>2300</td>
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### N. PENNSYLVANIA

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<td>OC</td>
<td>9e</td>
<td>successional mixed mesophytic</td>
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<td>OC</td>
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<td>succession after fire</td>
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### O. TENNESSEE

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<td>WM</td>
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<td>WM</td>
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## 0. TENNESSEE

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<td>oaks</td>
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<td>Mascot Cedar Glade and Oak Forest</td>
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<td>Stamps Hollow</td>
<td>MM</td>
<td>5</td>
<td>ferns</td>
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<td>Taylor's Creek Falls and Fancher's Falls</td>
<td>MM</td>
<td>6</td>
<td>ravine vegetation</td>
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<tr>
<td>Overcup Oak Swamp</td>
<td>MM</td>
<td>4</td>
<td>swamp oaks</td>
<td>100</td>
<td>4</td>
<td>255</td>
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<td>Vann Swamp Forest</td>
<td>OC</td>
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### P. VIRGINIA

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<td>Sweet Briar College Woods</td>
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<td>white oak, beech, etc.</td>
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<td>3</td>
<td>scrub oaks and pines</td>
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<tr>
<td>Rich Hole</td>
<td>OC</td>
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<td>cove hardwoods and successional</td>
<td>5000</td>
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<tr>
<td>Eakin Park Floodplain Forest</td>
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<td>5</td>
<td>floodplain</td>
<td>200</td>
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<td>Burling Woods</td>
<td>OC</td>
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<td>hemlock and other old trees</td>
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### Q. WEST VIRGINIA

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<th>Vegetation</th>
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<td>MM</td>
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<td>shrub and open bog</td>
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<td>MM</td>
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<td>red spruce and hardwoods</td>
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<td>1</td>
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<td>virgin spruce and hemlock</td>
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<td>1</td>
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<td>North Fork Mountain Spruce Knob</td>
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<td>spruce, red pine, paper birch</td>
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<td>290</td>
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<td>10</td>
<td>oaks and successional trees</td>
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TABLE VI
STANDS ARRANGED BY VEGETATIONAL REGIONS AND SUB-DIVISIONS
IN ORDER OF PRIORITY IN EACH DIVISION

I. MIXED MESOPHYTIC

A. CUMBERLAND MOUNTAINS

<table>
<thead>
<tr>
<th>Stand</th>
<th>Map No. &amp; State</th>
<th>Vegetation Description</th>
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<tr>
<td>Lilley Cornett Woods</td>
<td>Kentucky 1</td>
<td>association segregation</td>
<td>425</td>
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B. CUMBERLAND AND ALLEGHENY PLATEAU

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<tr>
<td>Savage Gulf</td>
<td>Tennessee 1</td>
<td>virgin mixed mesophytic in gorge</td>
<td>2000</td>
<td>1+</td>
<td>249</td>
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<tr>
<td>Hearts Content Scenic Area</td>
<td>Pennsylvania 12</td>
<td>virgin beech, hemlock and other hardwoods</td>
<td>120</td>
<td>1+</td>
<td>239</td>
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<td>Rock Creek Natural Area</td>
<td>Kentucky 4</td>
<td>virgin hemlocks and hardwoods</td>
<td>190</td>
<td>1</td>
<td>137</td>
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<tr>
<td>Red River, Upper Gorge</td>
<td>Kentucky 3</td>
<td>mixed mesophytic</td>
<td>5000</td>
<td>1</td>
<td>134</td>
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<td>Tight Hollow</td>
<td>Kentucky 2</td>
<td>mixed mesophytic</td>
<td>100</td>
<td>1</td>
<td>134</td>
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<tr>
<td>Bethany College Woods</td>
<td>West Virginia 9</td>
<td>white oak, beech</td>
<td>100</td>
<td>1</td>
<td>292</td>
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<tr>
<td>Stand</td>
<td>Map No. &amp; State</td>
<td>Vegetation</td>
<td>Size</td>
<td>Priority</td>
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<td>C. A. Eulett Preserve</td>
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<td>Thumping Dick (Dick Cove)</td>
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<td>cove hardwoods</td>
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<td>parts</td>
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<td>all variations</td>
<td>1000</td>
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<td>Bear Run Nature Reserve and Brooks Bird Sanctuary</td>
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<td>successional with same mature woods</td>
<td>1000</td>
<td>2</td>
<td>22</td>
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<td></td>
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<td>to 2000</td>
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### B. CUMBERLAND AND ALLEGHENY PLATEAU

