

**Historic Context Statement
and Pennsylvania Historic Resource Survey Forms**

**Michaux State Forest
for Proposed Pennsylvania Forest Fire Museum**

**Prepared by
Thomas E. Jones
Historic Preservation Planner
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cont 4/14/05

Michaux State Forest Historic Context Study

The following selection of chronologically arranged material relating to the practical scientific management Michaux State Forest is presented. This flow of materials initially provides a perspective on how such management occurred here from 1908 up till 1954 with the Michaux Forest Report of that year. The enclosed Table of Contents lists these papers. The reader can draw from this an understanding of what occurred here through these years.

- Caledonia Division
South Mountain – (Report Record of Activity)
Beginning January 1, 1908 (to 1916) by Robert Conklin
- Plantations at Pond Bank (Beginning in 1909)
(No author listed)
- Michaux State Forest Agricultural Operation – Oct. 28th, 1920
- Report/Talk by J. E. Aughanbaugh delivered on Sept. 30, 1935
- Regulations Regarding Roadside Improvement Cuttings and Forest Thinnings
with Regard to CCC Activities.
- The Staley Road Pulpwood Job. 1940s.
- Gov. Duff's Instruction and Information Requested During his Visit to Michaux
State Forest Wed. Oct. 15, 1947
- Outline of my suggestions for a Plan of Development and Management of the
State Forests. July 13, 1948 by T. G. Norris.
- A Letter to Foresters (1940s?)
- Untitled Speech Regarding Forest
- The Michaux 1954 Forest (Report)

Separate Section on Mt. Alto School of Forestry

- The Alto Forest Tree Nursery (Article not sourced)
- The Mount Alto Arboretum by J. E. Aughanbaugh
- Seventy-Fifth Anniversary Mount Alto Forest Tree Nursery

The Caledonia Division South Mountain (Report Record of Activity) compiled by Robert Conklin (Forester) portrays the early years of Michaux State Forest. In this record from Jan. 1, 1908 (to 1916) Conklin records the survey activity of laying the meets and bounds of the State Forest, but most importantly the laying out and planting of (tree) plantations in which new trees typically white pine were started. Conklin reports on the extent of old growth trees (5 %) and good young growth (15%) and their quality for practical forest uses. This means the whole state forest was walked and surveyed as to the character of its growth. The covering was composed of pines, oaks along with chestnut, maple, poplar, aspen, gum and hickory and ash.

This journal records the initial daily duties of the (Forest) manager, their laying out of roads, cutting, and planting of seedlings essential to reestablishing the native tree growth in the forest. The value of this large journal is its accurate portrayal of the imitation of scientifically based forestry not only here but its practices in the Commonwealth.

On page 174 the journal records the development of an experimental plot comprised of 3 one acre plots. These plots were laid out and planted for long term observation to aid in monitoring the growth in varied conditions, near the old Peach Orchard (locale unconfirmed). Labor and costs were monitored in order to develop practical planning for broad forestry application. The Caledonia Nursery is reported beginning on April 22, 1908 (page 250) detailed planting and costs schedules were kept for white pine, Norway spruce, European larch, and white ash, planting in the nursery, continuing through 1909. By Nov. 18, 1909 this activity involved over 54,612 white pine one year seedlings. For example, by 1916 the Caledonia Nursery development is fully reported with Land Capital at \$900, modified soil development with the enhancement of charcoal dust. An extensive water system was constructed involving over 580 feet of pipe, for water feed to the seedlings. Although simple in construction, this plantation provided tens of thousands of seedlings for the State Forest system.

The report of Plantations at Pond Bank portrays the practical forestry used to plant 34,000 Scotch pine and 6,000 European Larch, planted in 1909. This typewritten record shows the extent of monitoring and the explanation of failure at this locale due to frost, and sandy soil. 3,000 of each species of white ash and catalpa were planted along with 1 year old rock oak, white (2 years old). These plantings largely failed. Only the rock oak seemed to be suited to the poorer soil at this locale. This experiment was

conducted on poor soil conditions to get a better understanding of what tree species would do best on poorer soils and frost conditions.

In 1912 a Growth Study of White Pine was effected on three acres in a locale typical of Mountain Creek rock. Again three one acre plots were laid out with controlled varied conditions. In Plot No. 1 over 2,650 3 year old seedlings were planted for example. Labor and costs were carefully recorded in order to develop management profiles for such similar forest site both here and elsewhere in the state.

The formation of practical forestry knowledge and practices are clearly portrayed in these prior documents for the early years of 1908-1916. In 1935 J. E. Aughanbaugh gave extensive report of the whole forestry experimental operations in Michaux. This over 35 page report gives detailed observations on the success (and failures) of varied experimental plots in Michaux State Forest.

These involved:

- Mixed Plantation of Pine, Spruce and Larch
- Growth Study Plots in Mixed Oak. Planted fall 1931.
- 1908 Mixed Scotch and White Pine Plot.
- Study Plot (1/8 Acre) in Scotch Pine
- Scotch Pine Seed Supply Station Initiated. 1930.
- Red Pine Plantation, planted in 1921.

And in addition:

- White Pine thinning studies.
- Mixed Larch and Black Walnut Plantations, 1923.
- Pitch Pine Plantation, planted 1919.
- Jack Pine Plantation.

Most uniquely was the Dynamite Plot of 1910 when 3 acres of sterile clay soil was dynamited to loosen the soil for a planting of Norway spruce and white pine. The study of the growth produced a profile for a technique to recover such soils for forest cover.

- Mixed Conifers Planted on Acid Soil at the Promise Mine ore bank.

The study of this area produced a profile on such conifers to replant in industrial mining wastelands from iron ore extraction.

Aughanbaugh's report clearly portrays the advancement of the science of practical forestry developed by 1935 at Michaux State Forest and the Mount Alto School of Forestry here by that time.

By the early 1930s a Civilian Conservation Corps Camp was established at Michaux State Forest. The Regulations Regarding Roadside Improvement Cutting and Forest Thinnings records the manner of such activity. All aspects of this throughout forest lands activity are based upon sound forestry science practices.

The Staley Road Pulpwood Job was conducted so that state forests "...might become producers of high quality saw timber, pulpwood, and other valuable forest products." This, what appears to be a pioneering study, may have statewide forest industry history significance. Instituted in 1940, the Staley Road Pulpwood Job occurred within Michaux State Forest and was incorporated in the Michaux District Timber Management Plan (report copy not located). This plan was the first of its type in Pennsylvania and served as a model for all such plans. The pulpwood "Job" along with all timber management was meant to "...manage the timber on a sustained yield basis." Today the whole ecologic based approach to forest use centers on the sustainability factors of timber use and conservation. This activity at Michaux State Forest may have national historical significance.

Gov. Duff's Instruction on Oct. 15, 1947 highlights the planting of 1,000,000 hemlock seeds at Mount Alto. This staggering number illustrates the capacity and significance of the Mount Alto Nursery by the mid 20th century.

The Outline of My Suggestions for a Plan for Development and Management of the State Forests by T. G. Norris, July 8, 1948, is a milestone in the state's forest conservation history, Norris advised the Director, Bureau of Forests O. Ben Gripple on how such plans be done. Such plans were to contain the following,

- Adequate working space in District Headquarters.
- Adequate Forest Research.
- Department New Organ
- Accurate Mapping of Forest Lands
- Management Plan for Each Forest.
- Access Roads.

- Protection (Field) Plan to Eliminate Fire.
- Planting
- Plantation Thinning and Pruning.
- Utilization of Undesirable Species.
- Reduction of the Size of State Forests under the Direction of One District Forester.
- Seed Collection.
- Nursery Improvement.
- Adequate Equipment.
- Finance.

Major aspects of this outline evolved into Forest Management Plan(s) throughout Pennsylvania.

“A Letter to Foresters” signed by: George P. Athen, Robert Marshall, F. N. Munns, Gifford Pinchot, Ward Shepard, W. N. Sparhawk, Raphael Zon.

I assessed the cited topic of Forest Devastation on a national scale. This copy of this letter illustrates the critical trends of forestry in the middle of the 20th century which directly affected Michaux State Forest.

In October 1954 R. L. Dolton, District Forester, issued his report on the Michaux Forest District. This report contained descriptions of the:

- | | |
|-------------------------------------|---|
| • District | • Forest Area |
| • Population | • Forest Industries |
| • Forest Description | • Tree Farm System |
| • Administration of Forest District | • Fire Control |
| • Forest Fire Records 1944-53 | • Forest Fire Hazards |
| • Reforestation | • The Michaux and Mount Alto State Forest |
| • Development | • Recreation – Parks, Picnic Areas |
| • Pine Grove Furnace State Park | • Caledonia State Park |
| • Mount Alto Park | • Old Forge Picnic Area |
| • Mt. Pisgah State Park | • State Forest Products and Income |

- Administration of State Forest
- Mount Alto Forest Tree Nursery
- The Pennsylvania State Forest School
- Forestry Problems
- Private Woodland Management
- Personnel, September 1954
- Things to See
- The Arboretum
- Chimney Rocks
- Forest Management
- Conclusion

This report gives a full profile of the Michaux Forest District at just 50 years ago, a district system at a fully matured site.

These items are accompanied by articles on the:

- Mount Alto Forest Tree Nursery, in 1929
- The Mount Alto Arboretum by J. E. Aughanbaugh
- Seventy-Fifth Anniversary Mount Alto Tree Nursery, issued in 1977

The prior records, reports and articles all were found in the large amount of unindexed archival materials, held at the Michaux Forest office along Rt. 30. These records in some topic areas are extensive, in need of acute conservation in organization by topic. An area for these records needs to be defined on site, and curatorial activities logically planned and enacted.

**Effect Assessment for the Proposed Pennsylvania Forest Fire Museum –
Michaux State Forest – Greene Township
Franklin County, Pennsylvania**

The proposed location of the Pennsylvania Forest Fire Museum is outside, to the south of the White Pine Demonstration Plot (1907) along Rt. 30. Therefore there is no direct impact of the proposed museum's construction. The preliminary exterior designs for the museum portray a rustic style wooden building. Therefore there is a design compatibility for the proposed museum to its setting. In meetings with the staff of Michaux State Forest and the Museum organization they all expressed interest in conserving the extant tree plantings of the White Pine Demonstration Plot. It is the opinion of this surveyor that the proposed project will have little or no impact as currently proposed on the identified historic resource.



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1
3
Caledonia Division
South Mountain Reservation

Robert G. Conklin, Forester.

Beginning January 1, 1908.

Robert G. Conklin

Transferred to Caledonia Dec 13, 1907.

Caledonia Nursery.

Wednesday This nursery, is located to the South of
 April 22, 08 the C + G. Turn-pike, about 1/2 mile East
 of the Caledonia Park; and is included
 in the Graeffenburg compartment.

The exposure is a gentle slope to the
 south, draining into Carbaugh Run,
 located at the foot of a short hill, about
 100 yds away.

The soil is a sandy loam, with a
 great many stones mixed in it. This
 makes the work twice as hard, as all
 these stones must be removed before
 the soil is fit for beds. This greatly
 increased the cost of making the beds.

The boundaries are as follows: -
 Beginning at the intersection of fence along
 Pike + fence return

This is only the part included in the first
 years work; and will be enlarged as needed.

- Apr. 22. Work was started here on Apr. 22.
 Beds 1-12 were spaded & the largest
 stones taken out. (This includes bed No. 7.)
 (Excludes No. 7)
- Apr. 23. Raked beds 1-10 & planted them with
 White Pine seeds. Also cut pine branches
 covered beds 1, 2, & 3 with them.
- Apr. 24. Spaded beds 15-20, Raked beds 10, 12, & 13
 & planted them in W. Pine. Covered beds 4,
 5, 6, 7, & 8 with pine boughs.

Apr. 27. ~~Planted~~ beds 13-18. Rained, stopped work at 5:00 P.M. ~~Planted~~ beds 7, 14, + 21

Apr. 30. Raked beds 13, 14, 15, 16, + 17. Planted beds 15, 16, 17, 18, 19, with Norway Spruce
Raked beds 7, 14, 18, 19, 20, 21
Planted beds 7, + 14 with W. Ash.
Planted beds 20 + 21 with European Larch.

The making up of these beds & the planting cost \$24.75. (~~\$24.89~~)

This does not include the preliminary work on Tuesday, Apr. 14, which was simply the removal of the debris from the ground. Cost \$3.30.

There were planted here, in 21 beds
The following seeds: -

No Beds.	Species	Quantity	Price
12	White Pine	6 lbs	9.00
5	Norway Spruce	5 lbs.	2.50
2	European Larch	1 lb.	.70
2	White Ash	3 lbs	.78

There were 10 lbs. of W. Pine in the consignment, but 4 lbs were used in an experiment on Rocky Mt.

Total cost of seed \$12.98

Ry. Mt Exp. 4 lbs. White Pine @ 1.50, Forster's time 3.80. Labor
April, 1908. \$4.28 Total \$8.08. 5 acres planted. Uncovered mineral soil, placed seed and covered with foot.

The Summers Work

As soon as the seed was all in the ground, the work of covering the beds was started.

The screens used were made here, and the materials were all gotten here. The laths were gotten from the Mont Alto Division.

Laths - M. @ * per M. - *

The chestnut strips for the screens were sawed from fire-killed chestnuts, cut on the S. E. side of School-House Hill.

The oak for the stakes was sawed from logs cut on the N. W. slope of Correll's Ridge, almost down to the Rakey Mt. Run.

The total cost of the cutting, sawing, & hauling of this lumber, delivered at the Nursery here was

2322 Bd. ft Chestnut

Cutting	15.98	} Average \$ 16.80 per M. ft
Hauling	18.96	
Helping	4.05	

2100 Bd. ft. Oak

Cutting	13.20	} Average \$ 14.60 per M. ft
Hauling	14.12	
Helping	3.38	

Caldonia Nursery
Season, 1909.

1909

- Mar 24 First work of season. Started out & dug up the new beds for this year.
- Mar 29-31-31 Digging up beds. Nos 8-9-17-18-26-27-28
29
This is all new ground and is very stony and the work progresses very slowly.
- Apr 1-2 Continued work in Nursery. Worked part of new beds over for first time to remove sod and big stones
- Apr 5-6-7 Same as above on 5-6. On 6 & 7 took up and transplanted in Nursery the 18971 White Pine; 320 E. Larch, & 1137 Norway Spruce of last season. Also took up the 3979 White Ash. Of these 3270 were sent out for planting in the field and the remainder transplanted in the Nursery.
Beds # 2-3-4-5-6-7-8-10-11-12-13-14-15-16 W. Pine transplants. Bed # 17 Scotch Pine seed. Bed # 18 W. Ash transplants. Bed 19 Norway Spruce transplants. Also part of # 20. On # 20 also E. Larch transplants. On Bed # 9 was planted a mixture of White Pine & White Ash, to see what effect shade has on the Pine.
- Apr. 19 Raked beds for last time. Planted 15 lbs. White Pine, 1 lb E. Larch, & 2 lbs. Scotch Pine. Beds # 20-21-22-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42 & 43 were planted in white Pine, Beds # 23 & 24 in Larch, & Beds # 25-26 & 27 in Scotch Pine. In these seed beds the drills run lengthwise of the bed and are only 5 in. apart, giving 9 to the bed. All seed planted by hand.

- May 7. On this date we made up and planted
Beds Nos 44 + part of 45, also 46 + 47
44 + 45 planted with W. Ash and 46 +
47 planted with Chestnut
2 lbs W. Ash, $\frac{3}{4}$ bus. Chestnut.
- May 24 Weeding entire nursery and
to placing screens. Clearing paths
June 14 and widening upper path.
920 hours work.
- June 29 Weeding nursery for second time.
June 30 Also cultivated all the beds. Every thing
July 1 all O.K. except the Ash which does not
July 2 seem to have started at all
Cost \$28.56 in labor
- July 7. Watered all beds in Nursery, very
thoroughly.
Two men; - 6 hrs = \$8.40
- July 7 Watered Nursery again
3 men; - 9 hrs \$1.25
- July 13 Watered Nursery
Forester + Ranger, 2 hrs each \$1.20
- July 21 Watered Nursery
Forester + 1 Ranger, - 2 hrs. each, - \$1.20
- Aug 5 Watered Nursery
Ranger + two men - 3 hrs - \$1.44

- Aug 18-19 Weeded + cultivated nursery. Watered same. Cost \$5.46
- Aug 25 Watered nursery. The little white grub is cutting the small Pine transplants in Bed # 10, and also some of the Scotch pine.
Cost of watering \$1.17
- Sept 3. Watered nursery
Cost \$1.17
- Sept 7. Watered nursery
1 ranger + 2 men - 3 hrs - \$1.44
- Sept 10. Started to weed nursery. Found that some of white pine transplants in Bed # 10 had died from some natural cause while a great many had been cut off by a white grub. Also found this grub in Bed # cutting the roots of the Scotch Pine.
Ranger + two men - 10 hrs - \$4.80
- Nov. 8 Gathered few pine needles for winter protection.
- Nov. 17 2 men working in Nursery taking out the largest weeds from the beds.
1 ranger + 1 man
- Nov. 18. Took account of stock, and covered the beds for the winter. Piled the screens and lashed them down.

Nov. 18

men hours

Inventory

14,916, W. Pine, 1 yr. seed.; 1 yr. transpl.
 6,65, Norway Spruce, " " " " "
 200, European Larch, " " " " "
 837, White Ash, " " " " "
 54,612, White Pine, 1 yr. seedling.
 3,494, Scotch Pine, 1 yr. seedling
 1,036, European Larch, 1 yr. seedling
 222, Chestnut, 1 yr. seedlings

The above inventory shows up rather poorly for the season of 1909. But in the first place the location of the Nursery is entirely unsuited; and in the 2nd place, the season has been an exceptionally hard one here.

The inventory shows that we lost, during the summer, 4055 W. Pine transplants; 472, Norway Spruce transplants; & 120, European Larch transplants.

This loss is almost entirely due to a white grub which works along through the hills, & cuts the roots off the seedlings, and to damping off very early in season.

The germination percentages were very low; - the W. Pine showing about 15%; Scotch Pine 5%; and E. Larch; 5%. That is on seeds planted this spring, there having been planted 15 lbs. White Pine (\$30.00); 2 lbs. White Ash (\$0.50); 1 lb. European Larch (\$0.80); & 2 lbs. Scotch Pine (\$2.70).

The White Ash seed were a total failure.

All things taken together the success with the Nursery was very small this season.

Next season I will try to find a better location, and if that is not possible, will fertilize the soil and attempt to get better results.

Needle Experiment.

When the needles were removed from the beds last spring, they were gathered together and placed in large open sided bins, raised 2 ft. above the ground. These needles had absolutely no protection from the weather, but twice during the course of the summer they were shaken up with forks, giving the air free circulation all through them.

These same needles were taken from these bins and used on the beds for this winter's protection. We found them in practically perfect condition.

Next Spring we will take care of these same needles in the same way, and endeavor to find out how long it is possible to keep them.

Calidonia Nursery, Jan 1, 1916.

Investment Land Capital

0.9 acre @ \$10.00 per acre

\$ 9.00

Permanent Improvements

25.00

Modified soil with charcoal dust.

Water System

88.26

330 ft. 1 1/2" Gal. Pipe @ 14¢ — 46.20

230 ft. 1" Gal. Pipe @ 8¢ — 18.40

20 ft. 3/4" Gal. pipe @ 6¢ — 1.20

6 - 1" x 1" x 1" Gal. Tees @ 18¢ — 1.08

1 - 1 1/2" to 1 1/4" Reducer @ 18¢ — 0.18

1 - 1 1/4" to 1" Reducer @ 14¢ — 0.14

1 - 1 1/2" to 1" Reducer @ 12¢ — 0.12

6 - 1" to 3/4" Reducers @ 10¢ — 0.60

2 - 1 1/2" Elbs @ 18¢ — 0.36

6 - 3/4" Elbs @ 8¢ — 0.48

1 - 1 1/2" Close Nipple @ 12¢ — 0.12

1 - 1 1/4" Close Nipple @ 10¢ — 0.10

6 - 1" Close Nipples @ 8¢ — 0.48

1 - 1" Cap @ 10¢ — 0.10

1 - 1 1/2" Brass Globe Valve @ 1.00 — 1.00

6 - 3/4" Brass Elbs @ 40¢ — 2.40

Labor 90 hrs @ 17¢

— 15.30

\$ 88.26

Shades

270.00

699 - 5 ft. shades (A.) — 159.00

639 - 5 ft. shades (B.) — 111.00

Stakes

16.69

223 - 2" x 2" x 3' Stakes (A.) — 6.69

1000 - 2" x 2" x 3' Stakes (C.) — 10.00

Apr. 1916 Permanent improvements increased by
Modified soil with charcoal brage

\$ 33.22

Total investment Dec 30, 1916

Inventory Dec 30, 1916

Water System 80.00

200 - 4 ft Lath @ 4.00 = 0.80

Slates 1833 - 2" x 2" x 3' slates @ 1¢ = 18.33

40 - 2" x 2" x 3' slates @ 3¢ = 1.20

Shades 500 - 4' x 5' shades @ 10¢ = 50.00

912 - 4' x 5' shades @ 15¢ = 136.80

Total 287.13

Depreciation on above amounted to \$ 87.82

A

B

C

D

E-F

Forest Fires 230

G

H

I

Comp. Cuttings 190

J-K

L

M

N

Nursery 240-260

O-P

Plantation 190

Q-R

Roads 216

S

T

Tools-Rangers+Fire Wardens 220

U-V

W-X

Y-Z

PLANTATIONS AT POND BANK

These plantations are situated on the southern slope of Little Mountain about one-fourth mile east of the ranger station at Pond Bank.

The trees were planted in 1909 in a soil which is ^{of} a sandy loam nature and on the surface intermixed with many stones and a subsoil of clay. The planting was done in old fields.

EUROPEAN LARCH AND SCOTCH PINE

Thirty-four thousand Scotch pine and 6000 European larch were planted in 1909. Some of each species were planted pure and mixed. The mixture alternates two rows of each species. The spacing distance of the trees was 4 x 4 feet apart. The establishment is about 90%. The plantation seems to be free of enemies.

The measurements are as follows:

	<u>AVERAGE Height (feet)</u>	<u>AVERAGE Diameter (inches)</u>	<u>MAXIMUM Height (feet)</u>	<u>MAXIMUM Diameter (inches)</u>
European Larch	21.8	2.8	30	5.2
Scotch pine	22.3	3.6	26.5	5.1

ishment is about 65%. The plantation is a failure. The fail-
 due to the frost, seriously damaging the catalpa and oyster shell
 the white ash. The sandy soil is too poor for satisfactory growth
 of either species.

The measurements are as follows:

<u>SPECIES</u>	<u>AVERAGE Height (feet)</u>	<u>AVERAGE Diameter (inches)</u>	<u>MAXIMUM Height (feet)</u>	<u>MAXIMUM Diameter (inches)</u>
White ash	12.8	-----	20.0	-----
Catalpa	6.8	-----	15.0	0-----

Rock oak, white oak and white ash

Three thousand trees of each species were planted. The white ash
 and rock oak seedlings were 1 year old, the white oak 2 years old, ^{when planted.} The
 spacing distance was 4 x 4 feet apart. Not many of any species remain.
 According to the planting report there is some doubt as to the number
 that ~~was~~ ^{were} originally planted. It hardly seems possible that only be-
 tween 150 and 200 trees remain out of 3,000 that were planted.

The quality of the soil is too poor for satisfactory growing of
 white ash and white oak. The rock oak is a tree that is adapted to a
 poorer soil than white oak and white ash. It made a better growth.

The measurements are as follows:

	<u>AVERAGE Height (feet)</u>	<u>AVERAGE Diameter (inches)</u>	<u>MAXIMUM Height (feet)</u>	<u>MAXIMUM Diameter (inches)</u>
Rock Oak	18.1	2.5	27.0	4.8
White Oak	12.7	2.1	19.5	4.0
White ash	12.9	1.4	21.0	2.4

A number of the white oak trees were removed for planting in the Rothrock Memorial grove at Caledonia.

BLACK WALNUT

The black walnut was planted immediately below the forest ranger station at Pond Bank in 1907. The establishment is about 70%. The growth is poor due primarily to the frost damage to the trees. The plantation is in somewhat of a small frost pocket. The injury is greater than if the plantation would be at another place.

The measurements are as follows:

<u>AVERAGE Height (feet)</u>	<u>AVERAGE Diameter (inches)</u>	<u>MAXIMUM Height (feet)</u>	<u>MAXIMUM Diameter (inches)</u>
9.3	1.5	20.5	3.7

GROWTH STUDY OF WHITE PINE.

In 1912 an experimental plantation of White Pine was made in the Michaux District containing three acres. This planting site was located in one of the thickest growths of scrub oak and aspen that could be found in this forest.

The site was practically level and well drained, with soil of a sandy loam and outcropping of the typical Mountain Creek rock.

The area was divided into three plots each containing one acre. Each plot was given a different treatment prior to planting.

Plot No:1. All scrub oak, aspen, etc. were cleared off excepting a few large pitch pine that were allowed to stand.

Plot No:2. Low brush was all cut; scrub oak was thinned out and trimmed; aspen and the other oaks were thinned and trimmed leaving only one shoot of any species to stand on each two feet of ground.

Plot No:3. This plot was left under its natural condition no cutting being made whatsoever.

On Plot No:1 2,650 3-year old seedlings (1-year seedling and 2-year transplants) were planted using the mattock and mallet system, spacing 4' x 4'. The complete cost of this plot, including surveying, cutting, ^{and} burning all brush both on the plot and fire lane surrounding the same, cost of seedlings and planting, was \$46.49.

On Plot No:2 1,825 3-year old seedlings were used and the same method of planting was carried out as on Plot No:1, spacing 5' x 5'. The complete cost of this plot including surveying, cutting and burning all brush both on the plot and fire lane, trimming trees, cost of an planting seedlings, was \$41.63.

On Plot No:3 1,900 3-year old seedlings were used. Same method of planting was used as on Plot No:1, spacing 5' x 5'. The complete cost of this plot including surveying, cutting and burning of brush on fire lane surrounding plot, cost of and planting seedlings, was \$23.62.

It is interesting to find on a recent inspection that notwithstanding the different treatment given each plot, the percentage of planted trees remaining on each plot is practically the same, viz:

Plot No:1	78%
Plot No:2	77%
Plot No:3	75%

Until 1923, when a liberation cutting was made upon one of the plots, there was only a slight difference in the total height growth of the planted trees. Our reports show the average total height as follows:

Plot No:1	4.6 feet
Plot No:2	4.6 "
Plot No:3	4.1 "

The average current annual growth was as follows:

Plot No:1	4.9 inches
Plot No:2	5.0 "
Plot No:3	4.4 "

From this it can be seen that on Plot No:3 which had received no treatment the tree-growth was almost as good as upon the other plots, whereas on Plots Nos: 1 and 2 the average heights were the same.

During the summer of 1923 a liberation cutting was made in Plot No:1 when all scrub oak and aspen were removed. Since that time a noticeable increase in growth is shown on this plot in comparison with the other two plots. From measurements we find the average current annual growth to be:

Plot No:1	15.7 inches
Plot No:2	10.7 "
Plot No:3	6.1 "

And the average height growth made during the past four years on each plot is:

Plot No:1	4.3 feet
Plot No:2	3.6 "
Plot No:3	2.1 "

The average total height of trees in each plot is:

Plot No:1	6.2 feet
Plot No:2	5.1 "
Plot No:3	4.1 "

and the average current annual growth for the 15 years is as follows:

Plot No:1	8 inches
Plot No:2	6.5 "
Plot No:3	4.4 "

These facts would indicate that a liberation cutting at the proper time or a judicious thinning is of greater benefit to a plantation than the clearing of the area or any similar

preparation given to the site prior to planting. As in this instance a liberation cutting made eleven years after planting so stimulated the growth of planted trees, that they made in the four years following the liberation, almost as great a growth as they did previously in more than twice that period of time. The cost of liberation was less than the expense of clearing Plot No:1 and other work done in preparation for planting. While the facts here presented are based upon small selected sites, I think we can safely assume that the same results would be found on larger areas if given the same treatment.

May 12, 1928.

"O" A.
Hon. Gifford Pinchot,
Commissioner of Forestry,
Harrisburg, Penna.

Oct. 28th, 1930.

Dear Mr. Pinchot:-

"Michaux Forest Agricultural Operation."

Description.

The Michaux Forest farm land is situated in two distinct parts of the South Mountain State land, namely, Caledonia and Pine Grove Furnace. The Caledonia farm land is situated near the Lincoln Highway about one fourth of a mile south of Caledonia Park Station along the New Baltimore road and comprises about 40 acres. There are also some widely separated small fields which are productive and should be included in this area. The Pine Grove Furnace farm land comprises about 800 acres situated around the old Furnace site. Some of the above areas are in a fair state of cultivation while other areas are not productive.

History.

These areas have been farmed at intervals since the Department came into possession of the Caledonia and Pine Grove tracts. They have been producing corn, hay, oats, potatoes, buckwheat and other crops much of which was used for maintenance of State teams. Being impossible to use all of the products the Department sold the surplus from time to time and the receipts were used to purchase necessary materials for use in cultivating these areas. Some of the receipts have been sent to the State Treasurer to be placed to the credit of the State School Fund.

Recommendations.

Undoubtedly the Department should continue to cultivate,

Mr. Pinchot -2-

at least, a part of these areas in order to produce feed for the necessary teams on the forest. The surplus material should be sold and the money received applied to the purchase of necessary equipment in connection with the project. Therefore, I recommend that all areas farmed on the Pine Grove and Caledonia sections of the Michaux State Forest be designated an "operation" to be known as "Michaux Forest Agricultural Operation" and be governed by the Rules for "Operations" established by the State Forest Commission, July 2nd, 1920 and the Orders of the Commissioner of Forestry issued in pursuance thereof; also that the accounting in connection with receipts and expenses of this "Operation" date from January 1st, 1920 as far as practicable.

Yours respectfully,

Chief, Bureau of Operation.

October , 1920

Approved and So Ordered.

Commissioner of Forestry.



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF FORESTS AND WATERS
MONT ALTO DISTRICT
MONT ALTO, PA.

*Pond Bank
Plantations*

September 30, 1935.

*Mont Alto
87A.*

*Intermittent
... ..*

Mr. R. Lynn Emerick
Division of Research
Penna. Dept. of Forests & Waters
Harrisburg, Pennsylvania

Dear Mr. Emerick:

In compliance with your request,
I have had typed the talk which I gave at Pond
Bank, on August 23rd, to the Allegheny Section,
Society of American Foresters. I am sending you
a copy.

Yours respectfully,

J. E. Aughanbaugh.

J. E. AUGHANBAUGH

Research Forester

RECEIVED

SEP 30 1935

RECEIVED
MONT ALTO DISTRICT

MICHAUX FOREST DISTRICT

OUTLINE OF FORESTRY
TRIP AT POND BANK

Allegheny Section, S. A. F. -- August 23, 1935

J. E. A.

Here at Pond Bank there has been planted, over a long period of years, quite a variety of native and introduced species. This area now affords an opportunity to acquire valuable information regarding the growth habits and silvical requirements of these planted trees. It would be impossible, in the short time available, to show you all of our experimental plots and research projects that are located in this vicinity. Accordingly, a few have been selected that are easily accessible, and which will, I believe, illustrate problems in which you are interested.

I wish first to call your attention to this Mixed Plantation of Pine, Spruce And Larch. In the summer of 1926, a forest fire burned over this flat

area which you see before you. Following that fire all trees, except thrifty pitch pines, were cut and removed, and the underbrush was piled and burned during the winter. In the spring of 1927 separate blocks were planted with white pine, red pine, Norway spruce, and European larch. Here in front of us is the white pine block, and a little farther up along this road you noticed the edge of the red pine area. The spruce and larch areas cannot be seen from here, but they haven't grown so well as the pines.

To me this is an interesting area from a forestry standpoint. If mixed stands afford the best silvicultural possibilities, such a combination of hardwood sprouts and conifers might, with proper treatment, develop into a valuable piece of timber. But the question is, how should it be handled to get best results? What proportion of hardwoods to conifers would give the ideal mixture and how can that proportion be maintained? The answers to these

questions we are attempting to learn by means of study plots, each of which is given different initial treatment and then remeasured at regular intervals. I might mention that 2 years after planting, in the fall of 1929, this entire area was given a thorough liberation cutting, which removed practically all competing hardwood sprouts. As you can readily see, the sprouts are, in some spots, again overtopping the conifers.

Those white posts mark the corners of two study plots, each 6/10 of an acre in area, established in October, 1930. At that time an overstory of mixed oak, like you see below, stood on both the plots. The 1927 planting extends 200 feet below these plots, so that there is yet an underplanted strip beneath the older timber. The planted trees are mostly white pine. Studies were made on these plots before and after the older timber was cut. Purposes of the study were to

ascertain the recovery and rate of growth, weevil damage and felling damage to white pine after removal of the overstory, as contrasted to previous conditions under shade. In other words: is it better to plant immediately after a clear-cutting or burn on a hardwood area, or first to underplant and then later to remove the overwood? I might mention that, despite care in felling, a survival count the next spring showed that only 48% of the underplanted pines came through satisfactorily, 27% had a healthy color but showed conspicuous damage, 17% showed a sickly yellow color, and the other 8% were dead. On the other hand, when growing under shade only 3% of the white pines suffered weevil attack, as compared to 16% on the adjacent cut-over area where they enjoyed full sunlight. In 1931 the underplanted pines were, on the average, 2.6 feet tall and had made a current growth for 1930 of 8 inches. Those in the open averaged 3.4 feet in height, and their current growth was 13

inches. All our plots on this area will be measured again this fall.

Thus, we have illustrated here before us an important forestry problem----that of discovering the best and most economical method to convert hardwood timber to conifers, or to mix stands containing the proper proportion of each.

Let's now turn our attention to these Growth Study Plots In Mixed Oak, on which the trees have been numbered. Two quarter-acre plots were laid out here in the fall of 1931. One plot, lying just beyond this one, was given a thinning. On the plot which we are looking at no cutting was done, and it was left as a check area for the other. Before thinning, the two plots had a basal area that was almost identical, the check being 73.8 sq. ft. per acre. and the thinned showing 73.7 sq. ft. per acre. Because the trees on the thinned plot averaged slightly taller, that plot showed a little higher

mean annual growth---47.1 cu. ft. annually, as compared to 43.9 cu. ft. per acre per year for the check area. From the thinned plot there was removed 56% of the trees, 28% of the basal area, and 25% of the volume, which really amounted to a typical German "thinning from below". When these plots received their first remeasurement, in the fall of 1936, the data should reveal how much, if any, growth stimulus has resulted from the thinning. We have established now, quite a few such thinning series in the oak type and aim to put in many more in different age classes, mixtures, and sites throughout the State.

	Plots	
	<u>Thinned</u>	<u>Check</u>
Trees Per Acre	860	944
Average D. B. H.	3.6	3.8
Average Height	38.0	31.1
Basal Area	73.712	73.844
Volume In Cu. Ft.	1603	1491
M. A. I.	47.1	43.9

II. Mixt Scotch And White Pine Plot.

Planted in 1908, this mixed stand of Scotch and white pine now shows, at 27 years of age, that the Scotch pine is declining in vigor and resistance to its enemies. In the spring of 1932 a wind and ice storm damaged almost one-fourth of the Scotch pine, due to the brittleness of its wood, whereas the white pines in the mixture showed no serious damage whatever. Insect enemies too, such as spittle bug and bark beetles, and such fungus diseases as *Peridermium cerebrum* and a twig canker belonging to the germs *Atropellis*, have helped to weaken and kill many of the Scotch pines. Possibly too these pests were aided by the drought conditions that existed during and after the summer of 1930.

This plot, established in 1928, has now received two measurements. Originally there were in the mixture practically as many Scotch pines as what there were white pines. When the plot was first measured the Scotch pine had twice the basal area and more than $2\frac{1}{2}$ times the volume of the white

pine. Inside of 4 years such calamity befell the Scotch pine that its basal area for living trees had dropped to $1\frac{5}{4}$ times that of the white pine and its cu. ft. volume fell proportionately.

In the period from 1928 to 1932, the mortality on this quarter-acre plot was 33 Scotch pines as compared to only 2 white pines. Of course the death of so many trees was reflected too in the figures for mean annual and periodic annual growth in volume. In 1928, the average annual growth in volume was 76 cu. ft. per acre, which in 1932 had risen to 82 cu. ft. per acre per year. But growth for the 4-year period between measurements averaged only 85 cu. ft., and that is quite significant, being, as it is, only 3 cu. ft. more than the mean annual increment. Such conditions, which usually signify the approach of maturity for timber, depict strikingly, in this instance, the decadent condition of the stand.

After leaving this plot, we will visit 2 other study areas in Scotch pine. Unfortunately, however, both of them come due for remeasurement this winter,

and hence neither will show data that would reflect recent losses due to snow and ice damage, drought, insects and fungi.

Planted 1908		<u>1928--4 yrs.--</u> <u>1932</u>	
Trees Per Acre	(S)	672-----33-----540	
	(W)	1300	1160
Basal Area Per Acre	(S)	61.876	63.956
	(W)	93.0	100.8
Average D. B. H.	(S)	4.1	4.7
	(W)	3.0	3.2
Average Height	(S)	32.0	36.2
	(W)	29.0	31.6
Volume In Cu. Ft.	(S)	1105	1231
	(W)	416	546
M. A. I.	(S)	55.2	57.9
	(W)	76.0	82.1
P. A. I. (1928-32)	(S)	-----	51
	(W)	-----	34

III. Study Plot (1/8 Acre) In Scotch Pine.

This almost pure plot of Scotch Pine, planted at the same time as the previous one and now 27 yrs.

old, has done a little better in recent years than did the mixt Scotch and white pine area which we just came from. Even in it, however, the trees are growing very slowly and many are unthrifty. Whereas the heavy snow and ice storm of March, 1932, destroyed 104 trees per acre and damaged many others on the plot just visited, here on this 1/8 acre the loss was only 5 trees on the plot or 40 on a per acre basis. The records for this plot, based on 2 periodic measurements, are as follows:

	<u>1925</u>	<u>1930</u>
Trees Per Acre	<u>1504</u>	<u>1280</u>
Basal Area Per Acre	86.168	102.256
Average D. B. H.	3.2	3.8
Average Height	30.7	33.6
	3' in 5yrs.	7" per yr.
Volume Per Acre	1398 or 20 cds.	1802 or 25 cds.
M. A. I.	82.2	89.4
P. A. I.	----	114

From this data you can see that, up to 1930, this Scotch pine had been making rather favorable growth. If we had the figures that are to be taken this fall, I know that the picture for these last

5 years would not be so rosy. I would venture the guess that volume growth for the period (1930-35) was 30% or more less than what I just cited for the previous 5 years.

We will visit next our Scotch pine seed supply station and see how it has fared in recent years. You will find it listed as No. 71 in the guide-book. If you haven't already done so, I wish that you would read the write-up that is given there, as that will answer many questions that may arise when we see the area. The write-up begins on Page 71.

IV. Scotch Pine Seed Supply Station.

Many of you who are present here today visited this seed supply station in the summer of 1930, at the official opening of the Forest Research Institute. At that time this fully-stocked stand of Scotch pine was indeed a beautiful sight and its seemingly thrifty condition gave little indication of the catastrophe that soon was to befall it. Many outstanding foresters who have visited this plantation have been impressed with the excellent growth and fine form of

the trees. Dr. C. A. Schenck, a forester of international fame, after making a survey of the area remarked that this was "one of the finest plantations of Scotch pine of its age ever seen in my extensive forest travels in many parts of the world". If Dr. Schenck were present here today, I believe that he would be greatly impressed by the changed condition of this stand. Dr. Illick too, after visiting many of the best Scotch pine areas in Europe, was so impressed with this promising location that he established here the first Quality Forest Tree Seed Supply Station in Pennsylvania.

As mentioned previously, many different agencies have been responsible for this change. Of foremost importance was the severe snow and ice storm of March, 1932. That one storm broke the tops and trunks of 236 trees out of a total of 635, or 37% of the stand on this one-acre plot. Also, 62 other trees on the plot were bent over, some of them with their tops touching the ground. When examined a year later there were only 421 trees left

in good condition on the plot. In the 2 years that have elapsed since that examination; many additional trees have died due, it is believed, to other causes.

Some of the other principal agencies of destruction have been as follows: The trees were weakened to such an extent by spittle bugs that they became an easy prey for secondary bark beetles, particularly those of the genus *Ips* and also *Pityogenes*. A fungus disease, known as *Peridermium cerebrum*, causes ~~and~~ prominent swellings on the trunk and branches and ultimately kills the part of the tree above these enlargements. The affected bark of the enlargement dies after a few years and insects and wood-rot fungi enter at these places. That disease has become rather common in this plantation.

Within the last couple of years a twig and branch canker disease, identified by Dr. Jackson and other pathologists as belonging to the genus *Atropellis*, has become quite prominent on our Scotch and other hard pines here at Pond Bank. The cankers become long, flattened, smooth-barked areas, beneath which the wood is stained blue-black. The parts above the cankers die as soon as girdling is complete.

Tiny black fruiting bodies, about 1/8 inch in diameter, appear on the bark. Our observations thus far seem to classify this fungus as one of secondary nature, since it works mostly on the lower branches or attacks those that are in a weakened condition. Later I will show you examples of this disease on younger trees.

Another cause for the weakening of some of these pines has been the work of sapsuckers. These birds seem to prefer Scotch pine and I have seen many trees that were riddled by them, their activities being confined usually to certain well-defined bands on the trunk. These concentrated areas of holes appear to cause a constriction of the trunks, which in turn contributes to the death of some trees.

We will consider now the growth record of this plot. It was established in October, 1927 and re-measured in February, 1931. It will again be due for remeasurement this fall, at the end of the growing season.

	<u>1927</u>	<u>1931</u>
Trees Per Acre	748	713 (Now 40% less)
Basal Area Per Acre	64.419	76.028
Average D.B.H.	4.0 (4.5)	4.4 (6.0)
Average Height	--- (36.5)	--- (41.0)
Volume Per Acre	1121 (12 $\frac{1}{2}$ Cords)	1408 (15 $\frac{1}{2}$ Cords)
M.A.I. (adding material-74.4 (19yrs) cut--19 % by Volume)		78.6 (22 yrs.)
P.A.I. (3 growing seasons) ---		118.5

The increment figure above given is equivalent to a little more than 9% compound interest on the wood volume present in 1927. It would have been much higher if the stand density had been closer to normal stocking. Nevertheless, the growth made by this stand, up to 1931, may be considered as very good, in fact, much better than the average for Scotch pine. But even at that, it is considerably less than what red or white pine can do, as shown at Caledonia, the York Water Woods, or even here at Pond Bank. And if we now had the growth figures that are to be taken this fall at the next measurement, I believe you will agree with me that these last five years would not show up so favorably.

No doubt many of you foresters are red pine enthusiasts. We will take you next to a stand of red pine that appears to be promising.

5. Red Pine Plantation

This beautiful stand of red pine was planted in the spring of 1921 and is now 15 years old. The dominant trees have averaged $1\frac{1}{2}$ feet in height growth per year, since they are now over 21 feet tall. They are straight as an arrow and show excellent form. None of the other native hard pines of Pennsylvania is as symmetrical in crown and as upright in habit as red pine. Forked red pines occur but rarely, and very crooked one are almost never met. Whether it be in the Lake States, Canada, New England or Pennsylvania, this tree is noted for its excellence of form. Foresters have long since recognized this fact, and they also know that it is relatively free from serious enemies--that is, thus far--, is the most shade-enduring native hard pine that can be planted, and makes good, even, and fairly rapid growth, even on medium to fair quality sites. As a result, more and more red

pine should be and is being planted, instead of giving preference to introduced species of questionable value.

Please don't get the impression, from what I have said thus far about Scotch and red pine, that I believe in planting red pine exclusively. I'm a little inclined to agree with a certain other forester who says as follows: "I'm not ready yet to condemn Scotch pine. I don't praise it too much either, and not from wanting to be on the fence. But if you'll follow the reforestation movement it has some aspects common to many other lines. It's a case of 'off with the old love and on with the new', and that fits Red Pine to a T. Red pine is a good tree;--foresters thought the same of Scotch Pine, then of white. Larch was the new love for a short time, and now we're fickle and toy with Red Pine and Pitch Pine--can't just make up our minds which to use." There is plenty of truth in his statement. We have much to learn yet about even our native species, and while we're still learning, wisdom counsels that we proceed cautiously.

The red pine area does show good growth. In Nov. 1929, after 9 growing seasons, the trees averaged $1\frac{1}{2}$ inches in diameter breast-high and 9 feet in height, or

an average growth of one foot in height per year. Since that time the growth rate has increased considerably for, as I stated before the trees have now, at 14 years of age, been averaging $1\frac{1}{2}$ feet in height growth annually.

This study plot which you see has an area of $\frac{1}{5}$ acre and the data for the January, 1935 measurement are as follows:

Trees Per Acre-----	2515
Basal Area Per Acre-----	117.320
Average D.B.H.-----	2.9 (3.9)
Average Height-----	18.8 (21.0)
Total Cu. Ft. Volume-----	1386 (20 cords)
M.A.I.-----	99 (14 yrs.)

From here we will go to a thinning series in white pine.

6. White Pine Thinning Studies

Scope of Project

This white pine was planted in 1910. During August, 1927, two thinning plots of one acre each were

established. One plot received a medium thinning, and the other, at which we are now standing, a heavy thinning. Later, in August, 1928, a third plot was added to the series, but it was left unthinned as a check.

The thinning work was largely of the typical German type "from below", as the larger dominant trees were almost invariably retained, while the medium-sized and smaller ones were cut. At the start of the experiment, this area, where it was fully-stocked, supported around 1600 trees per acre. The stand on one plot was thinned to 800, and the other to 400 trees per acre. All trees on the thinned plots were measured for diameter and total height when the work was done, in Aug. 1927, but those on the check plot were not measured until August, 1928. All three plots were remeasured in September 1932.

The Heavy Thinned Plot.

You are looking now at the heavy thinned plot. Rather than "heavy", some foresters have characterized it as "Very heavy", and in at least one instance it has been roundly condemned as a "Bolshevik Cutting". However, it is my belief that the next remeasuring of these three plots will reveal some very interesting facts about

this particular study area. Here is a radical departure from the usual thinning practice of American foresters, who are, I believe, rather inclined to cut out principally dead and suppressed trees, and to disturb as little as possible the dominant crown canopy. On this plot, out of a total of 1329 trees there were cut 891--about two-thirds of the stand, and leaving 438 trees on the acre. This cutting removed 53% of the basal area and 50% of the volume.