<table>
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<th>Stand</th>
<th>Map No. &amp; State</th>
<th>Vegetation</th>
<th>Size</th>
<th>Priority</th>
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<td>marshland</td>
<td>400</td>
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<td>mixed hardwoods with hemlocks</td>
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<td>2-</td>
<td>291</td>
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<tr>
<td>Yahoo Falls Scenic Area</td>
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<td>3+</td>
<td>138</td>
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<td>Window Cliffs</td>
<td>Tennessee 2</td>
<td>cove hardwoods and hemlocks</td>
<td>200</td>
<td>3+</td>
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<td>Jennings Blazing Star Prairie</td>
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<td>grassland with oaks</td>
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<td>3</td>
<td>226</td>
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<td>Mill Creek Area</td>
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<td>3</td>
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<td>Georgia 4</td>
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<td>oaks, cherry, elm</td>
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<td>293</td>
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<td>North Fork Mountain Spruce Knob</td>
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II. WESTERN MESOPHYTIC

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<td>cedar glades over limestone</td>
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<td>Tennessee 7</td>
<td>prairie relic</td>
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B. ILLINOIN GLACIATION

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### B. ILLINOIN GLACIATION

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### C. HILL SECTION

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<tr>
<td>Kramer Woods</td>
<td>Indiana 5</td>
<td>flood plain forest</td>
<td>200</td>
<td>1</td>
<td>126</td>
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<tr>
<td>Donaldson's Woods</td>
<td>Indiana 2</td>
<td>mixed woods</td>
<td>80</td>
<td>1</td>
<td>126</td>
</tr>
<tr>
<td>Pioneer Mothers Forest</td>
<td>Indiana 8</td>
<td>beech, maple</td>
<td>80</td>
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<tr>
<td>Hemmer Woods</td>
<td>Indiana 4</td>
<td>flood plain forest</td>
<td>90</td>
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<tr>
<td>Cypress Slough</td>
<td>Indiana 1</td>
<td>flood plain forest</td>
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<tr>
<td>Lilly-Dickey Woods</td>
<td>Indiana 6</td>
<td>oak-hickory</td>
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### D. MISSISSIPPI PLATEAU

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<td>Alabama 2</td>
<td>hemlock and hardwoods</td>
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<td>Land Between The Lakes</td>
<td>Tennessee and Kentucky 7</td>
<td>oak-hickory</td>
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### E. MISSISSIPPI EMBAYMENT

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<td>Daniels Forest</td>
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<td>oaks, hickories and mesophytic species</td>
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III. OAK CHESTNUT

A. SOUTHERN APPALACHIANS

<table>
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<td>Mount Jefferson State Park</td>
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<td>oak-chestnut</td>
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<td>Rocky Face Mountain</td>
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<td>xerarch succession on granite outcrops</td>
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<tr>
<td>Kelsy Tract at Highlands</td>
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<td>hemlocks and cove hardwoods</td>
<td>162</td>
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<td>Cloudland Canyon State Park</td>
<td>Georgia 2</td>
<td>oak-chestnut and cove hardwoods</td>
<td>parts of 1699</td>
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<td>Chattooga River</td>
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### A. SOUTHERN APPALACHIANS

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<td>Whiteside Mountain and Devil's Den</td>
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### B. NORTHERN BLUE RIDGE

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### C. RIDGE AND VALLEY

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<td>Florence Jones Reinman Wildlife Sanctuary</td>
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<td>Stand</td>
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<td>with hemlock</td>
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<td>Dans Pulpit State Game Lands</td>
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<td></td>
<td></td>
<td>in valley</td>
<td>small</td>
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<td>Vann Swamp Forest</td>
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### C. RIDGE AND VALLEY

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<td>Hackman White Oak Stand</td>
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<td>Quince Orchard Woods</td>
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### E. GLACIATED

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<td>white cedar swamp</td>
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### E. GLACIATED

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APPENDIX
HISTORICAL BACKGROUND OF THE BANKHEAD NATIONAL FOREST

Site of the 11,000 Acre Wilderness Proposal
of the Alabama Conservancy

The state's oldest national forest was established in 1913 with 198,425 acres, and called Alabama National Forest. In 1938 it was proposed to increase the site to 560,604 acres and the name was changed to Black Warrior National Forest. In 1942 it was renamed the William B. Bankhead National Forest. Today it has only 176,895 acres.