There is some reason to believe that when you thin as heavily as this in white pine, a slight change in the form of the trees might result. The ideal tree of the forester and lumberman is the one which is tallest and straightest for a given diameter, but yet thrifty and able to resist the stress of storm, or snow and ice. The form of a tree in the sense considered here, may be mathematically expressed by simply dividing its total height in feet by its diameter in inches at breast height. When this test is applied to the average co-dominant tree on each plot of the series, the check plot shows a quotient of 6.35; the medium-thinned plot, 6.17; and this one--the heavy thinned plot, 5.69. But this difference is so slight, for the densities represented, that I can see little if any danger to the form of the

trees on this area. It is, however, obvious to the eye that on this plot the lower live branches are much larger than is the case on the check plot. But if we wish to plant white pine, I believe that, regardless of how it is grown, we'll always be faced with the necessity of pruning in order to get quality material from even-aged stands.

I know that you are interested in learning what kind of showing this stand has made, after 5 years of growth from the time of treatment. We will wait, however, until we visit the other two plots in the series, before I attempt to compare them. The next plot, which we will pass through, is the check plot.

The Check Plot

Medium-Thinned Plot and Discussion

is
This, the medium-thinned plot in this white pine thinning series. On this one acre there were, originally, 1127 trees. At the time of thinning there were cut 322 trees, or a little less than one-third of the stand, which amounted also to 19% of the basal area and 16% of the volume. Practically all the trees left were of codominant crown status.

We will see now how these three plots compare in rate of growth, for the period between the time of their establishment and the first remeasurement in Sept., 1932. The data might be analyzed from many different viewpoints, but I will mention now but a few of the outstanding trends that have become apparent inside of a relatively brief time.

At the start of the experiment the check plot, due to its greater density, showed a higher mean annual

growth (93.5 cu. ft. per acre per year) than did either of the others. Approaching it most closely, in this respect, was the heavy-thinned plot, which had an M.A.I. of 63.4; whereas the medium-thinned showed an average annual growth of 51.7 cu. ft. annually. At the end of the period (1932) the check plot was still ahead in total production of wood to date, but the medium-thinned had gained rapidly, and the other also was not so far behind.

One of the outstanding facts of this study to date is the splendid periodic growth shown by the two thinned plots. The medium-thinned plot produced 50% more wood per year, as a result of thinning, than did the check plot, on which no cutting was done. Even the heavy-thinned plot, on which the crown canopy was reduced to about half of normal, laid on almost as much wood as did the check plot (139 as against 146 cu. ft. per acre per year). Such rapid recovery from this so-called "Bolshevik Cutting", is rather surprising and shows that the trees thereon quickly adjusted themselves to the radical change in their environment.

One of the best ways to show how growth has increased, due to thinning, is to compare the periodic annual growth per cent, based, in this instance, on the original (1927 or 1928) volume as a base. When thus compared, the

medium-thinned plot did best, with a periodic annual increment of 16.4 %; the heavy-thinned came next, with 14.7%, while the check plot could do no better than 7%, or less than half that of the others.

Even the short time of this experiment demonstrates that there is danger of stagnating growth in close young pole stands of white pine. Heavy cutting gives the best trees light, returns considerable organic matter to the soil, and probably greatly speeds up activity of the organisms of decay and nitrification in the humus and upper mineral layers. "Thinning from below"; that is, taking out all the smaller trees, doesn't appear to stimulate growth of the dominant or larger trees to any considerable extent. Just how heavy to thin; in order to get best results, in stands of different ages and on all different sites, is a problem the solution of which requires, of course, many years of continuous research.

7. Mixed Larch and Black Walnut Plantations.

Here on the one hand we have a mixed plantation of Japanese and European larch, made in the spring of 1923, and on the other side of this trail an area planted with

black walnuts in the fall of 1906. No growth study plots have been established in either of them.

Measurements made on the larch, when it was 7 years old, indicated that the Japanese was then several feet taller, on the average, than the European; but their diameter growth was exactly the same. The two species are about equally represented on the area, and occur in irregular mixture.

We have several other larch plantings here at Pond Bank, and elsewhere on the Mont Alto Forest. Our observations would seem to indicate that the Japanese species prefers moist sites, whereas its European relative does best on the well-drained soils of the slopes. Here on this bottom, which seems to be a frost-pocket, European larch has almost annually shown some evidence of frost injury, but never have I noticed it on the Japanese.

The larch, either European or Japanese, as a tree for reforestation, has a most promising future in Pennsylvania. As yet, however, we know relatively little of the silvical habits and growth requirements of these two foreign species. We are justified in believing, however, that larch is a soil improver, makes rapid growth, grows well in mixtures, yields early thinnings, and produces valuable wood with a high pro-

portion of heartwood which serves a variety of important uses. It has been observed, too, that larch is highly resistant to wind and snow damage. If we plant it in suitable mixtures, and under satisfactory conditions, less injury from insects and diseases should be experienced.

This black walnut plantation has been an obvious failure from the time it was set out. Those trees are now 29 years old! Compare them in your mind with the walnut plantation at the nursery, back of the stone house now occupied by Ranger Staley. Those trees, though several years younger than these, now have a height of 40 feet and a diameter breast-high of $7\frac{1}{2}$ inches. We now know that black walnut is an exacting species--one which requires a deep, fertile, well-drained soil. Its failure here has been due to the poor sandy soil, and to the ~~for~~st-pocket location in which it has been struggling to grow.

8. Pitch Pine Plantation

This pitch pine was planted in the spring of 1919. For the past 5 or 6 summers it has been infested with spittle bugs, which have sapped its vitality and reduced its rate of growth. One year in particular, 1931, its foliage was so brown and deficient in chlorophyll as to appear as if scorched by fire.

The sample plot which you see here was established in the spring of 1928, the trees being then 9 years of age. It was remeasured in Feb. 1931, and at an age of 12 years showed a mean annual volume growth of 40 cu. ft. per acre per year. During the 3 growing seasons between measurements it made a periodic annual growth of about 95 cu. ft. per acre.

Pitch pine, as you know, is an intolerant tree and hence will not grow in dense stands. Let us compare this plot, for instance, with the red pine which we just visited. At 14 years the red pine had 2500 trees per acre, whereas at 12 years this pitch pine contains only 1360 trees per acre, little more than 50% as many. As fully-stocked stands of pitch pine reach maturity they become very open in nature. My studies have shown that, after 90 years, the mortality within such stands often becomes so great that actually it offsets the growth, and that such mature timber, if not cut, will break up

and deteriorate rapidly. I am emphasizing this growth habit of the tree--its inability to grow in dense stands --for, because of that fact, pitch pine compares unfavorably with some other pines on the basis of volume growth per acre. Individual trees grow just as fast in diameter and height as do red, Scotch, table mountain or Jersey scrub pines.

But, aside from growth rate, I believe you'll agree with me that pitch pine has other outstanding virtues that commend it to our attention, both for reforestation and for the management of extensive forested areas in the mountainous regions of Pennsylvania.

	<u>1928</u> (3 Yrs.)	<u>1931</u>
Trees Per Acre	1380	1360
Basal Area Per Acre	33.480	57.992
Average D.B.H.	2.0	2.8 (3.8)
Average Height	12.0	15.0 (17.8)
Volume in Cu. Ft.	209	475
M. A. I.	23.2 (9yrs.)	40 (12 yrs)
P. A. I. (3 yrs)	---	95

We will visit next a plantation of jack pine, or Banks pine as it is sometimes called, which was set out at the same time that this pitch pine was planted.

9. Jack Pine Plantation

Jack Pine, as you know, is not native to Pennsylvania. We grow very little, if any, of it in our nurseries, but we have made a few experimental plantings with this species on State forest lands. It thrives on sandy soil in the Lake States and has a reputation for its ability to make satisfactory growth on dry sterile sites. It is a far northern species which extends its range southward in the United States, from Maine to Minnesota. In Canada it grows almost far enough north in the valley of the Mackenzie River to catch the rays of the midnight sun. There the tree straggles over landscapes that otherwise would be treeless. It must necessarily adapt itself to circumstances. When these are favorable, it develops a trunk up to 2 feet in diameter and 70 feet tall, but, in adversity, it degenerates into a many-branched shrub a few feet high. At its best, it is as handsome a tree as anyone could desire. The characteristic thinness and delicacy of its foliage distinguish jack pine at once from our other common pines.

Here on this plot it has made good volume growth to date, surpassing somewhat the pitch pine which we just visited. At 11 years of age it showed a mean annual

increment of 56 cubic feet per acre, and for several years prior to 1930 was laying on wood at the rate of 114 cu. ft. or about 30% annually. Jack pine, however, is a short-lived tree. It fights a brave battle against adversities while it lasts, but it doesn't live long. Within its natural range, 60 years is an old age for this tree. It grows fast while young, but later it devotes all its energies to the mere process of living, and its increase in size is slow, until at a period when most trees are still in early youth, it dies of old age.

Data from a recent remeasurement of this plot have not yet been computed. Since 1930, however, it has suffered somewhat the same as Scotch pine, due to snow and ice damage, followed by spittle bug and bark beetles. Nevertheless, its growth to date has indicated the adaptability of this tree to our Pennsylvania soils and climate.

10. The Dynamite Plot

In 1910 three acres of Norway spruce were planted here on a sterile clay soil, which resulted from the refuse deposits formed from washing iron ore at the Promise Mine, located formerly just off here to our left.

Because of the unfavorable soil conditions, not many of the spruce were able to survive. Accordingly, in the fall of 1911, it was decided to experiment with the use of dynamite to loosen up the soil and render it more permeable for the roots of the planted trees. On this acre, already planted with Norway spruce, a half-stick of dynamite was used, at 20-foot intervals. The dynamite was placed 2 feet in the ground, and discharged by means of percussion caps and fuses, the work being supervised by a representative of the Du Pont Power Company.

The following spring after dynamiting the field was planted to white pine, which developed as a pure stand, except for scattered advance reproduction of pitch pine and shortleaf pines, and a few of the Norway spruce that had been planted in 1910. Then, in the spring of 1928, two permanent sample plots were established to determine the affectiveness of the dynamiting. They were measured again at the end of the 1932 growing season. On these two signs-----for the dynamite and check plots----- is a summary of the data covering both measurements.

The average yearly growth, made by these two plots during the 5 year period between measurements, was 177 and 148 cu. ft. of wood for dynamited and check areas

respectively. This looks like an evidence of superiority for the treated site. But standing in contradiction to these figures is the better early growth of the check plot. In 1928 the check plot showed a mean annual increment of 89 cu. ft., as contrasted to only 80 cu. ft. for this dynamited area. It is but reasonable to think that any benefits from the soil-loosening would be reflected in the first measurement of the plots --16 years after planting. At the last measurement, there was little difference in the wood volumes on the two areas.

In order further to test the effect of dynamite, a special study was made covering all trees within 6 feet of the points where the explosive was discharged. Measurements on 404 trees, standing thus in proximity to dynamite holes, showed, when the data was compared with that covering all trees on the plot, a difference in favor of the former of only .04 of an inch in average diameter at breast height. (4.20--4.16) Thus, although the data reflect some slight benefit to be derived from dynamiting the sub-soil, it is so small as to be less than the limit of error in the study, and far too small to justify the expense entailed, unless the future development of the stand is contradictory to that of early years.-----Considering the poor soil, this white pine has done remarkable well.

Dynamite Experimental Plot & Check

(Plots 1 acre each)

Plots	: Trees : Per Acre:	: Av. : D.B.H.	: Av. : Height	: Volume : In Cu. Ft.:	: M.A.I.
1927 Dynamited:	1704	3.53	22.4	1360	80
(17yrs) Check :	1753	3.55	23.2	1509	89
1932 Dynamited:	1616	4.15	27.0	2246	102
(22yrs) Check :	1680	4.10	25.7	2271	103

11. Mixed Conifers Planted on Acid Soil.

Off here to our left, about 500 feet, is located the Promise Mine ore-bank--one of the largest iron ore operations of the Old Mont Alto Furnace. We'll see it before long, as we work back toward our cars. The ore from this mine hole was intermixt with fine clay. In order to clean the ore it was washed in water which was kept running through a special agitating machine. The water, with its burden of sediment, was released into a settling dam or pool, where the mud was precipitated. It is on that mud-settling area that we are now standing.

An area here of about 2 acres has lain barren ever since 1890, when ore digging ceased. The soil is extremely fine in texture and highly acid in its reaction. As a result, its only vegetation, prior to our efforts

at planting, was a growth of dewberries, wild indigo, and mosses and lichens, with several scrub oaks and hard pines. Heaving of the soil, caused by freezing and thawing in winter, was probably the main reason why vegetation made so little progress on this denuded area during the 40 years since it was abandoned by industry. The fine clay retains much water, and it is not unusual in cold weather to find ice crystals 5 or 6 inches long forming at and just beneath the surface of the ground. The soil surface becomes very hot in summer.

In 1908 this mud dam area was planted with honey locust seedlings, but every tree failed. In 1918, however, an experimental planting was made with four species of pine at the north and most favorable end of the dam. This demonstrated that Scotch pine, pitch pine, and northern jack pine could grow successfully, altho white pine failed. Shortleaf pine seedlings also were planted later and failed quite generally.

A more elaborate effort to reforest the area was made in 1928 and 1929, when a variety of different species were planted in parallel rows across the middle of the dam. The species tried were Norway spruce, American red pine, Chinese red pine, Austrian pine,

Corsican pine, Scotch pine (root pruned & not root pruned), Japanese larch (root pruned & not root pruned), Southern white cedar, and English white oak (*Q. pedunculata*). The rest of the site was filled up with 3-year-old red pine and Scotch pine seedlings which are now rather promising in appearance.

All the trees tried show promise of successful growth, with the possible exception of Japanese larch. The hard pines, except Austrian and Corsican, promise best for reforestation on this bare area. Root pruning in this experiment appears advantageous to both larch and Scotch pine, when from a third to half the root length is cut off at time of planting. This planting area demonstrates how man may, at times, get results in forestry where nature has failed for forty years.

As we pass through this older planting, at the edge of the mud dam, ^{*Dr. Jackson &*} I will show you examples of a twig blight, of the genus *Atropellis*, that is present on many of the trees.

~~Dr. Jackson~~

DATA ON PLANTATIONS AT POND BANK*

SPECIES	AVERAGE HEIGHT (feet)	AVERAGE DIAMETER (inches)	MAXIMUM HEIGHT (feet)	MAXIMUM DIAMETER (inches)	NUMBER OF TREES 25 FEET AND OVER	NUMBER OF TREES 20 FEET AND OVER	NUMBER OF TREES 15 FEET AND OVER
European Larch <i>Planted 1909</i>	21.8	2.8	30	5.2	11	30	---
Scotch Pine <i>1909</i>	22.3	3.6	26.5	5.1	8	39	---
White Ash <i>1908</i>	12.8	---	20.0	---	---	1	10
Catalpa <i>1908</i>	6.8	---	15.0	---	---	---	1
Rock Oak <i>1905</i>	18.1	2.5	27.0	4.8	3	14	20
White Oak <i>1905</i>	12.7	2.1	19.5	4.0	---	---	10
White Ash <i>1905</i>	12.9	1.4	21.0	2.4	---	1	12
Scotch Pine <i>1909</i>	25.4	3.7	28.0	5.3	12	34	---
Black Walnut <i>1907</i>	9.3	1.5	20.5	3.7	---	1	1

*Based on measurements of 50 trees of each species taken March 28, 1923.

E. F. Brouse.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF FORESTS AND WATERS

Regulations Regarding Roadside Improvement Cuttings
And Forest Thinnings With Regard To CCC Activities

- (1) Improvement cuttings are to be made with special reference to the production of high grade timber and in such a manner as will provide food and cover for game. An adequate crown density must be maintained. It is a safe guide to make no openings in the canopy that the trees cannot fill by crown growth within five years. This does not apply to final cuttings.
- (2) Forestry demands low, smooth cut stumps. Cut all but one or two of the most promising sprouts from clumps of trees of the same root origin.
- (3) Undesirable trees and shrubs, such as striped maple, alder, witch-hazel, scrub oak, black gum, willow thickets, green briars and grape vines are not to be cut when no possible benefit is derived from their removal.
- (4) Laurel, rhododendron, Juneberry, dogwood, and other flower producing species should be preserved.
- (5) Trees or shrubs that yield food for wild life should be favored wherever practicable. Grape vines, black gum and similar species should be cut when they prevent the growth of valuable species.
- (6) Remove dead and dying trees except occasional ones that may serve as homes for woodpeckers, squirrels, raccons and other game animals.
- (7) Thorn trees are a haven of refuge for small birds when hunted by hawks, owls or predatory animals. Clumps and individual trees of this sort should be preserved.
- (8) All brush should be carried back 25 feet from the edges of the roads and trails and piled or scattered. When this is impracticable brush may be disposed of by burning in roads or places where desirable species will not be injured.

Brush disposal should be preferably by piling, in neat compact piles, or by lopping and scattering, so that all debris lies as closely as possible in contact with the ground. Brush is the natural fertilizer of the forest. If piled it becomes a reservoir for soil moisture and furnishes shelter and homes to many forms of wild life.

- (9) Favor conifers in conducting improvement cuttings as well as the following hardwoods; white, red and black, hickory, tulip poplar, white ash, basswood, elm, butternut, cucumber and black cherry.
- (10) Problem Trees: Rock oak is a good tree for the poorer, more adverse sites and seems to prosper better on sandy than on shale soils. It is desirable in mixture with other species on good sites up to 25 per cent of the stand, but should not be permitted to form stands of more than 75 per cent on any site unless no other desirable species are available.
- Scarlet oak does not thrive as well as rock oak on the poorer sites, but grows better than rock oak on good sites.
- Red maple is a good soil builder and should be encouraged as an understory, or if of good form. Cut poor trees as they will soon sprout up better than before, unless deer are numerous.
- Beech is preferable to red maple. Cut poor, scrubby trees to encourage root sprouts.
- Black locust, sassafras and hairy sumac yield desirable wood under favorable conditions. They are inoffensive, but should be cut when poor in form to encourage better sprouting.
- (11) Nurse Trees: Birches, aspen, and cherries are best. There is little advantage in cutting these except where there is a stand of understory trees of more desirable species ready to take their places.
- (12) The margin of forest stands should never be opened to the sun and wind. Live limbs should not be pruned from conifers if it can be avoided.
- (13) All cutting is prohibited within 25 feet of stream banks except in park areas with the approval of the Harrisburg office.
- (14) When in doubt about cutting a tree, it is better to let it stand.

THE STALEY ROAD PULPWOOD JOB

Forest Dept. of Pennsylvania and U.S. Forest Service, U.S. Department of Agriculture

The State-owned forests of the Commonwealth of Pennsylvania are not yet ready to bear successfully sustained crops. Several stands were given the best possible fire protection during the past half century, so that they might become producers of high quality softwood, pulpwood, and other valuable forest products. Now, in many areas of the State this timber land has reached a stage, where it is in dire need of timber management and is capable of sustaining various diversified forest industries.

TIMBER STUDY STARTED

The foresters of the Pennsylvania Department of Forests and Waters were aware of this timber situation, and another phase of the Commonwealth's forestry program was instituted during 1910.

It was at this time that a timber management study was started on the Michaux State Forest, which is located in the oak forests of Franklin, Adams, and Cumberland Counties. Several foresters worked 12 months classifying the various timber stand categories, preparing timber type maps, cruising the stand volumes, and calculating the growth. The data from this study was compiled into

a volume known as the Michaux District Timber Management Plan -- a guide for all other State timber management plans that were to follow soon. While not perfect in all respects, as is the case with many new developments, it is meeting the tests of practical application in the field.

THE COMPLETED PLAN

When the plan was completed, it gave the forester in charge an opportunity to go into the field and manage the timber on a sustained yield basis. The annual allowable cut of 1.5 million

board feet of sawtimber and 12,000 standard cords of pulpwood presented a goal for the managing forester to attain in a market that was not yet ready to buy selectively marked stumpage. Several trial sales were marked and put up for public bid. Fortunately, interest was strong enough to start the program on a limited scale. These first operations were very important in many respects: (a) the timber and the pulpwood operators saw the advantages of buying marked forest products; (b) the forester in charge became more closely associated with prospective buyers and prepared a mailing list of those interested in purchasing State-owned stumpage; and (c) all concerned met on common ground and discussed mutual needs and desires for future sales.

STALEY ROAD JOB

One of many sales that evolved from these preliminaries is known as the Staley Road Pulpwood Job, which contains a gross area of 282 acres. A total of 17,195 trees were marked selectively and scaled on the stump within the boundaries of this sale. The corresponding gross volume of 1630 standard cords* was distributed as follows:

DEH Group	% Trees	% Volume
6 — 10	85	58
11 — 14	12	26
15 — 18	2	10
19 — 22	1	6

*Burnham, U. F., Ferree, H. J., and Cunningham, F. E., June 1946. Site Class Volume Tables. NE For. Exp. Sta. Forest Management Paper No. 3.

For the most part, the trees in the larger diameter classes were trees of marginal sawtimber value, and it was considered advantageous to clear the area of them on this first pulpwood thinning.

SIX CUTTING UNITS

The procedures used in setting up the sale took many items into consideration. Prior to marking, the general sale area was scouted out, and it became apparent that there were enough old woods trails to be used as haul roads and as division lines for the purpose of splitting the tally and subdividing the entire sale into six cutting units. These subdivisions are useful tools both for the forester in charge of the sale and for the sale operator, who in many cases assigns the units to individual wood cutters. The forester, in addition to regulating the cutting progress by units, may put the sale up for bidding on a unit basis; thus, in effect, increasing the competition on the bid.

DISTRIBUTION OF CUT

The selectively marked and scaled pulpwood stumpage was distributed among four distinctly different timber categories that involved various size classes of pole timber and of saw timber. The thinning will benefit the pole timber stands by having the inferior growing stock removed and the residual stand improved by increasing the growth on better-formed stems. The saw timber stands will be improved by removing the marginal saw timber trees and the suppressed and poorly-formed trees of the understory, thus preparing the way for a saw timber cut and the subsequent establishment of reproduction that will then have the requirements for normal growth.

CUT AND LEAVE

The cut averaged ^{5.8} ~~six~~ standard cords per acre, and varied from

4.9 to 8.9 standard cords between stand categories. This cut amounted to 25% of the total volume on the sale area. Foresters sometimes describe the "cut" and the "leave" stand in B.F.A. (basal feet per acre), which is the cross-sectional area in feet of the trees measured at D.B.H. (diameter breast-high or 4.5 feet above ground). Data collected on this sale for inventory purposes showed that in trees 5 inches D.B.H. and above there were 26 B.F.A. marked for removal; however, this too varies between categories from 22 to 37 B.F.A. The average leave stand is 71 B.F.A. with a variation between categories from 57 to 107 B.F.A.

MARKETS

The operator of this job has two available markets, both of which are approximately 50 miles from the sale area. One of these, a manufacturer of felt roofing papers, buys rough wood only and pays \$13.20 a standard cord for hardwoods and \$11.32 for softwoods. The other, a manufacturer of document paper, buys peeled hardwoods at \$18.40, peeled pine at \$19.20, and rough pine at \$15.20 a standard cord. These prices are for wood delivered at the respective mills. Because of the preceding price differentials, the operator chose at the start of operations to chemical girdle with a 40% solution of sodium arsenite all those trees that could not be sap-peeled during the peeling season. Another stand that included 166 acres of light pole timber was excluded from the sodium arsenite treatment, so that it could be cut and sold to the buyer of rough wood, who will not take any bolts over 8 inches in diameter. A tractor trailer and a stake bed truck are used to haul the pulpwood to the pulping plants. The first mentioned carries a pay load of 7.5 standard cords; the second 3.75 standard cords. Since the job is relatively easy to operate,

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7-3 40 100 000

an old truck was altered for use in carrying the pulpwood bolts from the woods to a main trail, where they are transferred to one of these trucks and hauled away for pulping.

FUTURE BRIGHT

The future for selling selectively marked and scaled stumpage on the Michaux State Forest is expected to be bright, and it is anticipated that the annual cutting budget of 12,000 standard cords of pulpwood and 1.5 million board feet of sawtimber will be sold regularly. In support of this contention, it might be mentioned that the operator of the Staley Road Pulpwood Job is now concerned about the possibilities of "bidding in" another similar job by next spring. It shall be available!

Fayetteville, Pennsylvania

October 20, 1947

Subject: Gov. Duff's instructions and information requested during his visit to Michaux State Forest, Wed. Oct. 15, '47.

To: Mr. M. F. Draemel, Secretary.

From: T. G. Norris, District Forester.

Governor Duff first requested that we send this information direct to him but on later questioning said to send it to him through your office.

1. Seed collection of Scotch Pine (*Pinus Sylvestris* variety regia): This seed can be secured only by having a qualified man gather this seed in France, Germany or Luxinburg where this species of tree exists. Commercial Scotch Pine seed on the present market is secured from inferior trees.

D. W. Geesaman, Asst. District Forester, traveled widely with the Military Police in the present American and French zones and has observed the desirable stands. His report is attached. Mr. Geesaman is experienced in seed extraction and it is my recommendation that he be sent to Europe summer and fall of 1948 to secure a ton or more of this desirable seed.

2. The fertilizer used on the seedlings conifers. Larch and Norway spruce is 6/12/4. Harry E. Staley, Ranger at Mont Alto has been experimenting with this fertilizer for a number of years. Mr. Staley applies this fertilizer in salution and I would suggest that Mr. Staley be called in to demonstrate how to use the material at Indian Town Gap.

3. We were instructed to plant 1,000,000 hemlock at Mont Alto this fall. The seed beds are in the course of preparation now. Hemlock seed is also being collected. It is hard to get the seed crop is light and we now have about 20 pounds of seed. Today being bright and worm the cones have opened wide but the seed has not fallen. But should tomorrow (Tuesday Oct. 21) be bright and sunny seed harvest will be over in this section.

In order to get a final crop of 1,000,000 hemlock 3 yrs. from now, it will be necessary to sow 13 beds to Hemlock (1600 sq. ft. per bed.) each bed to yield 80,000 stocky 3 yr. seedlings. It will require 10 pounds of seed per bed or 130 pound of seed. Final yield 1,040,000 trees.

Very likely we will have to purchase 100 pound of Hemlock seed on the open market.

Fayetteville, Pennsylvania

(Continued)

Oct. 20, 1947

Hemlock seedlings require double shades. It will be necessary to build 500 double shades or 1000 single spaced shades this coming winter. These shades will remain on the beds the first two years at least.

Swamp muck will be required in order to produce good stocky trees. We have none on hand for immediate use. We can secure the same at Ponds near Pond Bank Village. These ponds are on the State Forests but funds will have to be made available to secure it. We will need the use of a small gasoline shovel for about 10 days to get the material out of the ponds. In order to speed up the handling of this muck several dump trucks should be hired to supplement the 3 dump trucks we now have.

We should get this muck before the fall rains come.

4. Governor Duff wanted the following trees for planting at Indian Town Gap spring of 1948:

White Pine	2-2-1 transplants	500
Pitch Pine	3 seedlings	5,000
Larch	2 seedlings	2,000

He also wanted the entire bed of Hemlock 3 yr. seedling approximately 30,000 trees to be reserved for planting in one block on lands to be purchased this winter.

5. We have made a survey of the available seed crop of Swamp White Oak (*Quercus bicolor*) and can collect between 5 and 10 bu. of this seed. Germination has started in this seed and this will be collected and planted this fall, immediately after the hemlock seed has been collected.

6. In order to extend the nursery as suggested by Governor Duff it will be necessary to purchase the adjoining Nunemaker farm for approximately \$10,000.00

F. G. Norris

Fayetteville, Pennsylvania

Oct. 20, 1947

Geesamans report on Scotch Pine seed collection.

In regard to the collection of Scotch Pine Seed in Europe. I served 2 years on the continent as a Military Police Escort and had ample opportunity for traveling and observing forest cover. Excellent stands of this species occur in Belgium, South of Liege and near Arlon, in Luxembourg near Luxembourg City and near Esch, in France, between Verdun and Metz and near Longwy and then again near Colmar and Mulhouse and in Germany near Nurnburg and Stuttgart and between Augsburg and Munich.

Keeping in mind the recent war and the tremendous damage to communications and installations in that part of the world, it would probably be necessary to arrange for transportation and billits through the Army or Military Governments in Germany. I feel certain that Senator Martin could do that.

In the event we make an attempt to secure some seed please consider me an applicant for the trip. I am of the opinion that 3 months would be sufficient time, probably sailing in early August and returning in October or November. Probably the seed could be extracted from the cones there for easier handling but it will be necessary to make some preliminary arrangements here. So, with your permission I would like to begin work on the matter as soon as possible in order that the red tape can be ironed out and the trip make a worth while project for you and the Commonwealth.

Fayetteville, Pennsylvania

July 13, 1948

Secretary
Department of Forests & Waters
Education Building
Harrisburg, Pa.

ATTN: Mr. O. Ben Gipple, Director
Bureau of Forests

Re: F 21 - July 8, 1948

Outline of my suggestions for a plan of development and management of the State Forests.

1. Adequate working space in District Headquarters.

A plan drawn by a competent architect should be made for a district office, work shop, garage (repair and storage), Forester and Ranger houses.

These buildings should be of standard plan and the materials should be cut and stored for seasoning at Department mills. They should be built of mature material.

Where possible the District Offices should be in the forests and be as distinctive as the newer Highway sheds. This is merely good advertising.

2. Adequate forest research.

Forest Research should be carried on in all fields.

Marketing of undesirable species
Planting, Seeding, (natural and artificial), Soil preparation, Fire control, new equipment testing, and any of the many and varied problems that confront the forester who does not have the time to solve the problem.

3. Department news organ-

Could be mimeographed for speed and economy. In this paper various methods and skills could be passed along. Skill of writing not to be considered but ideas of the various men can be presented.

Letterkenny Ordnance Depot offers cash prizes for acceptable ideas.

4. Accurate mapping of Forest Lands.

State Forest Lands should be mapped by Latitudes and Departures. The result mapped on heavy linen backed paper. (Similar to the maps of the Rockhill Coal and Iron Co.) Mr. Norton is familiar with these maps.

A map storage vault (fireproof) would have to be built to accommodate these maps. Various tracings could be made from them, forest type, age class, fire records, planting, roads, and so on in endless variety as needed.

A large drafting room is also needed in each District Office.

5. Management Plan for each Forest.

This plan should include a comprehensive logging and pulp wood cutting program. Present and future.

First - the forest should be laid out in compartments as cutting units. Mill sites picked and the compartment lines to conform with the cutting limits.

Compartments to be sub-divided into small (100 A or less) sub compartments and the stock and type survey worked on this small basis.

Small sub compartments can be added to form any size cutting unit but large compartments where the data is compiled cannot be broken down without a lot of added work.

6. Access roads.

Much of the State Forests are back of private lands and no roads enter them. In order to make the timber available access roads should be leased or purchased.

7. Purchase Units.

In order to consolidate the State Forest holdings purchase units should be set up in each forest.

This should be handled by a competent engineer and all procedure handled on a State-wide basis.

8. No Forest Products.

Minerals and other non-forest products should be located, mapped, and held or sold as the case may be.

This is another problem to be handled through the Harrisburg office.

9. Protection (field) plan to eliminate fire.

Taking each protection problem seperately, Railroad, Incendiary, or what have you, and determine the cause without question. Make a study of the ground and determine what is needed to protect the largest area of forest and then build the necessary trails, fire breaks, etc. It may be necessary, due to topography, to sacrifice considerable area as a bad risk. If you get any timber there, it's just plain luck, but hold the remainder at all costs.

10. Planting.

The main purpose to convert scrub species into desirable species.

In order to get some good results it may be necessary to fence against deer and move the fence as soon as the danger of deer damage is over.

11. Plantation thinning and pruning.

Low grade lumber from unpruned plantations will be a drug on the market. High grade material always will bring a premium price.

All plantations should be pruned to a 2 log height (30ft.) beginning pruning as soon as it can be done with safety.

Select tree seed from desirable specimens will eliminate much later field work.

12. Utilization of undesirable species.

Saw logs of desirable species will never be a problem of sales. But Black Gum, Birch, Soft Maple, and the deformed trees of other species take selling.

A program for State Forests similar to the Farm Forester Program will be necessary to sell this bulk of material now taking up valuable space on the State Forests.

13. Reduction of the Size of State Forests under the direction of one District Forester.

No one man can handle a forest the size of the present forest districts. More trained help will have to be forthcoming.

At the present stage of development of the State Forests, the area for useful handling should not exceed 10,000 acres. As the crop grows the size should be reduced.

14. Seed Collection.

Various seed collection stations should be set up. Seed extraction and storage must be the best. Cold storage in mouse proof buildings established.

Field plots for the collection of seed should be established all over the State, where a suitable stand is not State owned it should be bought or secured on a long term lease.

Cutting to stimulate seed production should be practiced on these plots. It might be necessary to prune similar to apple orchards.

Seed collection crews should be trained and employed for this purpose of cultivating and collection the year round.

Perfect seed is the cheapest, regardless of price.

15. Nursery improvement.

Nursery soils should receive the best treatment known. Soil fertility must be maintained. Poor nursery stock is mostly caused by poor seed and poor soil. A good tree, well-started, is half the battle.

16. Adequate equipment.

We should have a testing laboratory for all sorts of Forestry equipment, trucks, tractors, sawmills, planting tools, seed collection equipment, fire tools, and cultivating tools of all kinds.

17. Finance.

Such a program will cost in excess of \$ 1,000,000.00 per year for the State, but it will return to the Commonwealth a leading position in the lumber and pulp industry.

T. G. NORRIS

TGN:cr

NOT FOR PUBLICATION.

A LETTER TO FORESTERS

The destruction of the forests of America has been a long-drawn out tragedy of waste. Now we face the danger of a moral tragedy also: that the foresters of America will accept that destruction and by silence condone it.

Forest devastation is the heart of the forest problem. Yet on this vital issue we are drifting. Some of us are lured by the illusion that forest owners will voluntarily end forest devastation in spite of the overwhelming evidence, after half a century of public protest, that the progress in this direction is almost negligible. Some of us are lulled to inaction by a lack of faith in the possibility of remedying the evil. And now, to justify failure to meet the real issue, comes the excuse that after all timber is not going to be much needed. If the grapes cannot be reached, it is consoling to think they are sour.

It is not too late to adopt a policy of mastery instead of drift. But the first step is to recognize that the fate of our forests depends in large measure on the mental attitude of foresters, here and now, toward the problem of forest destruction.

The profession must squarely face the problem of forest devastation. In every field of human activity, failure to meet responsibility is implacably punished by spiritual decay. Failure to grapple with the problem of forest destruction threatens the usefulness of our profession. We must cleanse our minds of apathy and doubt; and through a rebirth of faith in forestry and a reawakening of all our moral and mental energies, we must set the forestry movement on the path to its goal.

The profession of forestry in America was born with high ideals and great purposes. It has fought many a bitter fight against heavy odds. It has won magnificent victories. From the very first its guiding spirit has been that of public service. The profession can be proud of its history.

Today foresters are confronted with as great a challenge as any they have met in the past. Will they meet this new challenge in the old spirit? There was never a more compelling call for constructive leadership in forestry than now. The forests of America were never more in peril than at this moment. We are headed toward forest bankruptcy. What forestry there is on private lands is too little to exert the slightest effect on the vast problem of our future forests.

Today, after fifty years of exhortation and protest, the bulk of our forests are still being slashed and ruined, the second growth even more disastrously than the old growth. They are being stripped of their timber with no provision for regrowth. This is forest devastation. Our public forests excepted, forest destruction holds unchecked sway.

The duty of the foresters of America, with faith in the forest and in the Nation, is clear before them. It is to destroy forest destruction in the United States.

For the safety and prosperity of our country, forest devastation must be stopped.

There exists today no program for dealing on a large scale directly with forest devastation. Except for the creation of public forests, the main attack on forest destruction has hitherto been indirect. It consists chiefly in encouraging private forestry by forest fire protection, research, and tax reform.

We recognize the splendid work done in these fields. But we also recognize the obvious truth that these efforts are not enough. The forestry movement must now be reinforced by an organized nation-wide program on the part of public agencies and of forest owners and industries to abolish destructive logging.

The cure of deforestation must be sought along two main lines; public measures to prevent forest devastation and a greatly increased program of public forests.

With such a background of control to assure forest renewal, the whole forestry movement would acquire a new vitality and energy. Today with the general prevalence of destructive logging many of our forestry activities are kept from full fruition. To what end a vast and expensive system of fire control if the forests it protects are to be destroyed by the axe? To what end a great program of forest research if the forests to which it should minister are to be destroyed? The future of our forests, of our forest industries, of organized forestry agencies, of education in forestry, and of the profession itself is all dependent on stopping forest destruction.

World-wide experience shows that in the absence of public control few private forests escape destruction. Most of the older countries have public control of private forests, from the well-nigh complete control of Sweden, Japan, and Switzerland, to the partial control of France and Germany. In most countries, public control of forests needed for protecting mountain and river systems is taken for granted.

When private property is so used as to lead to public injury, public regulation must be invoked. In the United States, public regulation is exercised over many forms of property, such as railroads and other public utilities, urban buildings, and interstate commerce. When the very existence of a great resource like our forests is at stake, and the results of present abuse may be felt for centuries, it is even more necessary to declare the public interest supreme.

The forest problem is a national problem. It cannot be solved without federal regulation. There is a wide and unquestioned field for state regulation, but it is idle to rely on independent action by forty or more States in time to save our forests. A great nation can and must invoke the powers necessary to save itself from the disaster of forest destruction. The Supreme Court of the United States in the recent Migratory Bird case has said: "It is not lightly to be assumed that in matters requiring national action, 'a power which must belong to and somewhere reside in every civilized government' is not to be found."

The silvicultural basis for control has already been laid by the Forest Service in the nation-wide "Timber Growing and Logging Practice" study. The original purpose of that study was to define the simplest measures necessary to prevent forest devastation. The next step in forestry is to put these measures into effect in every forest region of the United States.

The forests needed for the protection of our mountain and river systems are in need of special attention. Ultimately they should be largely in public ownership, but meanwhile their devastation must be prevented by public control.

Public regulation to prevent devastation is the most urgent need in forestry. Nevertheless public regulation would not in itself be a complete or in the long run a wholly satisfactory remedy for devastation. We need a great expansion of public forests. Among the many reasons for such a program we must give special attention to the pressing tendencies in forest land ownership. Private cut-over lands are being abandoned on an immense scale. They are coming back on the public whether it wants them or not. The breakdown of private ownership is creating a new public domain. If these lands are to be saved from complete devastation and from becoming an increasing burden on the community, they must be definitely organized and handled as public forests.

There must be not only more National Forests, but especially more State, county, and town forests. The problem of forest acquisition is altogether too big for any one public agency. There is room and to spare for all, without conflict or overlap. But to prevent conflict and to stimulate public ownership of every character the Federal Government and the States should work out a joint program nation-wide in scope and amply financed.

It goes without saying that all other current forestry work should be properly developed. Public support of forestry should be proportionate to the greatness of our forest resources and the vastness of the problem of their preservation.

This statement is not a forest program. It is a discussion of a few principles which, in our opinion, are basic to the real advancement of forestry. In brief, we believe that:

Forests are now and always will be indispensable to civilization.

Forest devastation goes on unchecked.

Forest devastation can not and will not be stopped by voluntary effort of forest owners and industries.

The only way to stop forest devastation is by public control.

Both Federal and State governments have ample power for such control.

Forest devastation must be stopped.

It is the duty of the foresters of America to stop it.

(Signed) GEORGE P. AHERN
ROBERT MARSHALL
E. N. MUNNS
GIFFORD PINCHOT
WARD SHEPARD
W. N. SPARHAWK
RAPHAEL ZON.

Washington, D. C.
February 7, 1930.

STUDY THE FOREST... THE GREATEST BENEFIT FROM A STUDY OF HISTORY IS TO AVOID PAST MISTAKES, CORRECTLY EVALUATE CURRENT CONDITIONS, AND PREDICT FUTURE DEVELOPMENTS WITH SOME DEGREE OF ACCURACY. THIS COULD NOT BE ANY MORE APPROPRIATE THAN IN A DISCUSSION SUCH AS THIS ONE THIS EVENING. IN ORDER TO EVALUATE THE SIGNIFICANCE OF THE FOREST RESOURCE PLANS, IT IS IMPERATIVE TO UNDERSTAND THE COMPLETE HISTORY OF THE FOREST AND PAST LAND-USE PRACTICES EFFECTING THE FOREST.

PRIOR TO THE WHITEMAN'S ARRIVAL IN PENNSYLVANIA, THE ENTIRE STATE, EXCEPTING A FEW LOWLAND MEADOWS AND ROCKY HIGHLAND AREAS WAS COVERED WITH DENSE FOREST GROWTH.

THE VAST TIMBER TRACTS APPEARED TO BE INEXHAUSTIBLE, AND IT SEEMED IMPOSSIBLE THAT SUCH FORESTS COULD EVER DISAPPEAR. HOWEVER, AS INCREASING POPULATIONS CONVERTED FORESTS INTO FARMS, AND EXPANDING WOOD-USING INDUSTRIES CONSUMED MORE AND MORE WOOD THE TIMBER RESOURCE GREW SMALLER.

DURING THE 1860'S PENNSYLVANIA LED THE NATION IN LUMBER PRODUCTION, BUT BY THE LATE 1800'S AN AWARENESS BEGAN TO GROW THAT THE FORESTS WERE NOT INEXHAUSTIBLE. LAND ONCE COVERED WITH VIRGIN FORESTS HAD BEEN CUT-OVER AND ABANDONED. DESTRUCTIVE FOREST FIRES RAN UNCONTROLLED OVER MOST OF THE CUT-OVER AREA.

BY 1900, WHEN THIS STATE HAD TO IMPORT LUMBER TO FILL ITS NEEDS, VARIOUS EFFORTS WERE MADE TO HALT DEPLETION OF THE FORESTS. THE FUTURE WOOD SUPPLY AND THE RESTORATION OF THE DENUED AREAS BE-

CAME A SOURCE OF CONCERN TO CONSERVATION-MINDED CITIZENS. IN THE LATE 1880'S VARIOUS COMMITTEES AND COMMISSIONS WERE APPOINTED TO

concentrated in this area due to the location of the Forest Academy.

STUDY THE FOREST SITUATION. AS A RESULT, IN 1895 A DIVISION OF FORESTRY WAS CREATED WITHIN THE PENNSYLVANIA DEPARTMENT OF AGRICULTURE. IN 1897 LEGISLATIVE ACTION AUTHORIZED THE PURCHASE OF UNSEATED LANDS, THUS CREATING THE STATE FOREST SYSTEM. THE FIRST LAND PURCHASED UNDER THIS ACT WAS A 7500 ACRE TRACT ACQUIRED IN CLINTON COUNTY IN 1898. THE MICHAUX STATE FOREST, NAMED IN HONOR OF THE FRENCH BOTANIST ANDRE MICHAUX AND HIS SON FRANEOS MICHAUX, WAS CREATED UNDER THIS ACT.

THE FIRST LAND PURCHASE FOR THIS STATE FOREST WAS 553 ACRES ACQUIRED FROM JAMES DULL IN APRIL 1902. DURING THE SAME YEAR TWO MAJOR PURCHASES WERE MADE WHEN 17,935 ACRES WERE ACQUIRED FROM THE MONT ALTO IRON COMPANY, AND 13,704 ACRES BOUGHT FROM THE

A significant development in the history of the area was the establishment of the State Forest Academy at Mont Alto in 1903. It is appropriate that this meeting is being held on the grounds of the second forestry school established in the United States.

Due to the location of the school at this location, the Michaux State Forest can claim many "firsts" in the history of state forest conservation.

The first forest tree nursery in Pennsylvania was established at Mont Alto in 1902, and has been in continuous operation since.

The first white pine plantation on State Forests was planted in 1902 on lands now occupied by the South Mountain Golf Course.

The District had the first wooden forest fire observation tower in 1905 and the first steel tower in 1914.

The first extensive tree planting and cultural work on state lands was concentrated in this area due to the location of the Forest Academy.

THE FOREST SITUATION. AS A RESULT, IN 1895 A DIVISION OF FORESTRY WAS CREATED WITHIN THE PENNSYLVANIA DEPARTMENT OF AGRICULTURE. IN 1897 LEGISLATIVE ACTION AUTHORIZED THE PURCHASE OF UNSEATED LANDS, THUS CREATING THE STATE FOREST SYSTEM. THE FIRST LAND PURCHASED UNDER THIS ACT WAS A 7500 ACRE TRACT ACQUIRED IN CLINTON COUNTY IN 1898. THE MICHAUX STATE FOREST, NAMED IN HONOR OF THE FRENCH BOTANIST ANDRE MICHAUX AND HIS SON FRANEOS MICHAUX, WAS CREATED UNDER THIS ACT.

THE FIRST LAND PURCHASE FOR THIS STATE FOREST WAS 558 ACRES ACQUIRED FROM JAMES DULL IN APRIL 1902. DURING THE SAME YEAR TWO MAJOR PURCHASES WERE MADE WHEN 17,935 ACRES WERE ACQUIRED FROM THE MONT ALTO IRON COMPANY, AND 13,704 ACRES BOUGHT FROM THE CALEDONIA MINING AND MANUFACTURING COMPANY. IN 1912, 16,864 ACRES IN THE PINE GROVE FURNACE AREA WERE PURCHASED FROM THE SOUTH MOUNTAIN MINING AND IRON COMPANY. 4,000 ACRES WERE OBTAINED FROM THE READING COMPANY IN 1931, AND 5,400 ACRES ACQUIRED IN 1932 FROM THE DEER PARK LAND COMPANY. SMALL PARCELS ACQUIRED FROM TIME TO TIME MADE-UP THE REMAINDER OF THE MICHAUX STATE FOREST.

THIS AREA DID NOT SUPPORT LARGE LUMBERING INTERESTS THAT EXISTED IN NORTHERN PENNSYLVANIA. HOWEVER, THE IRON COMPANIES USED THE LAND AS A SOURCE OF ORE AND A WOOD SUPPLY FOR CHARCOAL. BETWEEN 1780 AND 1900, WHEN THE FURNACES WERE IN OPERATION, THE FOREST WAS CUT TWO OR THREE TIMES FOR CHARCOAL WOOD. THE LOCATION OF MANY HEARTHES CAN STILL BE SEEN THROUGHOUT THE FOREST WHERE THE WOOD WAS STACKED AND FIRED TO MAKE CHARCOAL. THE IRON OPERATIONS BECAME UNECONOMICAL IN THE LATE 1800'S WHEN CHEAPER ORE WAS FOUND NEAR LAKE SUPERIOR, AND THE LAST FURNACE CLOSED NEAR THE END OF THE CENTURY.