The national forest program in Alabama was begun to protect the watersheds of the navigable rivers. Use of herbicides, bulldozing and clear cutting under today's "even-aged management" threatens to silt up these streams, put dangerous chemicals in the waters, and endanger the time-honored protective role of the forests. Bankhead streams provide drinking water for Birmingham, make Smith Lake the purest in the state, and provide fishing, swimming, boating and numerous other recreational experiences.

Once Considered for a National Park

In 1935 the newspapers reported that a great national park was to be established in Alabama National Forest. At this time Clear Creek still dropped 62 feet over double falls then wound through a canyon 200 to 300 feet deep, with towering rock palisades only 500 feet apart at some points along the rim. Creation of Smith Lake unundated this finest waterfall in the state. The Bankhead still has Kinlock and numerous smaller waterfalls, and approximately 30 miles of lesser gorges, in the proposed wilderness area. There is a visitor center at the forest's natural bridge. As early as 1929 the natural beauty of the area attracted an estimated 30,000 visitors.

Prehistoric and Historic Indian Remains

Relics of Alabama's early people are scattered throughout the Bankhead and the surrounding countryside. Some Indian mounds occur along the northern boundary of the forest. Arrow heads and spear points were abundant. The territory was ceded to the United States by the Cherokees on September 14, 1916 and by the Chickasaws four days later. Along the miles of bluffs within the wilderness proposal are
numerous overhangs which probably provide shelter for primitive hunters over a period of thousands of years. Little archaeological research has been done in the forest.

A Game Paradise

Between 1820 and 1830 government surveyors opened the land for settlement. Deer, wild turkey and other game provided an important part of the food supply of the white settlers. Winston County was a hunting paradise until the building of the North Alabama Railway in 1887. With the rapid settlement of the country and the advent of forest fires the game and fish gradually disappeared.

Soon after the creation of Alabama National Forest the Alabama Department of Game and Fisheries established 16,000 acres as the Sipsey River Game Refuge, with no hunting allowed. The Wilderness Area is within this sanctuary boundary. In 1925-26 there were 105 deer released in the refuge. Bass and bream were planted in the streams. By 1938 the overflow wildlife from this protected area had begun to repopulate the whole forest, and the Forest Service and the State Conservation Department established a 96,000 acre wildlife management area including the refuge.

In 1955 black bears were introduced in the sanctuary in an attempt to restore a permanent bear population. Conservation department experts expected the bears to help prevent disease in the wildlife by eliminating weak and sick animals. Unfortunately the bears were all killed. The Department of Conservation discontinued the refuge in the 1960's.

The Civil War

With Alabama's secession from the Union a turbulent period came to the Tories of the Hills as described in Wesley Sylvester Thompson's novel. The people of Winston County refused to support the Confederacy. In the bitter struggle that followed many sheltered in the forest to escape death or service for either side. In the northeastern section of Bankhead Forest "saltpeter cave" was mined to get chemicals for gunpowder. Here outlaws and draft evaders hid during the war. Wolfpens Cemetery and Old Pine Torch Church remain as reminders of those early days.
In the great mobilization of natural resources forced by World War II, Alabama's forests produced seven billion board feet of lumber. Cutting in the Bankhead has continued to accelerate with the advent of the paper industry bringing automated equipment and destructive forestry practices. Today the area once considered fine enough for a national park, is being converted to a pine plantation.
Sedimentary rocks of the lower Pennsylvanian Pottsville Group are exposed in the proposed wilderness area. These consist of massive beds of sandstone with thinner intervals of siltstone and shale and scattered thin seams of coral.