FOREST
1012

THESE WAS THE SCENERY FOREST FIRES THAT... THE CONDITION OF THE EARLY FORESTS IS WELL-DOCUMENTED.
THE 1890'S THROUGH THE 1930'S... ACCORDING TO LUCY BRAUN'S DECIDUOUS FORESTS OF EASTERN
NORTH AMERICA ON THE NORTHERN END OF THE BLUE RIDGE THE "GENERAL
EXTREMELY SEVERE FOREST FIRES OCCURRED IN THE 1870'S, 1880'S,
ON RAVINE SLOPES BY A MIXED FOREST OF WHITE OAK, RED OAK, TULIP,
THE CUMBERLAND VALLEY TO THE... RAVINES OF HEMLOCK-WHITE
PINE COMMUNITIES".

WERE DESTROYED... ALSO; FROM THE EARLY 1900'S AN ARTICLE FROM THE PENNSYLVANIA
FORESTRY REPORT STATED, "THE ORIGINAL TIMBER HAD ALL BEEN
REMOVED BETWEEN 1870 AND 1885, AND THE YOUNG SECOND GROWTH WAS CUT
AS SOON AS IT BECAME LARGE ENOUGH TO MAKE A STICK".

HARRY B. PERRY, 86 YEAR OLD RETIRED FOREST FOREMAN WHO
STARTED EMPLOYMENT WITH THE DEPARTMENT IN 1906, STATES THAT BY THE
1890'S THE AREA HAD BEEN ALMOST COMPLETELY CUT-OFF AND HAD BEEN
REPEATEDLY BURNED OVER. AT THAT TIME THE ONLY TRACTS OF ORIGINAL
TIMBER REMAINING IN THE VICINITY OF CALEDONIA WERE TWO CONIFEROUS
STANDS;;ONE IN WHAT IS NOW CALEDONIA STATE PARK AND THE OTHER NEAR
THE GOLF COURSE ROAD.

FOLLOWING CUTTING OF THE ORIGINAL FOREST, A SECOND GROWTH
SEEDLING AND SPROUT FOREST BECAME ESTABLISHED. THIS SECOND GROWTH
FOREST WAS CUT WHEN THE TREES REACHED SUFFICIENT SIZE TO PRODUCE
CHARCOAL WOOD. THESE PRE-MATURE CUTTINGS PRODUCED THE LOW-QUALITY
SPROUT FOREST THAT IS PRESENT TODAY.

THE PREDOMINANT ORIGINAL FOREST TYPE; OAK-CHESTNUT DE-
VELOPED INTO A CHESTNUT, SCARLET OAK, ROCK OAK FOREST FOLLOWING THE
REPEATED CUTTINGS. THIS SECOND-GROWTH FOREST HAS BEEN SUBJECT TO
A SERIES OF CATASTROPHIC EVENTS SINCE ITS ORIGIN. THE FIRST OF
OAKS...

THESE WAS THE SEVERE FOREST FIRES THAT OCCURRED PERIODICALLY FROM THE 1890'S THROUGH THE 1930'S. THESE FIRES BURNED OVER MOST OF THE MOUNTAIN RANGE, WITH MUCH OF THE FOREST BEING REPEATEDLY BURNED. EXTREMELY SEVERE FOREST FIRES OCCURRED IN THE LATE 1800'S, IN 1910, 1915 AND 1930. THE 1915 FIRE COVERED THE ENTIRE MOUNTAIN RANGE FROM THE CUMBERLAND VALLEY TO THE BUCHANAN VALLEY IN THE PINE GROVE SPRING FURNACE AREA. IN THAT FIRE A NUMBER OF BUILDINGS AT LAUREL LAKE WERE DESTROYED. IN THE HEAVILY BURNED AREAS, SCRUB OAK REPLACED THE MORE VALUABLE OAKS AND CHESTNUT. THE NEXT MAJOR INFLUENCE WAS THE INVASION OF THE CHESTNUT BLIGHT IN 1911. BY 1920 THE BLIGHT HAD INFECTED EVERY LIVING CHESTNUT, LEAVING A GROSSLY UNDERSTOCKED FOREST OF PREDOMINANTLY SCARLET AND CHESTNUT OAK. BETWEEN 1920 AND 1930 DEER HAD A DETRIMENTAL EFFECT ON YOUNG TREE GROWTH. THE EMERGING FOREST PROVIDED EXCELLENT HABITAT FOR DEER, AND SINCE DOES WERE PROTECTED, THE HERD MULTIPLIED BEYOND THE RANGE CARRYING CAPACITY. NATURAL TREE REPRODUCTION DURING THIS PERIOD WAS OVER-BROWSED AND PLANTATION ESTABLISHMENTS WERE ALMOST TOTAL FAILURES. IN RECENT YEARS, WILDLIFE MANAGEMENT PRACTICES HAVE EFFECTIVELY CONTROLLED DEER POPULATION AND THEY ARE NO LONGER A PROBLEM. DURING THE PAST THREE DECADES THERE HAVE BEEN OTHER LESS SPECTACULAR, BUT STILL MAJOR DETRIMENTAL EVENTS AFFECTING THE FOREST. SPORADIC ATTACKS BY THE PIT-MAKING OAK SCALE HAVE SERIOUSLY AFFECTED, AND IN SOME CASES KILLED CHESTNUT OAKS. THE LAST SERIOUS SCALE DAMAGE OCCURRED IN THE EARLY 1950'S; KILLING MANY CHESTNUT OAKS AND LEAVING THE SURVIVORS STAG-HEADED AND UNHEALTHY.

DROUGHT YEARS OCCURRED IN 1930 AND THE PERIOD 1962-1966. THESE LATTER YEARS WERE THE DRIEST EVER RECORDED FOR THIS AREA, WITH PRECIPITATION DEFICIENCIES EXCEEDING 50 INCHES. IT IS SIGNIFICANT TO NOTE THAT IN CONTRAST TO EARLIER PERIODS, FIRE LOSSES DURING THESE YEARS WERE MINIMAL.

THE NARROW MOUNTAIN VALLEYS ARE SUSCEPTIBLE TO LATE SPRING FROSTS, AND FROSTS FREQUENTLY OCCUR AFTER LEAF-EMERGENCE IN MID-MAY. THESE LATE FROSTS RESULT IN TREE DEFOLIATION, CAUSING SLOW GROWTH RATES AND IN SOME CASES, MORTALITY.

UNDOUBTEDLY, WITHIN THE PAST 20 YEARS THE MOST DEVASTATING EVENTS THAT HAVE OCCURRED ON THE MICHAUX FOREST HAVE BEEN THE EPIDEMIC OUT-BREAKS OF VARIOUS DEFOLIATING INSECTS. LEAF-EATING INSECTS SUCH AS THE FOREST TENT CATERPILLAR, OAK LEAF ROLLERS, CANKERWORMS, OAK-LEAF TIER AND ORANGE-STRIPED OAK WORMS HAVE DEFOLIATED VAST AREAS OF THE FOREST.

DEFOLIATION BY THE FOREST TENT CATERPILLAR WAS WIDE-SPREAD THROUGHOUT THE FOREST IN THE MID-1950'S, AND WAS PARTICULARLY SEVERE IN THE OLD FORGE AND PINE GROVE FURNACE AREAS IN 1958, 1959 AND 1960.

THE ORANGE-STRIPED OAK WORM, ALONG WITH OTHER DEFOLIATORS HAVE CAUSED PERIODIC LATE SUMMER DEFOLIATIONS SINCE 1950.

A REVIEW OF THE PAST HISTORY OF THIS FOREST, COMMENCING WITH IMPROPER LAND-USE DURING THE LAST CENTURY CLEARLY INDICATES A CLASSIC CAUSE AND EFFECT SITUATION. REPEATED CUTTINGS, PARTICULARLY IN YOUNG STANDS, CREATED A LOW-QUALITY SPROUT-ORIGIN FOREST. EXTENSIVE FOREST FIRES FURTHER DETERIORATED THE FOREST BY ALTERING SPECIES COMPOSITION, AND GREATLY INCREASING DEFECT, ESPECIALLY HEART-ROTS.

THE CHESTNUT BLIGHT ELIMINATED A HIGHLY VALUABLE TREE SPECIES FROM THE FOREST. THIS BLIGHT RESULTED IN UNDER-STOCKED STANDS, AND EVENTUAL REPLACEMENT OF THE AMERICAN CHESTNUT BY INFERIOR SCARLET OAK AND CHESTNUT OAK.

THESE FORE-GOING EVENTS THAT OCCURRED OVER ONE-HALF CENTURY AGO, HAD A MAJOR LASTING EFFECT ON THE FOREST, AS THEY CREATED UN-NATURAL CONDITIONS AND ALTERED TREE SPECIES COMPOSITION.

THE MORE RECENT EVENTS, PARTICULARLY DEFOLIATION BY INSECTS, ALTHOUGH SEVERE, PROBABLY WOULD NOT HAVE BEEN AS CRITICAL IF THE TREES HAD NOT BEEN WEAKENED BY PAST FIRES, AND SPECIES COMPOSITION CHANGED BY THE CHESTNUT BLIGHT. IT IS IMPORTANT TO NOTE THAT THE SPECIES PRIMARILY EFFECTED BY RECENT EVENTS ARE SCARLET AND CHESTNUT OAKS, WHOSE ABUNDANCE WAS CREATED BY FIRE AND CHESTNUT BLIGHT.

THE CUMULATIVE EFFECTS OF THESE DETRIMENTAL INFLUENCES OVER THE PAST 150 YEARS HAVE PRODUCED THE PRESENT CONDITION OF "OAK DECLINE". THE MAJORITY OF THE SCARLET OAKS ON THE FOREST ARE IN SOME STATE OF DECLINE, RANGING FROM PARTIAL CROWN DIEBACK TO TOTAL MORTALITY. AT THE PRESENT TIME APPROXIMATELY 20,000 ACRES OF THE 80,000 ACRE MICHAUX STATE FOREST ARE AFFECTED TO SOME DEGREE. THE DETERIORATING CONDITION OF THE FOREST HAS RESULTED IN LARGE-SCALE SALVAGE OPERATIONS DURING THE PAST FEW YEARS. ANALYSES OF THE TREE REPRODUCTION RESULTING FROM THESE OPERATIONS INDICATE THAT THE FOREST OF THE FUTURE WILL BE VIGOROUS, HEALTHY AND HAVE HIGHER-QUALITY SPECIES COMPOSITION THAN THE PRESENT-DAY FOREST.

IN CLOSING IT SHOULD BE NOTED THAT NO OTHER STATE FOREST HAS BEEN SUBJECTED TO THE NUMBER OR DEGREE OF DETRIMENTAL INFLUENCES AS THE MICHAUX.

THE
MICHAUX FOREST



FORWARD

The people of Pennsylvania are today showing more interest in their State Forests and Parks than ever before.

It is hoped this report will answer some of the questions which are oft-times asked regarding the State Forest Lands, more specifically the Michaux Forest District.

R. L. Dolton,
District Forester

October - 1954

MICHAUX FOREST DISTRICT #1
PENNSYLVANIA DEPARTMENT OF FORESTS AND WATERS
FAYETTEVILLE - ROUTE #1, PA.

I - THE DISTRICT

The Michaux Forest District is located in almost the south-central portion of the State.

The southern boundary of the district is the "Mason-Dixon Line". The eastern boundary is the Susquehanna River and the northern and western boundary roughly follows U. S. Route #11 from Harrisburg to the Maryland line.

The Michaux District was named in honor of Andre Michaux and his son Francis Andre Michaux the well-known French botanists. Franklin, Adams, York and Cumberland Counties are within it's confines.

Near the western border of the district the beautiful South Mountains traverse the area from north to south. To the west of this ridge nestles the Cumberland Valley and to the east, the rich York valley. Elevations range from less than 200 feet along the Susquehanna River to better than 2000 feet in the South Mountains.

Many colorful local names given to the mountain area exist, such as Black Andy's Trail, Dead Woman's Hollow, Chimney Rocks and others have interesting stories connected with their names. Historians will find that many of the names have actual facts as to their basis.

The South Mountains and the surrounding area is dotted with springs and streams; this factor makes it ideal from the standpoint of fishing and timber growing. The normal summers have balmy days and cool evenings. The average annual temperature is 52.2° F., based on a yearly range. During the winter snow may be expected in November, December, January, February and March. Annual average precipitation is 38.34 inches. Winters are generally moderate.

FOREST AREAS

The Michaux District includes 2,788 square miles, or 1,759,232 acres.

(continued)

<u>COUNTY</u>	<u>TOTAL SQ. MIL.</u>	<u>AREA ACRES</u>	<u>NON- FOREST ACRES</u>	<u>FORESTED ACRES</u>	<u>% FORESTED</u>
Adams	526.0	336,640	233,822	102,818	30.5
Cumberland	554.5	354,880	247,104	107,776	69.6
Franklin	754.3	482,722	294,340	188,412	39.0
York	914.0	584,930	426,445	158,515	27.1
	<u>2748.8</u>	<u>1,759,332</u>	<u>1,201,711</u>	<u>557,210</u>	<u>31.7</u>

Good roads interlace the district, U.S. #30 cutting the state forest east and west. State Road #233 winds through the forest from Route #11 to the north, south to U.S.30.

Forest roads are very driveable and kept well maintained.

Airports are located at Chambersburg and York with various other air strips.

POPULATION - 1950

	<u>TOTAL</u>	<u>PER SQ. MILE</u>
Adams	44,197	84.0
Cumberland	94,457	170.2
Franklin	75,927	100.7
York	202,737	221.8

FOREST INDUSTRIES

Large scale logging is no longer a forest industry. There are many sawmill operators throughout the four county area, however, who are dependent upon the forest land for raw materials.

The majority of these mills cut between 100,000 to 200,000 board feet per year and there are approximately 70 such mills.

A century ago the forests were cut heavily for the charcoal industry to feed the iron furnaces in this section.

Two paperwood industries are located within the District.

FOREST DESCRIPTION

In the treatment of the forest description we will be principally concerned with that growing on State Forest Land. By so doing, practically all of the timber types within the district will also be covered.

As early as 1790 iron furnaces were in operation and charcoal was very much in demand. As a result the forests were cut over and cut over hard.

Early foresters made note that the majority of the land was lumbered between 1870 and 1885 and then as they so aptly put it "cut over just as soon as a sprout would make a stick of wood".

The forests at that time must have been a depressing sight to foresters. No effort had been made to preserve or protect the woodland. Fire had ravaged the land so often that in many places only scrub oak and fire-scarred pitch pine were present.

The present forests of the Michaux District are principally hardwoods, often designated as the Oak Region. This term is often misleading inasmuch as other species beside oak are present and in some areas are predominant. Some few of the species are white pine, hemlock, tulip poplar, ash and red maple.

The oaks include white, red, black, scarlet and chestnut oak; these being the most common.

The Michaux District is in reality a meeting ground for both the northern species and the southern species. One area is composed of sugar maple, beech and birch, exemplifying the northern type. In the southern part of the district short-leaf pine represents a southern species.

On the state forest land there is an estimated saw-timber volume of 82,682,000 board feet and 39,663,004 cubic feet. The component parts of this are listed below.

<u>STAND CLASS</u>	<u>AREA</u> <u>(ACRES)</u>	<u>GROSS VOLUME</u>	
		<u>M. BD. FT.</u>	<u>CU. FT.</u>
Sawtimber	9,189	57,503	5,578,900
Poletimber	49,737	24,402	33,920,900
Plantations	<u>504</u>	<u>777</u>	<u>163,240</u>
TOTALS	59,480	82,682	39,663,040

TREE FARM SYSTEM

The tree farm program is one which started first in the Pacific Northwest after World War II. Since its invention it has spread throughout the length and breadth of the land.

Much in the past has been accomplished by governmental agencies in relation to forestry. The tree farm system is a very encouraging trend as it shows a healthy interest in the part of the private individual to treat his woodland with care.

A forest land owner in order to have his woodland certified as a Tree Farm must follow approved forestry practices. These include protecting his forest from fire and grazing. Approved practices are also followed on harvest and improvement cuttings with the view of assuring a continuous timber supply.

Within the Michaux Forest District there are eighteen certified Tree Farms embracing a total of 4477 acres.

II - ADMINISTRATION OF FOREST DISTRICT

The Department of Forests and Waters, by law, is charged with the administration of all State Forest Lands.

Authorization is also provided the Department to assist private forest owners in protection of their woodland from fire, disease and insects. Assistance and advice is regards to tree planting and woodland management is also given.

FIRE CONTROL

Fire control is probably the most important factor in regards to administration. Without fire control other administrative activities such as management, recreation, etc., would not be possible.

All forest land, both State and private, within the district are afforded fire protection. This, however, does not release the private land owner of his responsibility to protect his own property.

The organization and maintenance of a fire control system and fire fighting organization is the direct responsibility of the District Forester. He is aided in this work by the Assistant Foresters, the Fire Inspector, Forest Rangers, Park Foremen and the volunteer Fire Wardens.

The Volunteer Fire Warden with his crew is actually one of the most important cogs of the fire control system. Too much praise cannot be given to these men. They are equipped with State fire fighting tools, however, they serve without pay except when actually engaged in fighting forest fire. Fire Wardens stand ready to combat fire either independently or when called by the district. Fire crews are usually composed of from ten to twenty men.

Detection of fires is primarily handled by fire towers of which there are five in our district. A few individuals strategically located adjacent to the forest also report fires.

District Towers are listed below:

<u>NAME OF TOWER</u>	<u>HEIGHT</u>	<u>COUNTY</u>	<u>ELEVATION</u>	<u>LOCATION</u>
Snowy Mountain	85'	Franklin	1900'	Snowy Mountain
Mount Dunlap	65'	Franklin	1700'	Mount Dunlap
Big Flat	65'	Cumberland	1960'	Atop Big Flat, 4 mi. North inter- section of Shippensburg & Ridge Roads
Bandana	65'	York	860'	Hanover Water- Shed

Towers in the Michaux District are normally manned from four to six months of the year.

There are 60 active Fire Wardens with organized crews within the District.

FOREST FIRE RECORDS - DISTRICT BASIS - 10 YEAR PERIOD-1944-53.

No. of fires.....	159
Area Burned.....	2,299 Acres
Average Acre Per Fire.....	14.46
<u>CAUSES: No. of Fires</u>	
Railroads.....	23
Brush Burning.....	22
Incendiary.....	41
Transient.....	31
Unknown.....	10
Miscellaneous.....	30

The fires listed above occurred on both private and State Forest Land.

Averages on State Forest Land would normally run lower, both from the standpoint of number of fires and acreage burned.

I feel this is due not only to constant vigilance on the part of the fire-fighting organization, but due to the fact that the general public is becoming more fire conscious. Even though there is an ever-increasing heavy use on the forests by the general public, fires as a rule are diminishing. The people are certainly to be congratulated for their care. Their efforts are going a long way in helping to combat the fire problem.

FOREST FIRE HAZARDS

The greatest Forest Fire hazard existing today within the Michaux District are the unattended dumps adjacent to forest land.

These dumps as long as they exist will constitute a direct menace to our timberlands.

On State Forest Land, brush resulting from logging operations must be lopped and kept back from the roads 50 feet.

Areas of high risk have been broken down into smaller areas by means of bull-dozed fire lines. This makes these areas more accessible and makes it possible to stop fires that may occur before they develop into large, hard-to-control fires.

REFORESTATION

Practically all of the State Forest Land within the Michaux District suitable for reforestation has been planted. At the present time reforestation within the district is carried on by private planters.

During the spring and fall of 1952 and the spring of 1953 private planters within the Michaux Forest District planted 968,540 forest trees. A tabulation of the plantings by counties is listed below:

<u>NO. OF TREES PLANTED</u>	<u>COUNTY</u>
1952 (Spring and Fall)	
237,550	Adams
31,225	Cumberland
44,915	Franklin
208,000	York
1953 (Spring)	
144,075	Adams
72,500	Cumberland
29,950	Franklin
201,325	York

It is the endeavor of the Department of Forests and Waters to constantly improve on the quality of planting stock shipped to planters. Better nursery practices and the establishment of excellent seed sources are just two of the methods to obtain the goal.

Trees for reforestation purposes are available at cost; for information and order forms contact the nearest District Forester.

III - THE MICHAUX AND MONT ALTO STATE FOREST

The State Forests as we know them today had their inception back in 1895 under an act that empowered the State to acquire land and that the land be for the production of wood, protection of watersheds, safe-guarding water supplies, regulating stream flow, promoting health and providing outdoor recreation. By 1899, the State owned for the purposes of forest preservation 19,604 acres. Today State Forest Lands total over 1-3/4 million acres.

The bill creating the Department of Forestry became law on February 25, 1901.

Originally the area now known as the Michaux District was designated at the South Mountain Reservation.

The Michaux Forest District is comprised of the Michaux State Forest and the Mont Alto State Forest. At one time these were handled as individual units. Administratively, it has proven more practical to unite these two forests into one unit.

The earliest report from a forester's standpoint was made in 1902 by Mr. George H. Wirt, then Forester for the area. Mr. Wirt at that time noted the devastation which had been wrought by lumbering and uncontrolled fires.

DEVELOPMENT

The early foresters were faced with an enormous task. This included not only protecting the area under their charge but also developing the forest to the extent it could be utilized by the public and forestry practice. It was also necessary to break down life-long erroneous traditions regarding burning the forest lands; to prove that it was better to care for them than to wantonly burn and cut them.

Roads were one of the first developments and these often followed the old charcoal hauler's roads.

Due to limited funds and personnel, accomplishments were at times slow. Continued work and effort have finally brought the facilities listed below to the Michaux District:-

Macadam Roads.....	5.7	Miles
Improved Earth Roads.....	203.88	"
Woods Roads.....	12.80	"
Foot Trails.....	282.06	"
Boundary Lines.....	202.70	"
State Forest Parks.....	4	
Leased Cabin Sites.....	513	
Ranger Stations.....	6	
Fire Towers.....	5	

RECREATION - PARKS, PICNIC AREAS

One phase of forest use that is coming more and more to the front is that of recreation. Every year more and more people are turning to the outdoors for recreation and relaxation. A conservative estimate of the number of persons visiting the State Parks within this district was placed at 500,000.

Recreational areas within the Michaux and Mont Alto State Forests are as follows:

PINE GROVE FURNACE STATE PARK:

Located in a beautiful setting on the site of the Old Iron Furnaces, Pine Grove Furnace is composed of two areas; Laurel Lake and Fuller Lake.

Laurel Lake affords picnicking, hiking and swimming. Swimming in the Lake and sunbathing on the beach are popular activities with summer visitors.

Fuller Lake is located approximately two miles southwest of Laurel Lake and has in addition to picnicking and swimming, tenting facilities. Located at Pine Grove Furnace is the remains of one of the old iron furnace stacks. In this area are many reminders of the days when the making of "pig iron" was a thriving industry.

CALEDONIA STATE PARK:

This Park named after the old charcoal iron furnace operated by Thaddeus Stevens is located on Route #30, approximately midway between Chambersburg and the historic Gettysburg Battlefield.

Caledonia park provides picnicking, hiking and swimming for the enjoyment of the public. The swimming pool is owned and operated by the Department of Forests and Waters.

Facilities have been developed for both tent and trailer camping.

A golf course is situated within the park area, as is Graeffenburg Inn. Graeffenburg Inn is one of the oldest and most famous Inns on the Lincoln Highway. The Inn has been in continuous operation for over 150 years.

MONT ALTO PARK:

This park was developed in the 1880's by Colonel George B. Wiestling and later was operated by the Cumberland Valley Railroad Company. The park area was acquired when the Commonwealth purchased the holdings of the Mont Alto Iron Co.

The beautiful grove here contains tables and fire-places for picnicking.

OLD FORGE PICNIC AREA:

The Old Forge is the site of what once was an iron forge and rolling mill where crude pig iron was manufactured into articles of domestic use.

Picnicking facilities are available within this area.

MT. PISGAH STATE PARK;

This park at present is designated as Mt. Pisgah. Located in York County in the proximity of Wrightsville, a beautiful view is afforded of the York Valley and Susquehanna River.

At the present time the area is open to picnicking and it is hoped that in the near future an observation tower will be available.

The land for this park was donated to the Commonwealth by Mr. S. S. Lewis, present Secretary of the Department of Forests and Waters.

The majority of the parks afford excellent trout fishing in the nearby streams.

Both small game and deer hunting attract visitors during the open seasons.

STATE FOREST PRODUCTS AND INCOME

When the State Forests were first acquired they returned very little to the Commonwealth in regards to a monetary value. This was, of course, due to the fact that the State Forests in many cases had been so badly overcut and recreation facilities had not as yet been developed.

Now due to proper forest management measures, the forests are again being harvested under correct cutting practices. Rights-of-way, minerals, camping fees, and leased camp site rentals are additional sources of income from the forests.

Below is a record of receipts for 1952/53 from the Michaux District:

	<u>1952</u>	<u>1953</u>
Timber.....	\$ 7,634.10	\$17,846.65
Pulp and Fuelwood.....	1,799.82	2,162.66
Other wood products....	312.98	352.78
Minerals.....	41.45	10.50
Tenters.....	2,743.10	2,855.75

(Continued)

Receipts for 1952 and 1953 continued:

	<u>1952</u>	<u>1953</u>
Camp Site Leases.....	\$ 6,745.00	\$ 6,880.44
Rights-of-way.....	1,466.81	1,630.70
Building Rentals.....	2,198.00	3,144.00
Swimming Pool.....	<u>8,159.30</u>	<u>8,711.90</u>
TOTALS...	\$31,080.56	\$43,585.38

During the year 1953 other receipts such as nursery sales, etc., along with those listed above returned to the Commonwealth in excess of \$66,000.00.

All cottages which are privately owned but located on State Forest Land pay taxes to the township in which they are located. In addition, the Department pays annually to the townships the sum of seven and one-half cents per acre for each acre of state land within the township. These monies are to be used for schools, roads and county expenses.

ADMINISTRATION OF STATE FOREST

The State Forests are under the direct supervision of the District Forester. The policies under which the forests are administered are set forth by the Secretary of the Department.

Lending assistance to the District Forester within the Michaux District are two Assistant Foresters and six Forest Rangers.

The forest is divided into six Ranger Divisions; the supervision of work within each division being charged to the Ranger of that Division.

Some of the Ranger's responsibilities are:

1. Maintenance and construction of roads, trails and boundary lines.
2. Reforestation plantings, when needed.
3. Supervision and sale of dead wood and other forest products within their district.
4. Suppression and prevention of forest fires.
5. Rendering assistance to foresters on timber sale areas.
6. Supplying information to hunters, tourists, fishermen and other visitors to the forest.

(continued)

Ranger duties continued:

7. Supervision of job projects carried out on the State Forest.
8. The work of seeing that State Forest rules and regulations are not violated.
9. Carrying out protection work against forest enemies, such as insects and fungus.

The Forest Rangers are the mainstay of the District Forester to see that the forest work is carried through to it's completion.

THINGS TO SEE

Beside the recreational facilities and hiking trails there are many interesting and educational points of interest within the forest.

MONT ALTO FOREST TREE NURSERY:

Here are grown the tiny seedlings which are used to replant, cut-over areas, land suitable only for forest growth and other plantings throughout the Commonwealth.

Established in 1902, this nursery was the beginning of practical forestry on this forest.

The nursery today covers twelve and one-half acres, affording the opportunity to see how forest tree seedlings are grown.

THE ARBORETUM:

The Arboretum was started in 1903 by the planting of trees not native to this region. The 1947 catalog lists 157 genera and 551 species and varieties of woody plants foreign to Pennsylvania growing thriftily and representing north temperate species from all over the world.

The Arboretum is maintained by the Division of Research.

THE PENNSYLVANIA STATE FOREST SCHOOL:

This school for many years called The Pennsylvania State Forest Academy was among the first forest schools established in the United States. Authorized by legislative enactment in 1903 to supply the urgent need for technically trained foresters for increasing areas of State Forest administered by the Commonwealth.

The present school resulted from a merger on June 15, 1929 of the Pennsylvania State Forest School at Mont Alto and the Forest School at State College. Now a part of Pennsylvania State University, students take the freshman course at Mont Alto, then go to the State University for the sophomore, junior and senior years.

In addition to well-equipped buildings, the Michaux and Mont Alto forests offer excellent opportunities for the study and practice of forestry in the woods.

CHIMNEY ROCKS:

These rocks, piled one upon the other in rugged splendor afford a beautiful view of the Antietam Valley to the east and south. To the north is a panoramic view along Green Ridge which is hard to surpass. This lookout may be reached from Snowy Mountain fire tower by traveling southeast along the Appalachian Trail to the end of the road. A short hike of .3 mile brings you to the lookout post.

The Mont Alto and Michaux State Forests are the sites of many growth study plots in white pine, rock oak, black walnut, mixed hardwoods and other species. These plots are measured every five years by Division of Research Foresters.

There are many experimental plantings and plantations to see. One of the most famous of the plantations is the white pine planting adjacent to Route #30 in Caledonia Park. This plantation was established in 1906 and 1907. White pine in this plantation range in diameter from 6.0 to 11.2 inches diameter breast high. Average diameter is 8.3. Heights range from 49.8 feet to 68.0 feet, average 61.4 feet. Measurements based on 1948 data.

One timber sale operation, designated as the Smith Sale, is near completion and two more sales are under way.

These sale areas are good examples of proper cutting practices on State Forest Land. The Smith Sale involved 550 acres of State Forest Land and 1,474,000 board feet of timber was designated for cutting. Each individual tree was appraised on its own value and on its relationship to its neighbor by a forester before it was marked for cutting.

There are Game Refuges within the Michaux District where game of all kinds can live unmolested from mankind. In addition, the State Parks act as game sanctuaries as hunting is prohibited within their confines.

IV - FORESTRY PROBLEMS

Many problems concerning our forests have been solved by foresters since the inception of the Forestry Department as such.

There are today problems which have come down through the years such as Chestnut Blight, in addition there are relatively new ones such as Oak Wilt. The latter disease we feel, though a serious one, is and will be combatted by foresters to the point where it should not reach epidemic proportions in Pennsylvania. Within the Michaux District, Oak Wilt has up to the present time been stopped in it's spread.

Forest fires will always remain a problem until the day comes that not one single acre of forest land is burned. Vast strides have been made in both prevention and suppression, however, there is still too much timber being burned needlessly. The public has been fine in it's cooperation to cut the forest fire loss, but there are still too many persons careless with fire.

Insects and pathological diseases are a constant problem in the forest. Foresters must at all times be on the lookout for attacks in order to be able to inaugurate control measures in time.

Forests must have proper management, especially on private lands. Foresters must "sell" forestry to private land owners.

Steady markets must be found for the products our forests yield. Not only is this important from the standpoints of supplying an outlet for the forests as they are harvested, but also to assure forest workers a steady income from their labors.

The overall problem of the forester is to see that the forests produce the safest maximum yield of timber crops, not only from the standpoint of volume produced but also high quality volume. One must provide within the forest a program to maintain healthful recreational facilities, to the fisherman, hunter, nature lover and all other visitors, whether picnickers or those who just like to visit the forest.

V - FOREST MANAGEMENT

The Michaux Forest District was the first to have it's Management Plan completed. In August, 1951 the District Office received it's completed plan. Initial steps were taken to put the plan into action and the forest has been under management since that time. The objective of the plan is to:

(continued)

FOREST MANAGEMENT - Continued

- (a) Maintain adequate watershed cover on the State Forests at all times.
- (b) Utilize methods of harvesting the timber in such a manner as to maintain a correct balance between growth and allowable cut, after the maximum yields per acre have been obtained.
- (c) To improve through cultural methods the quantity and quality of our present timber stands.
- (d) Promote stability of employment of those persons engaged in harvesting forest products.
- (e) To afford sufficient food and cover for wildlife.

The present sawtimber volume in sawtimber stands is 57,503,000 board feet. Present total volume in pole timber stands is 40,997,300 cubic feet. Under management, the plans call for an allowable cut during the 1951-1959 period of 13,539,000 board feet and 10,372,500 cubic feet. Under this type of cutting the volume in sawtimber stands should increase to 72,435,000 board feet and the volume in pole timber stands to increase to 51,480,000 cubic feet by 1960.

Cuttings must be regulated in such a way that a normal or optimum volume of healthy vigorous trees is attained. After this condition has been reached then the greatest possible amounts of the most desirable timber will be continually grown for harvest.

PRIVATE WOODLAND MANAGEMENT

One of the most important phases of forest management today is that of the privately-owned forests.

The majority of the forested land in Pennsylvania and in the United States is at the present time in the hands of private owners.

The degree of forest management applied to these private woodlands ranges from very poor to fair. Many forest land owners in the past have not treated their woodland as a continuous crop, but rather the forest land was cut in such a manner as to yield the most money per acre. Little thought was given to the future. As a result, there are many sub-marginal woodlands, composed of species of poor form and low commercial value. In addition, there are many acres of young pole-size timber. These sub-marginal areas must be converted to productive areas through the medium of cultural measures. Many of the young pole stands must be thinned if they are to produce the maximum quality yield in the future.

After this condition has been reached then the greatest possible amounts of the most desirable timber will be continually grown for harvest.

All too often private woodland owners are not familiar with the technical aspects of the measures which should be applied to their woodland. The Pennsylvania Department of Forests and Waters recognized this situation. Foresters of the Department offer technical advice as to the best form of management for a particular woodland. Where needed, limited field assistance is also given.

Owners wishing information or assistance regarding planting or woodland problems should contact their local District Forester.

Private woodland owners are becoming more and more conscious of the fact that their woodlands are a valuable asset, to be treated like other crops, and to look to their woodlands for additional income. In time it is hoped that every acre of private forest land, through the owners' efforts, will be under some form of forest management.

CONCLUSION

This booklet has merely scratched the surface of the activities within a forest district. It is hoped that it will serve to point out some of the benefits which the forests of Pennsylvania afford the people of the Commonwealth.

Timber for homes, forest products for the nation, conservation of water, food and cover for wildlife, rest and recreation for all - these are our forests, let's take care of our heritage, "LET'S KEEP PENNSYLVANIA GREEN".

PERSONNEL

September - 1954

District Office - Fayetteville, Route #1, Penna.
Telephone - Fayetteville 42-J

R. L. Dolton - District Forester
John F. Ewers - Assistant Forester
Jacob F. Wagner - Assistant Forester
Martha E. Shearer - Senior Stenographer-Clerk

FOREST RANGERS -

George E. Hartzell - Fayetteville, Penna.
William U. Verdier - Mont Alto, Penna.
David N. Perry - Route #2, Shippensburg, Penna.
Harold H. High - Old Forge, R.#4, Waynesboro, Penna.
Raymond Hockley - Pine Grove, R. #2, Gardners, Penna.
Ivan K. Gulden - Caledonia - R.#2, Orrtanna, Penna.

FOREST FIRE INSPECTOR -

Donald B. Hall - Route #1, Orrtanna, Penna.

TOWERMEN

Norman Wagaman - Snowy Mountain Fire Tower
Samuel R. Frampton - Mount Dunlap Fire Tower
Russell A. Heller - Big Flat Fire Tower
Paul E. Little - Bandana Fire Tower

STATE FOREST PARKS AND PICNIC AREAS

Caledonia - Austin Minnick, Foreman
Pine Grove Furnace - Raymond Hockley, Ranger
Mont Alto - William U. Verdier, Ranger
Old Forge - Harold C. High, Ranger
Mt. Pisgah - Merle Smeltzer, Foreman

SMOKE ENDS ARE
BURNING CAREFULLY
FIRE

THE MONT ALTO FOREST TREE NURSERY

INTRODUCTION

THE Mont Alto Forest Tree Nursery is one of the pioneer forest tree nurseries of the United States. It was established in 1902 by George H. Wirt, who was the first and, at that time, the only technically trained forester in the State forest service of Pennsylvania.

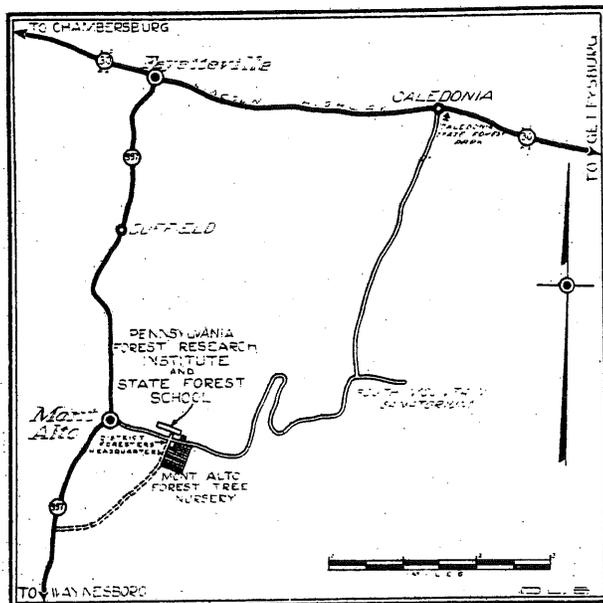
Immediately after the nursery site was selected, enough ground was plowed and harrowed for the laying out of 36 seeds beds, each four feet wide by 79 feet long. The first seed (white pine) was sown on April 28, 1902. In the Spring of 1903, the first trees—1,600 two-year-old transplants—were removed from the nursery for reforestation purposes. They were planted in "The Monaghan Field" on the Mont Alto State Forest, near the present location of the South Mountain State Sanitorium. The next year (1904) a total of 7,700 trees was taken from the nursery, and in 1905 the number shipped increased to 15,000. During the first five years (1903-1907), the output of the nursery totalled 97,281 trees. The total output was increased to more than 2,000,000 seedlings and transplants during the second five-year period (1908-1912).

The purpose in establishing the Mont Alto Nursery is recorded in numerous printed and unpublished reports. These reports show a twofold purpose: first, to help reforest the extensive waste lands in the Commonwealth; and second, to furnish private forest landowners with planting stock, free of charge, or at a nominal cost (40, 41, 42, 44). In a large measure, this early vision of possible services and benefits has already been realized.

A review of the records of the Mont Alto Nursery shows a rapid and regular increase in production. From a very modest beginning in 1903, when only 1,600 trees were lifted from the nursery beds, the output has increased, until during the last five years (1925-1929) from two to four million trees have been shipped each year. In the 27 years that this nursery has been in operation, more than 35,000,000 seedlings and transplants have been grown and distributed for reforestation purposes in all sections of Pennsylvania.

WHERE MONT ALTO NURSERY IS LOCATED

The Mont Alto Nursery is located on the northwestern slope of the South Mountains, in Franklin County, Pennsylvania. It is approximately six miles northeast of Waynesboro and 12 miles south of Chambersburg, in the well-known South Mountain fruit belt. This location is unusually well adapted to nursery work because of the general climate, the long growing season, and the protection afforded by the neighboring forest-covered mountains.



Location of the Mont Alto Forest Tree Nursery

The annual rainfall in this region averages about 39 inches. The mean temperature is 52° F. The average date of the last killing frost is the first of May, whereas the first killing frost in fall does not occur, on the average, until October 12. These figures, however, do not picture the full advantages of the location of the Mont Alto Nursery. In spring, it is usually possible to begin the work of lifting trees from the beds as early as March. Ofttimes it is not necessary to mulch the trees for winter protection before Thanksgiving Day, and sometimes not before Christmas. The rainfall is fairly evenly distributed throughout the year, and long droughts are infrequent.

The Mont Alto Nursery is easily reached by following a concrete road that branches from the Lincoln Highway at Fayetteville, and runs to the village of Mont Alto. An improved road, leading from that village, passes the nursery, goes through the Mont Alto State Forest, and climbs the mountain to the Mont Alto State Sanatorium. Near the nursery is the State Forest School, which is a branch of Pennsylvania State College. Here, too, is the Pennsylvania Forest Research Institute of the Department of Forests and Waters.

HOW THE NURSERY WAS STARTED

In 1902, George H. Wirt, the first professional forester in the State forest service of Pennsylvania, was sent to Mont Alto to start forest work. His first task was the establishment of the Mont Alto Forest Tree Nursery (1, 21, 41, 42). Immediately after the nursery site was selected, the ground was plowed, harrowed, and laid out in 36 seed beds, each four feet wide by 79 feet long. Six pounds of white pine seed were purchased at \$2 a pound, and 10,000 one-year-old white pine seedlings at \$4 a thousand. On April 28, 1902, the first seed was sown. The sowing was done by Augustus Varnicle, a local blacksmith, who had expressed doubt that white pine trees ever grew from seed. In one bed a pound and a half of seed was sown broadcast. The remainder of the seed was sown in drills across the beds. The 10,000 white pine seedlings were dibbled in and placed in rows across the beds.

The first summer was hot and dry. Billets of wood were placed between the drills to conserve moisture. Water was carried from the nearby creek and applied to the trees with sprinkling cans. Shades were made of woven wire fence, cut into lengths of 10 to 12 feet, to which were nailed one-half-inch by two-inch laths. Some of these old screens were in use more than 25 years. Although 5,500 of the transplants survived, losses were excessive, and the germination of the seed was unsatisfactory.

On September 3, 1902, William Daywalt, a farmer who lived on the nearby mountain, delivered a wagon load of white pine cones. There were 56 bushels in the load. From these cones 41 pounds of seed were obtained. Mr. Daywalt also delivered one-half bushel of white oak acorns for \$1.50. Twenty pounds of seed were bought and sown in the Fall of 1902, and 20 additional pounds of native seed were sown in the Spring of 1903. These were the first sowings of forest tree seeds in the State nurseries of Pennsylvania. In addition to this seed sowing in the nursery, extensive plantings of chestnuts, to be exact, 2,436 hills, were made in the Mont Alto Forest by Forest Ranger Ford Sylvester in November, 1902.

In 1903 the Pennsylvania State Forest School was started at Mont

Immediately thereafter the size of the nursery was increased. Most of the work in the nursery was done by students as a part of their regular course of studies. The nursery formed an integral part of the school, and, together with the Mont Alto Forest, was a centre for work in silvical research and practicum. Table I on page 51 lists all the foresters who have been in direct charge of the Mont Alto Nursery since its establishment in 1902.

GROUND PLAN OF NURSERY

For many years the layout or ground plan of the Mont Alto Forest Tree Nursery was arranged primarily to facilitate hand labor. It was blocked off into sections of about one half of an acre or slightly larger in size. These sections were subdivided into beds four feet wide by 25 feet long, and the resultant standard bed of 100 square feet has always been used as a unit for seed sowing, bookkeeping, and management purposes (39). With the increased use of horse and motor-drawn implements, along with transportation by truck, it is no longer advantageous to have the ground subdivided in this manner. Beds are now laid out in greater lengths, thus reducing to a considerable extent unnecessary turning with trucks and implements.

When lands are irrigated, fertilized, and cultivated intensively for the production of a valuable crop, excessive waste spaces between production areas are a liability. At Mont Alto an effort has been made to reduce the amount of "path area" to a minimum. This reduction of space given up to paths has led to a considerable reduction in the cost of weeding and general management expenses.

SOURCES AND COLLECTION OF FOREST TREE SEED

At the start of the Mont Alto Nursery, some seed was collected locally and some was purchased (11, 11, 17). In later years, considerable quantities of seed were purchased from seed-collecting stations that were started in the Lakes States and in New England. Even today a large portion of the seed used at Mont Alto is necessarily purchased from sources outside of the State. Especially is this true of evergreen tree seed, such as the pines and the spruces. These trees the uncertain seed producers. With them, a year of plentiful seed production is usually followed by several years of scanty seed production. Hence, only those regions where there are still large stands of mature timber can be depended upon for regular supplies of seed.

It is now generally known that the best seed to plant in any given region is seed produced by trees within that region. Through heredity, such seed produces trees that are adapted to the climate of the region. Hence, these trees usually make better timber than do trees

grown from seed procured in foreign countries. It is, therefore, the practice in the operation of the State nurseries of Pennsylvania to secure as much seed as possible from sources within the Commonwealth. In the case of the hardwoods, it has been easy to secure ample supplies. Walnut, oak, maple, and ash trees seed frequently, and the seed is easily collected. As early as the Winter of 1903-1904, seed of the black locust was gathered about Mont Alto and sown in the Spring of 1904. In 1906 approximately 37 bushels of walnuts were gathered. Some of the oldest plantations in the State, such as those in the vicinity of Mont Alto and the Caledonia State Forest Park, were made by planting seedlings grown in the Mont Alto Nursery from local seed.

The fine stands of natural white pine in Mont Alto Park and on the flats near New Baltimore were recognized, even at the time the nursery was started, as possible sources of good seed. In 1902, 65 bushels of white pine cones were gathered, and cones have been collected from the trees in these stands every seed year since that time.

On the occasion of that first seed harvest in 1902, the collected cones were laid on a tight attic floor to dry, and the seed was then shaken out. In 1905, 50 bushels of cones were gathered, yielding 37 pounds of cleaned seed. That year a seed-drying establishment, with a capacity of 50 bushels, was equipped in an old brick building (19). The equipment consisted of several tiers of hardwood lath trays, with muslin trays at the bottom to catch the seed as they were shaken out. The handling of seed in this special manner is probably the very first instance of such practice by any state.

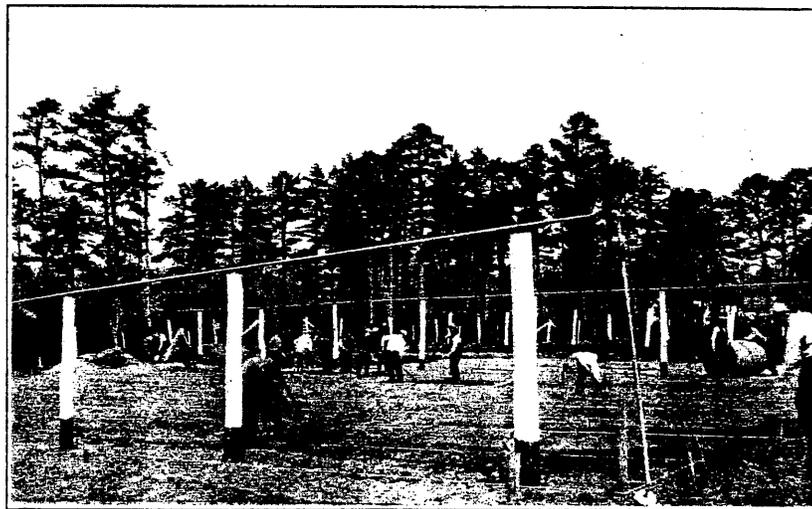
To facilitate the practice of securing home-grown seed for the nursery, special plots, known as seed supply stations, have been set apart in various forest plantations in the near-by forests. These plots are tended primarily for seed production, and the trees kept under close observation. Thus, it will be possible to secure additional quantities of native seed as soon as these plantations have reached seed-bearing age. The first of these special seed supply stations was established in 1927 by State Forester Joseph S. Illick in a plantation of Scotch pine in the Mont Alto State Forest, and in a natural stand of white pine near the Greenwood Forest Tree Nursery, in Huntingdon County.