The geology of the region provides the basic setting for the scenic beauty and unique flora and fauna in certain sections of the Bankhead forest and is responsible for the protection and perpetration of certain floral and faunal species here. In surrounding territory these same species have vanished; either because of inability to endure climatic changes, or because of the inroads of civilization. But here, in certain cool moist canyons such as are present along the Bee Branch of the Sipsey River, these species linger today. The canyons are rimmed by massive beds of strongly cemented sandstone. Weathering, leading to the formation of the canyons, commenced along joints or fractures in the sandstone beds, and, as the sand was slowly etched away by percolating ground water from either side of these joints, underlying softer siltstone and claystone beds were eventually exposed to weathering and erosion. Rivulets of water quickly cut through these weaker beds and deep, steepwalled canyons were formed. After downcutting had reached its limit, however, lateral cutting and narrowing of divides between tributaries was hindered because the weak siltstone and claystone beds were protected from slope wash by the overlying resistant sandstone beds rimming the canyons. Further, because the strata in the Bankhead forest are undeformed, that is, flat-lying, a protective layer of sandstone caps all divides between canyons. The result is the formation of a network of deep, shadowy, cool canyons bordered by precipitous cliffs, some of which are well over 100 feet high. Trees within the canyons receive abundant moisture and, in turn, add to the shade and coolness of the canyons. The inaccessibility of the canyon bottoms to equipment of the logging industries has permitted the trees therein to thus far remain, and in these canyons are found the large hemlock and poplar trees, remnants of forests past which once covered Alabama.

The canyons are not self-sufficient however. They obtain their water supply from slope wash and subsurface seepage from the divides around them. If these divides are stripped of trees pursuant to the even-age forestry management policy the canyons will suffer. Loss of plant life on the
divides will lead to erosion. During periods of heavy rainfall the canyons will be flooded with silt- and soil-laden water which can no longer be absorbed on the divides because the forests there are gone. The delicate complex faunal and floral systems within the canyons could well be washed out in a succession of such floodings. In dry periods the inability of the barren divides to hold water and thus to yield a steady supply of subsurface drainage to the canyons below will place the plant and animal life therein at the mercy of the weather. Small, shallow-rooted plants and moisture-needing animals will not survive.

Geology has provided a natural refuge system in the Bankhead forest. This system found in the deep canyons can serve and help to sustain life in the surrounding forest, but in turn the surrounding forest is needed to protect and sustain it.

Submitted by
Dr. Denny N. Beduce
Chairman
Department of Geology
Birmingham - Southern College
Tennessee cedar glades occur in the Central Basin where thinbedded, horizontally oriented dolomitic limestone is at or near the surface. Such limestones have been laid bare by erosion in a wide broken circle within the Tennessee Central Basin, an area about 40 by 60 miles in extent. A few similar, disjunct glades are to be found in east Tennessee, northwest Georgia, and northern Alabama. These disjunct glades contain some, but not all, of the elements of the flora of middle Tennessee glades and therefore pose some interesting questions about migration routes and time and place of origin of the species involved.

The Central Basin probably began during Pliocene time (Wilson 1948) and was more or less completed by the end of the first Pleistocene Interglacial Age, although deepening and widening have occurred since and are, of course, still continuing. Factors accompanying the development of the Basin, and especially of the glades, have apparently provided the impetus for speciation in several genera, Leavenworthia (Baldwin 1945, Lloyd 1965, Rollins 1963), Lesquerella (Rollins 1954, 1957), Petalostemon (Breeden 1965) and Tallinum (Ware 1967), among others. Certainly many of the glade endemics originated in situ. Those glade species with disjunctions in widely separated physiographic provinces, such as the Ridge and Valley Province or the Ozark glades, obviously had quite a different history.

From November to April, when the greater part of the annual precipitation occurs, glade soil is saturated, but it dries out quickly and excessively during the summer. The occurrence of rigorous conditions at opposite ends of the moisture scale appears to be an important factor in the seasonal distribution of annuals and in the seasonal growth of perennials. Summer temperatures in glades often range 15 to 20 degrees F above those of wooded, non-glade portions of the Basin (Turner, personal communication), and light intensities are quite high. Since soil varies in depth, soil moisture and temperature also vary and probably influence the sporadic distribution of herbaceous species.

Glade communities are essentially primary communities, not greatly changed in character since first described as "cedar barrens" by settlers moving westward. They include relatively simple, open, herb or grass dominated communities (Quarterman 1950), which may be subdivided on the basis of soil depth into three types: 1) soil 0.5" to about 4", dominated by Leavenworthia spp., Sedum pulchellum, Arenaria patula and Cyperus ineflexus; 2) 4.5" to about 12", dominated by
Aristida longispica and Sporobolus vaginiflorus that are rather generally distributed. Most of the endemic and disjunct species, which occur as localized populations often spatially separated from other populations of the same species, are in these open communities or zones which lie between stands of 3) red cedar woods that develop on deeper soil. From April to June, glades present a display of flowering that transforms the "barrens" to "rock gardens." Such beauty should be valued and preserved.

The once rather extensive cedar glades are rapidly being destroyed. The entire Central Basin is becoming urbanized and the areas left open are being developed for recreation. This process usually damages or destroys most of the natural values of the land. Encroachment on Cedars of Lebanon Forest is likely at any time by additional campsites, etc. It is adjacent to Cedars of Lebanon State Park, also largely on glade land, but devoted to uses with a different priority than that I am suggesting here. This is a fragile ecosystem, reduced to rock pile status all too readily by overuse. The fact that it is state owned has so far protected it, but that very fact could very quickly become a threat as pressure for recreational facilities increases.

The Cedars of Lebanon State (Tennessee) Forest includes the most extensive and best example of a cedar glade ecosystem extant. Most, if not all, of the 15 endemic and several disjunct glade plant species occur there. Some extensive example(s) of this ecosystem needs to be preserved permanently as a Biological Study Area in order that evolutionary and autecological studies of its flora may continue; inventory of its invertebrate fauna may be undertaken, and investigations of the nature of the total natural community may remain possible. It is a well circumscribed ecosystem that lends itself admirably to studies of community development and maintenance. The gene pool of its unique flora, alone, is enough to justify preserving examples of glade ecosystem. Many of the plants produce naturally occurring plant growth and germination inhibitors that are of considerable interest to ecologists and organic chemists, at present, and that, conceivably, could become of more practical value.

The beauty of the spring aspect (April-June) should also be considered in its favor.
Werner Big Timber in Savage Gulf
Grundy County, Tennessee
Elsie Quarterman
Vanderbilt University

While this report is concerned chiefly with the Werner Big Timber in Savage Gulf, there are several places on the Cumberland Plateau level (1800 to 2000 ft.) at the margin of the gorge on which significant remnants of forest occur. An overstory comprised of white oak (Quercus alba), scarlet oak (Q. coccinea), black oak (Q. velutina), chestnut oak (Q. prinus), pignut and mockernut hickories (Carya glabra and C. tomentosa), shortleaf pine (Pinus echinata) and Virginia pine (P. virginiana) has been listed on the south side of the gorge, with chestnut oak and shortleaf pine represented by individuals up to three and four feet in diameter. The lower layers contain chestnut sprouts (Castanea dentata), sourwood (Oxydendrum arboreum), red maple (Acer rubrum), sassafras (Sassafras albidum), dogwood (Cornus Florida and other species), witch hazel (Hamamelis virginiana), mountain laurel (Kalmia latifolia), Vaccinium spp., and Smilax spp. Among others. Even this incomplete list includes 10 of the 14 species listed by Braun (1950) as typical of the Cliff Section forests of the Southern Cumberland Plateau. I am confident that the other four species are also present in the area.

On the north side of the gorge there is a stand, locally known as the Big Pines, that is presently dominated by shortleaf pines three to four feet in diameter.

Although most of the forests along the margin of the gorge have been selectively cut, they are obviously renewable, and include enough large individuals to assure fairly rapid reseeding of adjacent land. They have value in their own right as representative forests of the Southern Cumberland Plateau, and, in addition, comprise a buffer zone essential to the protection of the virgin stand within the gorge.