HOW SEED IS SOWN IN NURSERY BEDS

The seed of most trees, especially that of evergreens, is very tiny. This necessitates the careful preparation of the soil before the seed is sown. At Mont Alto the practice is to plow the soil as deeply as possible, and then pulverize it by dragging and harrowing. The next step is to throw up seed beds by using a "middle-buster" plow. (See

illustration, page 30). This implement is like those used in the South for ridge-plowing sweet potatoes. By the use of this plow a great economy in labor is effected. For many years it was the practice to do this work by hand-spading.

After the beds are thrown up in the rough, they are marked out by stakes and twine, and then smoothed off by hand-raking. The raking is a very important operation. It is done thoroughly, all lumps and stones are removed, and the surface of the bed made as fine and smooth as that of a well-cared-for vegetable garden. The beds are finished with a slightly convex surface to facilitate drainage. They are raked to a width of slightly more than four feet, so that, even after the edges have been worn away, the seeded bed will still be a full four



Nursery Crew Preparing Beds for the Sowing of Seed

feet in width. These beds are raised about four inches higher than the paths that separate them. The paths themselves are 18 inches wide. These 18-inch strips include the unsown edges of the beds.

The practice of making seed beds in this exact and precise manner has been adopted after much experimentation. Beds and paths of varying widths have been tried. For many years, beds 25 feet in length were used, with wide paths across the ends. These wide paths proved to be unnecessary and were an actual hindrance to the use of labor-saving devices. When beds of other widths were used, they were found to be wasteful, for sometimes hardly 50 per cent of the area of the beds contained seedlings. Under the present practice, beds may be as long as the sections in which they are located, but they are seeded in strips 50 feet long. Spaces one foot wide are left bare between these 50-foot seeded strips.

SURVIVAL OF TREES WITH ROOT EXPOSURE OF VARIABLE LENGTHS

LENGTH OF EXPOSURE (Minutes)	NUMBER OF TREES PLANTED (April 4 and 5)	NUMBER OF TREES SURVIVING (August 2)
None (Check)	100	89
10	100	83
20	100	92
40	100	82
60	100	66
90	100	30
120	100	36
180	100	3
240	100	4
360 (6 hours)	100	4

GROWTH OF THE MONT ALTO NURSERY

The original area of the Mont Alto Nursery in 1902 was about one fourth of an acre of bed surface. From this small area the size of the nursery increased steadily. The early additions were made by demolishing dilapidated houses and fences, and improving the grounds about the original nursery site. By 1910 all the cleared land owned by the State south of the old Mont Alto Furnace site was occupied by nursery beds. This made a nursery area of approximately 10 acres. In 1924 the area of the nursery was temporarily expanded by adding to it about two acres of old orchard land, located north of the State Forest School campus. This soil was stony and unsuited for nursery use, hence it was abandoned in 1926.

In the Autumn of 1929, a tract of land lying west of the original nursery was bought for nursery use. An area of two and one-half acres was immediately broken and worked into shape for seeding in the Fall of 1930. This site is well located for irrigation and nursery management.

Tables II to VII in the Appendix give some records of the expansion of the Mont Alto Nursery in terms of the increased number of trees grown. The following table gives the number of trees shipped by years from the Mont Alto Nursery, from its beginning in 1902 to 1929:

TREES SHIPPED FROM MONT ALTO FOREST TREE NURSERY

YEAR	NUMBER OF TREES SHIPPED
1903	1,600
1904	7,700
1905	15,000
1906	51,051
1907	21,930
1908	98,286

YEAR	NUMBER OF TREES SHIPPED
1909	362,633
1910	714,054
1911	489,393
1912	437,425
1913	228,705
1914	1,161,305
1915	546,857
1916	1,550,658
1917	1,620,957
1918	1,728,377
1919	1,002,027
1920	482,333
1921	1,244,544
1922	1,801,047
1923	3,167,304
1924	3,957,498
1925	2,881,930
1926	4,171,660
1927	3,620,286
1928	2,083,870
1929	1,781,017
Total number of trees shipped (1903-1929)	35,184,404

PRINCIPAL KINDS OF TREES PRODUCED

Many different kinds of forest tree seedlings and transplants have been grown in the Mont Alto Nursery. Inventories of this nursery are listed in the Appendix (Tables II to VII). These inventories do not list all the trees grown, because many different kinds were planted in the nursery in small quantities for arboretum and experimental purposes. Of the 76 different tree species grown in the nursery in 1922, only 25 were present in numbers above 10,000.

In the past, white pine exceeded all other trees grown in the Mont Alto Nursery. In recent years, serious enemies of this tree, such as the white pine weevil and the white pine blister rust, have decreased its popularity with tree planters. Because of its general freedom from enemies, red pine is now replacing white pine to some extent. A comparison of the inventory for 1928 with those of earlier years. (Tables II to VII), gives supporting information pertaining to this changing tendency in the use of trees for planting purposes. Norway spruce ranks second to white pine in the total number of trees grown. Scotch pine has been grown in numbers almost equal to Norway spruce. Pitch pine and Japanese larch are two trees that have also won favor with forest tree planters. Among broadleaf trees, red oak, white ash, black locust, and black walnut have been produced in considerable quantities.



The Mont Alto Nursery Produced the White Pine Seedlings That Now Make Up This Attractive and Thrifty Plantation Near Austin in Potter County

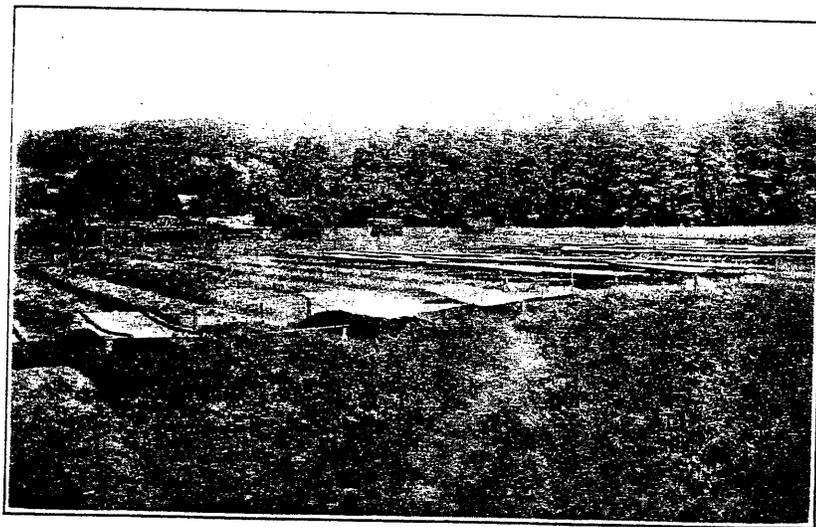
Cow field Mt Alto San Antonio



One of the Oldest White Pine Plantations Grown from Mont Alto Trees. These 20-Year-Old Trees are Rapidly Approaching Merchantable Size



The Site of the Mont Alto Nursery in April, 1902



*General View of the Mont Alto Nursery in 1904. Two Years
After Its Establishment*

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THE MONT ALTO ARBORETUM

BY

J. E. Aughanbaugh

In 1903, coincident with the founding of the State Forest Academy and the first State Forest tree nursery at Mont Alto, the Department of Forests & Waters began planting there trees and shrubs of many different kinds. At first this collection of woody plants grew largely through the generosity of individuals, government agencies, and institutions. Its extension thereafter has been based primarily on exchange of seed with experiment stations, forest schools, and state and federal forest services. Many of the specimens have been gotten through cooperation with the United States Department of Agriculture, Division of Foreign Plant Introduction.

According to Research Bulletin 3, "Woody Plants of the Mont Alto State Forest, Native and Introduced," there were represented at Mont Alto in 1950 a total of 357 species, 144 of them native to the region and 193 introduced. These specimens were then classified in 38 different families and 80 genera. At present the arboretum contains 488 species and varieties, representing 55 families and 150 genera, and most of the recent additions have been exotics. There are now about 1500 different specimens.

The Mont Alto arboretum has become an interesting and valuable asset, as well as major showplace of Pennsylvania forestry. It serves, first of all, as a proving ground for exotics, to determine the adaptability of such introduced plants to the climate and soils of Pennsylvania--a type of information needed to guide our selection of foreign trees and shrubs to plant for wood production, game food and soil erosion purposes. Another of its major uses is for forestry students, visitors, and Department personnel to observe,

study and compare most easily the dendrological and silvical characteristics of a great many trees from all parts of the North Temperate Zone. It supplies, moreover, material for herbariums, and twig and seed collections; and furnishes seed and planting stocks for exchange with interested individuals and organizations. Thus it renders valuable services to the Commonwealth and to other botanical and forestry agencies throughout the world.

To maintain and expand this tree and shrub collection necessitates of course considerable labor. It involves, first of all, a continuous correspondence with numerous agencies to effect seed and plant exchanges considered mutually satisfactory. Next the seed is sown, beds properly labeled, and then the young plants tended until they reach a size suitable for the arboretum; and a small section of the Mont Alto nursery is devoted exclusively to this specialized phase of research. When transplanted to the arboretum the specimens are spaced about ten feet apart in rows, tagged, mulched, and occasionally pruned. Periodically too the grass and weeds need to be mowed and the soil cultivated about the bases of the trees.

A major problem always has been to label plants satisfactorily. Painted wood labels, bearing the common and scientific name, look nice for a few years but unfortunately they deteriorate rapidly. A more practical solution has been to use small copper tags bearing stamped numbers that refer one to a **Check List** for identification of a specimen. At first Bulletin 5, already referred to, served well as a numerical basis, but rapid expansion of the arboretum forced a recent revision of that catalog. Now of course all tree numbers must be changed to conform with the new **Check List**.

Technical nomenclature and the arrangement of families and genera used in this revised Check List follow the 1927 edition of Alfred Rehder's "Manual of Cultivated Trees and Shrubs." Accepted common names are, for practically all species, in accordance with "Standardized Plant Names" published in 1924 by an American Joint Committee on Horticultural Nomenclature.

As the retagging progresses, other phases of arboratum work being carried along systematically are as follows: (1) Check every specimen to see that it is correctly identified, (2) submit sample twigs, leaves and fruits from unknown or questionable plants to Arnold Arboretum for positive designation of species, and (3) assemble pertinent information pertaining to each tree and shrub, so arranged that it can be typed satisfactorily for a card index file. Future plans too will involve a periodic canvass of the arboratum to compile growth data, phenological notes, information on insect and fungus injury, and particularly to observe and report those plants that show outstanding promise of usefulness.

PLANTING EXPERIMENTS ON BURNED AREA ON SNOWY MOUNTAIN,
MONT ALTO STATE FOREST, IN SPRING OF
1931.

D.
MONT ALTO- SNOWY MT. 3 E.
F.

In August, 1930, a fire burned over a portion of Snowy Mountain, in the Mont Alto State Forest. The forest cover comprised the oak-chestnut-pitch pine type, in which a considerable amount of scrub oak was represented. With the exception of a scattering of dominant, mature pitch pines that had withstood previous fires, a major portion of the timber was not more than five years of age, having originated since the occurrence of the last fire (1926) on the same area. The 1930 fire was of such severity that much of the young growth was killed outright. Some of the trees sprouted from their base before winter, but these young sprouts were invariably killed back by frost, so that in the spring of 1931 the burned area presented a quite desolate appearance.

Several different portions of the burn were selected for planting experiments in the spring of 1931. Because of variable conditions of soil, rocks, and tree growth, only the more favorable areas were chosen. Their relative location is shown on the sketch appended to this report and in the discussion which follows they will be referred to as areas 3D, 3E and 3F.

The planting occurred on April 13, 14 and 15. The planters were Wilbur Heefner, Wilbur Parker, Stewart Dayhart, Donald Rock and John Cook, all of Mont Alto, and the field work was supervised by members of the Pennsylvania Forest Research Institute. The planting stock was all two-year-old seedlings, secured from the Mont Alto

and Rockview forest tree nurseries. Mattocks were the tools used for the planting. The field work was done very carefully and for that reason proceeded more slowly and at a higher cost than would have resulted from rapid slovenly planting.

PLANTING AREA 3D.

One of the purposes of this particular planting was to experiment with different methods of protecting planted seedlings from damage by deer. Accordingly, 200 seedlings of each of the following species - pitch pine, red pine, shortleaf pine, jack pine and white pine - were planted on an area of approximately an acre on the west side of Curran's Path. Each species was planted in a separate block comprising four rows of 50 trees each. Although the trees were planted in rows, care was taken to avoid locating the seedlings close beside saplings and stumps that would be likely to sprout later and hinder their growth.

After the planting had been completed the area was divided into three equal parts. The seedlings on the middle portion of the plot were sprayed with a commercial deer repellant preparation. On another portion the brush was cut and piled around the planted trees. The remaining portion was kept as a check.

To plant these 1,000 trees and do the work carefully required 36 man hours of labor which, at 30 cents an hour, made a total

(3)

cost of \$10.80. Also, to cut the brush, lop it into short lengths, and pile it around the planted trees on a third of planted area necessitated an additional expenditure of \$3.50. The labor involved in spraying the trees with a deer repellent preparation amounted to \$.90, making a total cost of approximately \$15.00 for the experiment.

Directly opposite, on the east side of Curran's Path, there were planted approximately 1500 seedlings of the same species, namely red, pitch, shortleaf, jack and white pines, covering an area of about $1\frac{1}{2}$ acres. The species were mixed thoroughly in planting. No attempt was made to space the trees regularly in straight rows, but rather to spot plant them in the situations where they would be least likely to suffer from competition with hardwood sprouts which might develop later. Undoubtedly these trees will need some assistance cutting in the future to release them from hardwood competition. The planting cost averaged \$6.20 per 1,000 trees.

PLANTING AREA 3E.

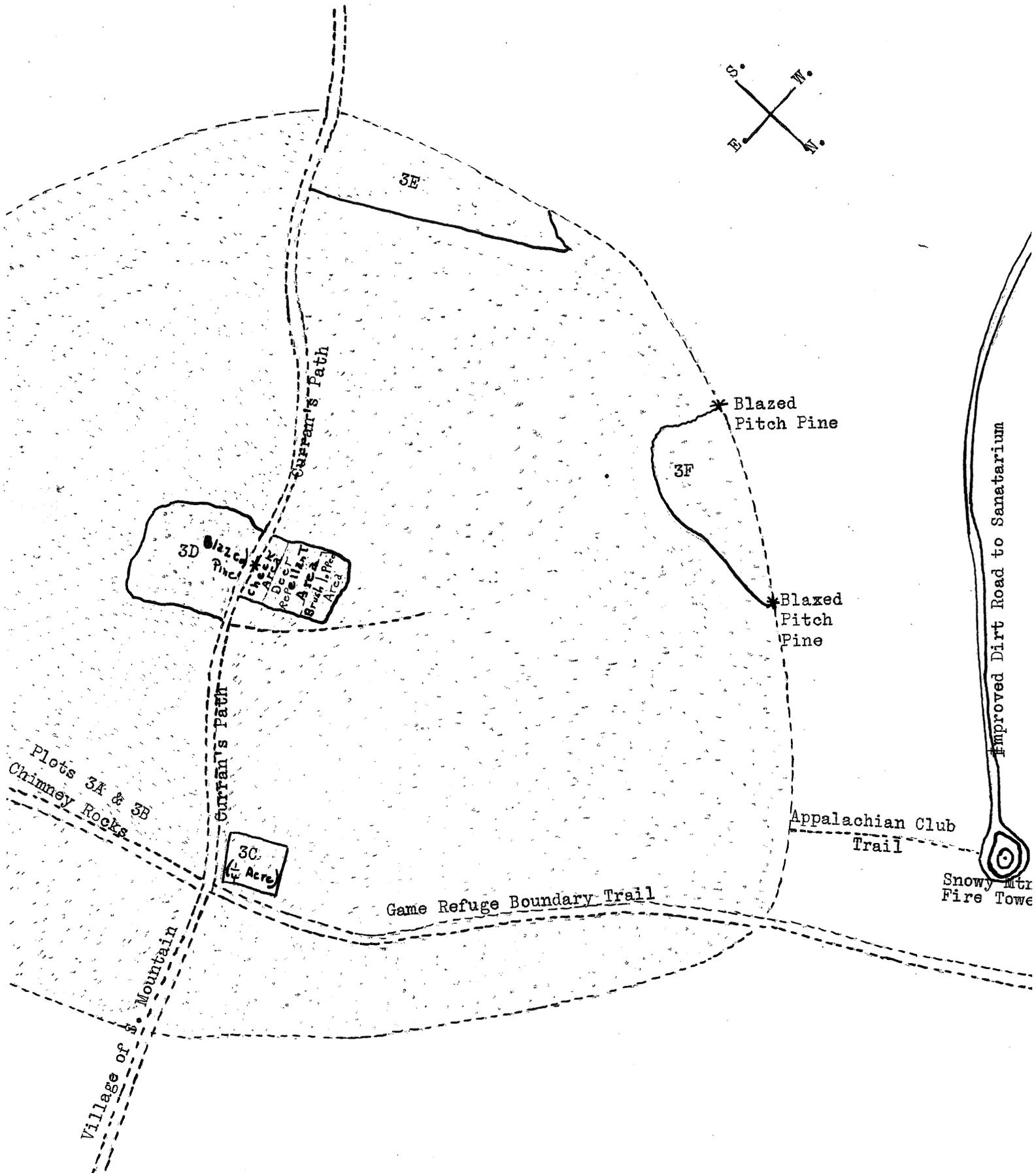
On the south corner of the burned area, adjoining Curran's Path, there is a narrow stretch of soil that is of good depth and relatively free of stones and dense brush. Approximately 500 trees, representing 100 each of white, red and shortleaf pine, and 200 of pitch pine, were planted. The method of planting was in rows, mixing the species indiscriminately within the rows. The work was done carefully, necessitating a cost of \$9.50 per 1,000 trees. The planted trees cover an acre

of about three-fourths of an acre.

PLANTING AREA 3F.

This area, located on the south western edge of the 1930 burn, is characterized by a rather dense cover of scrub oak, some of which had already commenced sprouting at the time of planting. Since black locust was observed to be one of the most successful species competing with scrub oak sprout growth after the 1926 burn on Snowy Mountain, its value in eradication of this forest weed was considered to be worthy of investigation. Accordingly, 200 black locust seedlings were spot-planted over an area of approximately two acres. As locust is quite intolerant, care was exercised to locate the seedlings only in the more favorable openings where shade from young hardwood sprouts would offer the least competition. Pruning back the long tap roots of the seedlings before planting greatly facilitated the work. To complete the project required a total of 23 man hours or a cost of \$8.63 per 1,000 trees planted.

SKETCH SHOWING LOCATION OF SOME 1931 PLANTING AREAS
 ON SNOWY MOUNTAIN, MONT ALTO FOREST.
 (Dotted Area Shows Location of The 1930 Burn).



SEVENTY-FIFTH ANNIVERSARY

MONT ALTO FOREST TREE NURSERY

The Mont Alto Nursery was established in 1902 by George H. Wirt, who was the first and, at that time, the only technically trained forester in the State Forest Service of Pennsylvania. The purposes in establishing the Mont Alto Nursery were three fold: 1) to help reforest the extensive wastelands throughout the Commonwealth; 2) to furnish private landowners with planting stock; and 3) later to act as an educational resource for the Pennsylvania State Forest Academy established in 1903.

The Nursery was established on a site formally occupied by several houses, their out-buildings and gardens, open fields, and some wooded areas. From a beginning with only a few seedbeds on a small plot of ground, the Nursery increased in size until it reached its present area of 22 acres in 1929.

The first seed sown on April 28, 1902, was six pounds of white pine. Also, in the spring of 1902, 10,000 one year old white pine seedlings were transplanted on the Nursery. In the spring of 1903 the first trees, sixteen hundred transplants, were removed from the Nursery for reforestation purposes. They were planted on the Mont Alto State Forest near the present site of the South Mountain Restoration Center.

The annual production at the Nursery began with the small quantity of 1,600 transplants in 1903. As the years passed, the production of planting stock increased; and there were some years that over 4,000,000 seedlings were propagated. The planned annual production at present is approximately 2,000,000 seedlings.

In the past 75 years about 160,000,000 seedlings, transplants, and other types of stock have been distributed from the Mont Alto Nursery for reforestation of lands in the Commonwealth.

During the early years of the Nursery operation, the seedlings and transplants were used to reforest State lands only, they later became available to the public. When the stock was first made available to the private landowner, there was no charge for the trees. Later, laws were passed to provide for sale prices not to exceed the cost of production.

Since George Wirt founded the Nursery in 1902, a number of people have been in direct charge of its operation. These are listed below with their dates of service:

George H. Wirt, 1902 to September 1906; Ralph E. Brock, September 1906 to March 1911; Tom O. Beitsch, March 1911 to September 1912; George A. Retan, September 1912 to April 1918; W. Boyd Evans, April 1918 to May 1918; Joseph S. Illick, May 1918 to July 1918; George S. Perry*, July 1918 to November 1927; Tom O. Bradley, November 1927 to July 1931; W. L. Byers**, July 1931 to April 1935; H. E. Clepper, April 1935 to June 1936; William C. Sechrist, June 1936 to November 1939; J. E. Aughanbaugh, December 1939 to March 1940; R. R. Houpt, March 1940 to 1946; Thomas G. Norris, 1946 to

to 1952; Harry W. Staley, 1952 to 1957; Phillip Eckert, Spring of 1956; Joseph A. Hill, 1957 to 1977; and Roger C. Coady, January 1977 to present.

*Absent on leave for two periods during which time the Nursery was supervised by:

Charles M. Genaux, July 1924 to September 1924; Louis C. Loetzer, September 1924 to August 1925; Wayne A. McNess, June 1927 to September 1927.

**During the summer of 1932 the Nursery was under the direction of Ranger Harry W. Staley.

Other important dates and persons in the history of Mont Alto Nursery are: 1952-1953, a Division of Nurseries was created, headed by Thomas G. Norris; in 1955, Joseph Ibberson was placed in charge of the Division of Research and Division of Nurseries; 1956, Thomas S. DeLong was appointed Nurseries Supervisor, Nurseries Section, Forest Advisory Services; and in January 1977, Joseph A. Hill became Nurseries Supervisor.

Some Special Events in the History of Mont Alto Nursery

In 1898, the land upon which the major portion of the Nursery is situated was purchased from the Mont Alto Iron Company. An additional five acres west of the Slabtown Road was purchased in 1929 to complete the entire Nursery complex.

The Mont Alto Nursery was one of the first nurseries, if not the very first, in this country to develop a system of records and accounts. The beginning was made in 1906 when a system of special nursery forms was developed.

The Tarburner Spring, south east of the Nursery supplied water to the Nursery and also to the Mont Alto campus of the Pennsylvania State University. It was constructed prior to 1909. This water supply to the Nursery is used for irrigation as well as for drinking water. The water of this spring was once bottled and sold extensively throughout the Cumberland Valley because of its purity.

The first reservoir to supply the Nursery irrigation system was built in 1909. An additional reservoir of much larger capacity (400,000 gallons) was constructed between 1934 and 1936.

One of the first black walnut plantations in the State of Pennsylvania was established in 1909 on the northern side of the Nursery. Some of these trees still stand today and provide a seed source for the Nursery seedling production program.

Attempts to improve the Mont Alto Nursery soils were made prior to 1912. However, a major soil renovation program did not take place until the early 1960's when deep subsoiling was initiated and large additions of sand and sawdust were applied.

Installation of the Skinner overhead irrigation system was started about 1915, with some changes and additions being made through 1933. A major renovation of the system was made in the early 1960's.

The greenhouse, now used for tree improvement work and fertilization studies, was constructed in two steps. In 1928, the wooden part was built for the purpose of storing tools. Later, during the 1930's, the glass section was added to the existing wooden structure.