Savage Gulf is about 600 to 800 feet deep and three miles long. There are precipitous cliffs of Pottsville Sandstone at the top which make access to the valley below difficult. From the base of this cap rock of the Plateau, natural terraces or benches of tumbled boulders descend stepwise to Savage Creek at the bottom of the gorge. The forest on the north-facing slope of the gorge includes all of the nine species in the typical Mixed Mesophytic Forest
climax (Braun, 1950 p. 40). These are beech (Fagus grandifolia),
tulip poplar (Liriodendron tulipifera), basswood (Tilia
heterophylla), sugar maple (Acer saccharum), chestnut sprouts
(Castanea dentata), sweet buckeye (Aesculus octandra), red oak
(Quercus rubra), white oak (Quercus alba), and hemlock (Tsuga
canadensis). Also listed by Braun for some variants of the
Mixed Mesophytic Climax and present in Savage Gulf are yellow
birch (Betula lutea), black cherry (Prunus serotina), cucumber
tree (Magnolia acuminata, over 12 inches in diameter), white
ash (Fraxinus americana), red maple (Acer rubrum), sour gum
(Nyssa sylvatica), black walnut (Juglans nigra), and shagbark
hickory (Carya ovata). This leaves only Halesia monticola and
Carya cordiformis of her total list of species so far unrep­resented
on our present lists. It is not unreasonable to expect
these also to be present in the gulf. Chestnut oak occurs in
the gulf chiefly at the upper limits of the stand. Understory
species so far listed are Cornus florida, Ilex opaca, Cladrastis
lutea, Acer pensylvanicum, Lindera benzoin, Asimina triloba,
Zanthorhiza apiifolia, and Rhododendron maximum (along the
stream bank). Two striking features of this forest are the
large size of the trees and the homogeneity of their distribu­tion
within the stand. Association segregates are not
apparent on the north-facing slope, but the dominant species
are repeated with an unusual degree of regularity throughout,
so that it illustrates the most typical and richest phase of
the Mixed Mesophytic Association.

The early spring flora of the forest floor is
exceedingly rich, including such species as Hepatica, Trillium,
Erythronium, Dicentra, Arisaema, Disporum, Polygonatum,
Streptopus, Claytonia, Asarum, and Anemonella. Tiarella,
Mitchella repens, Lycopodium lucidulum, Actaea alba, A. rubra,
Adiantum, pedatum, Asplenium montanum, and Collinsonia
canadensis have also been noted. The ferns and herbaceous
layers have not been thoroughly listed at any season, however.

The south-facing slope has a preponderance of oak and
hickory grading upwards from the typical forest at the stream
margin toward the cliffs above. Association segregates should
be evident up this slope, which we hope to investigate more
carefully in the near future.

The Savage Gulf forest is noteworthy for several
reasons: so far as we know, it is the only virgin tract of
typical Mixed Mesophytic Climax Forest remaining in Tennessee
(that in the Falls Creek gorge is a hemlock-yellow birch-
rhododendron association segregate) (Caplenor, 1954); the
tract is large enough to contain the entire gamut of species
comprising the typical dominant list of this climax type in all
layers, many individual overstory trees are up to four feet in diameter; it lies near the southern limit of, but within, the Mixed Mesophytic Forest Region per se, and thus is not a disjunct; and, as do all Mixed Mesophytic stands, it more nearly resembles the Tertiary Forest than anything else extant in eastern United States.

Other features of interest in the gorge are the exposures of geological strata from the Pennsylvanian sandstones downward to St. Louis cherty limestone of the Mississippian Period. There are three caves in Savage Gulf, the largest of which, Bear Hole Cave, is listed in Barr's "Caves of Tennessee" (1961). These are relatively small caves of the sort that are frequent in the region. At the head of the gorge, Savage Falls drops a continuous flow of water 15 feet into a quiet pool. The creek sinks shortly below this pool and reappears further down the valley. About halfway along the three-mile length of the valley a spring flowing from one of the caves adds considerably to the flow of water. The stream is picturesque and lovely as it flows over and around large boulders, disappears and reappears under the rocky bottom and ultimately joins the Collins River, one of the six major Tennessee streams that drain the western slopes of the Cumberland escarpment.

The unique character and high quality of the Werner Big Timber make it suitable for a natural area or wilderness preserve, fitting categories c and d of the Natural Landmarks list. It should be preserved as part of our natural heritage, as an important example of a significant and once far more extensive forest association.

The timber is in imminent danger of cutting. The owners would like to see it preserved, but have held out financially about as long as they can without cutting or selling. Only the possibility offered by this program and the interest it might arouse toward public ownership prevented logging last winter. It is therefore important that decisions regarding this tract be made as soon as is humanly possible. In my opinion, it could form a wilderness nucleus of a rather large area including a Plateau level buffer zone containing the Big Pines and other renewable Plateau forest; the Big Stone Door, a 700-acre tract recently acquired by the State of Tennessee above Big Creek, whose gorge is directly opposite that of Savage Creek where it joins the Collins River; Laurel Falls, in private ownership, and also on Big Creek; and perhaps other adjacent cut-over land on which tourist amenities could be developed without damaging the natural history value of the Werner Big Timber.


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