In 1930, lifting of seedlings from seedbeds changed from a manual operation (using spading forks) to a machine operation. The machine at this time being horse-drawn, but in later years pulled by a tractor.

From 1937 to 1940, the Civilian Conservation Corps constructed buildings at the Nursery which still stand today; these are the two large barns and storage buildings, a two-story building at the rear of the Nursery, and three shade sheds.

Chemical weed control was on an experimental basis from 1950 to 1956. In 1956, it became part of routine Nursery operations and has continued to this day at a great savings over costs involved in hand weeding.

Seed testing and complete records of all lots used for Nursery production was put on a scientific basis in 1956 and continues to this date.

In 1957, a cold storage building was constructed to properly refrigerate seed for long periods of time and seedlings on a short term basis.

In 1961, a tree improvement program was initiated for Mont Alto and the other State Nurseries. A forest geneticist was hired in 1962 to plan and direct this program. At this time, the greenhouse at Mont Alto became the center for the grafting of planting stock. The trees grafted here, when planted in seed orchards, eventually will supply seed of an improved quality to be used in the production of seedlings in the nurseries.

In 1969, a soils testing laboratory was established at the Mont Alto Nursery to provide State Nurseries with soils analyses results that can be applied to their soils management program.

During the 1960's and 70's, five foresters were trained at Mont Alto Nursery for supervisory positions in the State nursery system.

Throughout the 75 years of Mont Alto Nursery's existence, it has been used for investigation of many nursery stock and soil problems.

IDENTIFICATION AND LOCATION

Survey Code: _____ Tax Parcel/Other No.: _____ Multiple _____
 County: _____ Franklin _____ 0 5 5 2. _____
 Municipality: 1. _____ Greene Township _____ 2. _____
 Address: _____ Michaux State Forest Lands _____
 Historic Name: _____ White Pine – Michaux State Forest _____
 Other Name: _____ Demonstration Plot _____
 Owner Name/Address: _____
 Owner Category: _____ Private _____ Public-local _____ Public-state _____ Public-federal _____
 Resource Category: _____ Building _____ District _____ Site _____ Structure _____ Other _____
 Number/Approximate Number of Resources Covered by This Form: _____ 1 _____
 USGS Quad: 1. _____ Caledonia Park, PA _____ 2. _____
 UTM: A. _____ C. _____
 References: B. _____ D. _____

HISTORIC AND CURRENT FUNCTIONS

Historic Function Category:	Subcategory:	Code:
A. _____ Landscape _____	_____ Conservation Area _____	1 5 I
B. _____	_____	_____
C. _____	_____	_____
D. _____	_____	_____
Particular Type:	A. _____	
	B. _____	
	C. _____	
	D. _____	
Current Function Category:	Subcategory:	Code:
A. _____ Landscape _____	_____ Conservation Area _____	1 5 I
B. _____	_____	_____
C. _____	_____	_____
D. _____	_____	_____

PHYSICAL DESCRIPTION

Architectural Classification: A. _____ N/A _____
 B. _____ C. _____
 D. _____ Other: _____
 Exterior Materials: Foundation _____ N/A _____ Roof _____
 Walls _____ Walls _____
 Other _____ Other _____
 Structural System: 1. _____ N/A _____ 2. _____
 Width: _____ N/A _____ Depth: _____ N/A _____ Stories/Height: _____ N/A _____

HISTORICAL INFORMATION

Year built: _____ 1906 to 1920s _____ Additions/Alterations Dates: __c. 1923__ c. 1926 _____

Basis for Dating: _____ Documentary _____ Physical

Explain: The historic documentation confirms the above dates.

Cultural/Ethnic Affiliation: 1. _____ -- _____ 2. _____

Associated Individuals: 1. _____ 2. _____

Associated Events: 1. _____ -- _____ 2. _____

Architects/Engineers: 1. _____ -- _____ 2. _____

Builders: 1. _____ Mt. Alto Students _____ 2. _____

MAJOR BIBLIOGRAPHICAL REFERENCES

Files and records of Michaux State Forest Office in the state forest holding.

PREVIOUS SURVEY, DETERMINATIONS

EVALUATION (Survey Director/Consultants Only)

Individual NR Potential: _____ Yes _____ No Context(s): _____ Agriculture/Forestry _____

Contributes to Potential District _____ Yes _____ No District Name/Status: __White Pine Plantation/____
__Caledonia Plantations _____

Explain: The surviving trees are contained in a grove along Rt. 30.

THREATS

Threats: 1 1. None 2. Public Development 3. Private Development 4. Neglect 5. Other

Explain: The plantation has been altered by utility lines and installations, lack of pruning and maintenance is not going on at present.

SURVEYOR INFORMATION

Surveyor Name/Title: _____ Thomas E. Jones _____ Date: _____ 04/04 _____

Project Name: _____ PA Forest Fire Museum _____

Organization: _____ Telephone: _____ 610-252-9902 _____

Street and No.: _____ P. O. Box 1326 _____

City, State: _____ Easton, PA _____ Zip Code: _____ 18044-1326 _____

Additional Survey Documentation: _____

Associated Survey Codes: _____

PENNSYLVANIA HISTORICAL RESOURCE SURVEY FORM – NARRATIVE SHEET
Pennsylvania Historical and Museum Commission, Bureau for Historic Preservation

89 C

Survey Code: _____ Tax/Parcel No.: Multiple
County: Franklin Municipality: Greene Township
Address: Rt. 30 – Michaux State Forest
Historic/Other Name: Caledonia White Pine – Demonstration Plot

PHYSICAL DESCRIPTION:

The White Pine Plantation – Demonstration Plot (planned tree planting plots) within the Michaux State Forest is situated along both sides (north and south) of Rt. 30 at the western main entry point of the Forest. This now dense growth of planted pines, at right angle grid to Rt. 30, creates a dark grove of pine trees 60' up to 70' in height. It reflects the once dense growth of vast pine forest throughout Pennsylvania prior to historic development. This locale was once one of a group of tree planted demonstration plots termed the Caledonia Plantation. Here, however, in the 1920s scientific monitoring of the trees planting occurred. Careful cutting and pruning was effected on the trees. Their growth cycles were monitored and projected timber yields were calculated. This activity caused the trees to grow straight, up, with the lower section clear of branches. This activity occurred during the 1920s. Since then, the trees were left to grow naturally. There has been a gradual encroachment of deciduous trees into the plot since that time, on a small scale. The biggest changes have been tree cutting of road side trees for highway widening. As well on the north portion a large section of the plot was cut down for a utility installation. These activities have a moderate level affected the cultural integrity of the full plot as it survives today.

HISTORICAL NARRATIVE:

THE CALEDONIA PLANTATIONS

Bordering the Lincoln Highway midway between Chambersburg and Gettysburg are the most talked of forest tree plantations in Pennsylvania. In 1906 the students at the State Forest School, Mont Alto, planted 75,000 trees, most of them white pine, in abandoned fields dotted with patches of grass, clumps of sumac, briar thickets, and a few scattered trees. The resultant tree growth was widely known as The Caledonia Plantations. Two-year old white pine seedlings were used in the planting. The trees were spaced 4x4 feet apart, and placed in rows running at right angles to the highway.

Records show that a year after planting 98 % of the trees were growing. During the first three years after planting few people noticed the trees. They were too small to be seen. The fourth year they began to lift their tips above the grass. By 1912, six years after planting, the trees had grown enough so that their lateral branches began to meet. Three years later (1915) the branches were so interwoven that the plantation was almost an impenetrable thicket. The leaf canopy was now so dense that the lower lateral branches were dying off for want of light and growing space. Competition between neighboring trees was then very keen. Many of the weaker specimens began to lose out in the struggle. By 1922 seven or eight whorls of lower branches were dead. The tree trunks were then covered with dead branches for a distance of 6 to 10 feet from the ground. These dead lateral branches did practically no harm to the trees. In time they would fall off naturally, but as long as they remained on the trees the plantation was an impenetrable thicket and a fire hazard of the first order. In its natural condition it was not available as an object lesson in forestry. It did not serve as a show place, nor could it be used advantageously for forest studies.

In the fall of 1922 it was decided to treat the planted trees so that they could be seen and studied. Operations were started in January, 1923, and had three main objectives, namely:

1. To remake the plantation available as a show place, that is, to demonstrate in a practical way the possibilities of forest tree planting on idle land, and the use of correct methods in handling forest tree plantations.
2. To make possible the establishment of special study and experimental plots for the purpose of collecting valuable information on the behavior, growth, and yield of planted forest trees.
3. To improve the quality of the wood produced by the trees.

In order to facilitate the treatment and make possible the keeping of accurate records, special plots were established within The Caledonia Plantations for each major study project.

THE PRUNING PROJECT - DEMONSTRATION PLOT

During January and February, 1923, 3.4 acres of white pines in The Caledonia Plantations were pruned. The pruning work was confined to dead branches except along the borders, where green branches persisted down to the ground. As a rule, seven to eight whorls of dead branches were on the trees. Their removal cleared the stems from 6 to 10 feet from the ground. Most of the pruning work was done with hand axes, but pruning saws were also used. A skilled man with an ax in excellent condition can prune faster and almost as well as with a saw, but in case of a miscut, considerable damage is done with the ax, while damage rarely results from the use of the saw.

HISTORICAL NARRATIVE:

The cost of the work, based on an operation covering 3.4 acres, was as follows:

	<u>Labor time per acre</u> (hours)	<u>cost per acre*</u>
Pruning	44.1	\$13.23
Burning pruned material	<u>31.7</u>	<u>\$ 9.51</u>
	75.8	\$22.74

*Labor rate 30 c per hour

By January, 1926, three more whorls of dead branches had developed above those pruned off in 1923. The pruning work of 1926 was done chiefly with special pruning saws. The use of hand axes was no longer practical. The cost of the 1926 pruning was as follows:

	<u>Labor time per acre</u> (hours)	<u>cost per acre*</u>
Pruning	60.0	\$18.00
Removing and burning pruned material	<u>36.0</u>	<u>\$10.80</u>
	96.0	\$28.80

*Labor rate 30 c per hour

Permanently employed forest rangers did the pruning during the winter months when other forest work was not processing. At the end of the second pruning the stems of the trees were clear from branches for 18 to 20 feet from the ground. The treated part of the plantation is now open to view, and offers one of the best show and study plots in the forests of Pennsylvania.

The primary purpose of the pruning work was not the removal of the dead lateral branches, but the development of show and study plots as an educational project. The Caledonia Plantations paid high dividends every day. The pruning work opened a gateway to the development of additional demonstration plots in thinning, growth, and yield studies, and other study projects whose educational value is beyond monetary estimate.

HISTORICAL NARRATIVE:

THE THINNING PLOTS

Four thinning plots were established in The Caledonia Plantations. The one plot was treated to a light thinning, the second served as a check plot. The first thinning took place in 1925. This was followed by a similar treatment in 1926. Detailed records are kept of conditions before thinning. Among the items on the records covering conditions before and after thinning are: The number of trees, their average diameter and height, the volume, the increment, and an itemized statement of costs of all operations.

On the heavily thinned plot of one-third of an acre there were 534 trees prior to the 1926 thinning. During the thinning 264 were removed, of which 102 were dead and 162 suppressed or defectives. The cost of the thinning of the work was:

	<u>Cost per acre*</u>
Thinning and cutting material into cordwood	\$ 9.00
Piling cordwood	\$ 4.50
Carrying and burning brush	<u>\$ 5.40</u>
Total	\$18.90

*Labor rate 30 c per hour

This thinning on the one-third acre plot yielded more than 8 cords of wood. This is at the rate of 6 plus cords per acre. At \$3.00 per cord the returns from the thinnings approximately pay for the operation. Because of the thinning operation, the 20-year old white pine stand is greatly improved. There remain on the one-third acre plot 270 trees with an average height of 30 feet, an average diameter of 4.8 inches, and a total basal area at breast-high of 37.4 square feet. These figures compare favorably with those given in yield tables for site quality I second growth white pine in New Hampshire.

These four thinning plots, all of which were clearly demarcated and permanently monumented, demonstrated effectively the general principles of thinning, show the effects of different degrees of thinning, and give reliable cost and yield figures that are of practical value to forest land owners considering this form of forest improvement work. These plots were first class object lessons in practical forestry.

HISTORICAL NARRATIVE:

THE SAMPLE PLOT OF 1916

In 1916, ten years after the Caledonia plantations were established, a sample plot covering one-tenth of an acre was laid off in a selected area. The boundary lines were carefully surveyed and clearly demarcated. The corners were permanently marked with squared locust posts painted white. All the lower dead branches were pruned off. Every tree was given a number, which was painted on the bark about 5 feet above the ground. In demonstration areas the painting of numbers with white paint is preferable to other methods of numbering, for it attracts attention. A breast-high mark was painted, also in white, on each tree at 44 feet above the ground. Then, on November 7, 1916, the diameter, height, crown class of each of the 264 trees on the plot was recorded. On February 23, 1922, all the trees were again remeasured. Before growth will start next spring (1927) every remaining tree will be remeasured to ascertain the growth at the end of the 1926 growing season – twenty years after the trees were planted.

This demonstration area was maintained primarily to show the growth and yield of planted white pine in southern Pennsylvania. What could be expected if 2-year white pine seedlings are planted in an abandoned field on a sandy loam soil with a northern exposure at an altitude of 1,000 feet. This plot is well situated for show and study purposes. It is located along a trolley line, less than 100 yards from the Lincoln Highway. The advantages of close proximity to a well traveled highway far outweighed the disadvantages. Demonstration plots deserved a place in the foreground.

The records of this sample plot were complete down to the 264 trees. Even the exact year of weevil attack on specific trees was recorded. The value of demonstration areas was in direct proportion to the kind of data that was available concerning them. The planting of trees, that is, the establishment of a plantation, was viewed only one step in the making and maintenance of worth-while demonstration plots.

BLUE RIBBON TREES

The growing stock of a forest is, as a rule, made up of a limited amount of preferred tree stock and a relatively large amount of common tree stock. In a plantation spaced 4 x 4 feet there are about 2,750 trees per acre at the beginning of the rotation. About 200 to 250 trees per acre remain at the end of an average rotation. About 90 % drop out and only 10 % remain to make up the final stand. This shows that on an average of every 10 trees planted, only one tree will be a part of the mature stand.

The trees, planted in 1906, were pruned and thinned in 1923 and 1926. When this work was completed there remained 270 trees on the one-third acre plot. That is less than 30 % of the original number of trees. The others had been eliminated by suppression or thinning. A careful survey was made of the 270 trees that remained, and from them were selected the 66 best specimens, giving full consideration to size, condition, form, and spacing. This was at the rate of about 200 trees per acre. At first a preliminary selection of the best trees was made. They were then re-checked and then the final selection made. Each of the selected trees was marked at about breast-high with a band of blue paint 1 ½ inches in width. In Europe the prevailing practice is to mark the selected trees with a band of white paint. In the Pennsylvania plots a band of blue paint is placed about the select trees. For this reason they are called "Blue Ribbon Trees."

HISTORICAL NARRATIVE:

The designation of blue ribbon trees was viewed as a good practice, for it brings about economy in forest tendance. In a pruning operation designed primarily for the improvement of wood quality, it is wasteful to distribute operations over 1,000 to 1,500 trees, when we know that only 200 or 250 will reach a size to merit pruning for quality production. Then too, thinning and other stand development operations are simplified if the preferred trees are designated and clearly demarcated. The marking of blue ribbon trees is a practice that merits use in America, especially in study plots and stands under intensive management. It is in keeping with similar practices in stock breeding, poultry raising, and vegetable gardening, in which preference and special attention is given to select specimens early in their development. In white pine stands on an average site, the blue ribbon trees can be selected advantageously between the ages of 15 and 25 years. By this time natural tree competition is gone far enough to enable the forester to select the preferred trees.

Along the Lincoln Highway and directly in front of one of The Caledonia Plantations is a large painted sign (6x10 feet). On the sign is the following legend:

WHITE PINE PLANTATION
PLANTED 1906
PRUNED 1923 and 1926
WHEN 50 YEARS OLD WILL YIELD 35,000 BOARD
FEET OF LUMBER PER ACRE

This simple sign was very effective in telling the high points of this forest tree planting in 1906.

At present the original planting layout of the Caledonia Tree Plantation – Demonstration Plots is not known. Initial on site inspection of the project area revealed the presence of a large number of mature up to 80'-100' tall planted white pines on a grid system, covering the northern half of the proposed museum project site; along Rt. 30.

At present it is not feasible to determine the scientific management and interpretation of these landmark white pines within the larger context of Caledonia Plantation – Demonstration Plots. Further research may clarify these historical aspects. As a potential cultural resource the remains of the Caledonia Plantations appear substantive along the Rt. 30 corridor in Michaux State Forest. This is especially true along the southern border of Rt. 30 through the proposed museum site.

In closing, care and attention appears to have been placed by the staff of Michaux State Forest towards the plantings of white pine of the Caledonia Plantations up through World War II into the 1960s. Active public awareness of its scientific qualities has diminished in terms of public awareness and management since then.

In locations immediately adjacent to the proposed Pennsylvania Forest Fire Museum land parcel in Michaux State Forest the following the main above grade cultural features were created since 1920.

- To the southwest of the museum land parcel immediately adjacent there are two 1920s bungalow style residences of high rustic craft construction. One is a course mountain stone bungalow residence circa 1920s, the other is a log cabin/bungalow of high craftsmanship.
- After World War II the Appalachian Trail was moved due west from Caledonia Park to its current locale immediately adjacent and along the eastern boundary of the proposed museum parcel

HISTORICAL NARRATIVE:

- After World War II an interstate underground gas pipeline was trench cut and installed and forms the southern boundary of the proposed museum land parcel.

The White Pine Plantation – the Caledonia Plantation(s) may be today the earliest surviving scientifically controlled tree/plot yield and growth, tree plots in the state (1906). Earlier 1902 plantings occurred at Mt. Alto, but have been reduced to a small number of trees. Tree demonstration plots effected in 1923-26 by pruning and growth study for yield for timber sales and management received great public/visitor interest in its day. This activity fostered many other such plots throughout the state forest system in Pennsylvania. This Practical Forestry was a new idea and developing profession between the years of 1902 into the mid 1920s. This practical forestry was a clear concept and policy within and into deep state forest land holdings. Although effected by some cutting for utility lines and some encroachment of deciduous trees, the White Pine Plantation maintains a high level of historic physical integrity. The resource as a whole appears to form an historic district that fits into the National Register of Historic Places Criteria A and D.

PENNSYLVANIA HISTORIC RESOURCE SURVEY FORM – DATA SHEET
 Pennsylvania Historical and Museum Commission, Bureau of Historic Preservation

89 B

IDENTIFICATION AND LOCATION

Survey Code: _____ Tax Parcel/Other No.: _____ Multiple _____
 County: _____ Franklin _____ 0_ 5_ 5_ 2. _____
 Municipality: 1. _____ Greene Township _____ 2. _____
 Address: _____
 Historic Name: _____ Caledonia Blacksmith Shop _____
 Other Name: _____ Pennsylvania Department of Conservation and Natural Resources _____
 Owner Name/Address: _____ Harrisburg, Pennsylvania _____
 Owner Category: _____ Private _____ Public-local _____ Public-state _____ Public-federal
 Resource Category: _____ Building _____ District _____ Site _____ Structure _____ Other
 Number/Approximate Number of Resources Covered by This Form: _____ 1 _____
 USGS Quad: 1. _____ Caledonia Park, PA _____ 2. _____
 UTM: A. _____ C. _____
 References: B. _____ D. _____

HISTORIC AND CURRENT FUNCTIONS

Historic Function Category:	Subcategory:	Code:
A. _____ Industry _____	_____ Manufacturing _____	1 0 A
B. _____	_____ Facility _____	_____
C. _____	_____	_____
D. _____	_____	_____
Particular Type:	A. _____ Blacksmith shop _____	
	B. _____	
	C. _____	
	D. _____	
Current Function Category:	Subcategory:	Code:
A. _____ (Museum) _____	_____	_____
B. _____	_____	_____
C. _____	_____	_____
D. _____	_____	_____

PHYSICAL DESCRIPTION

Architectural Classification: A. _____
 B. _____ C. _____
 D. _____ Other: _____

Exterior Materials:	Foundation _____	Roof _____
	Walls _____	Walls _____
	Other _____	Other _____

Structural System: 1. _____ 2. _____
 Width: _____ Depth: _____ Stories/Height: _____

HISTORICAL INFORMATION

Year built: 1837 (?) Additions/Alterations Dates: c. c.

Basis for Dating: Documentary Physical

Explain: The historic documentation indicates the above date.

Cultural/Ethnic Affiliation: 1. -- 2.

Associated Individuals: 1. Thaddeus Stevens 2.

Associated Events: 1. -- 2.

Architects/Engineers: 1. -- 2.

Builders: 1. 2.

MAJOR BIBLIOGRAPHICAL REFERENCES

Files and records of Michaux State Forest Office in the state forest holding.

PREVIOUS SURVEY, DETERMINATIONS

EVALUATION (Survey Director/Consultants Only)

Individual NR Potential: Yes No Context(s): Industry

Contributes to Potential District Yes No District Name/Status: White Pine Plantation/
Caledonia Plantations

Explain: The surviving trees are contained in a grove along Rt. 30.

THREATS

Threats: 1 None 2. Public Development 3. Private Development 4. Neglect 5. Other

Explain:

SURVEYOR INFORMATION

Surveyor Name/Title: Thomas E. Jones Date: 04/04

Project Name: PA Forest Fire Museum

Organization: Telephone: 610-252-9902

Street and No.: P. O. Box 1326

City, State: Easton, PA Zip Code: 18044-1326

Additional Survey Documentation:

Associated Survey Codes:

PENNSYLVANIA HISTORICAL RESOURCE SURVEY FORM – NARRATIVE SHEET
Pennsylvania Historical and Museum Commission, Bureau for Historic Preservation

89 C

Survey Code: _____ Tax/Parcel No.: _____ N/A
County: _____ Franklin _____ Municipality: _____ Greene Township
Address: _____ Route 30 _____
Historic/Other Name: _____ Caledonia Furnace – Blacksmith Shop _____

PHYSICAL DESCRIPTION:

The only original structure that remains of the Caledonia Furnace is the stone Blacksmith Shop located in Caledonia State Park. This one and a half storey building is built of one storey high stone structure with a stepped brick gable roof ends. The building is 3 bays long by 3 bays deep structure. The blacksmith shop is a well maintained building and has served as a museum since the later 1920s to 1930s, in some form. The interior is opened into by double doors on its east and west elevations and single "Dutch" door on the south elevation.

HISTORICAL NARRATIVE:

The Furnace Years. 1830 – 1890s.

In 1837 the Caledonia Iron Works was established under the ownership of Thaddeus Stevens and James D. Paxton. Attracted by the waterpower of Conococheague Creek, the Turnpike's presence, the presence of quality iron ore, limestone for flux and extensive forests to burn for charcoal fuel, an extensive ironmaking operation was erected at the juncture of Conococheague Creek and Rocky Mountain Creek (now the center of Caledonia State Park).

The details of Caledonia Iron Furnaces' activities prior to 1863 are scant due to the destruction of its records by Confederate troops. What we do know prior to 1863 is the following:

- The iron furnace was owned and operated by Thaddeus Stevens and James D. Paxton till 1848, when due to heavy indebtedness Stevens bought out Paxton.
- Initially the land holdings encompassed 12,000 acres from which iron ore and timber (burnt out charcoal) were processed to supply the furnace.
- The iron making complex concentrated at the juncture of Conococheague and Rocky Mountain Creek at now Caledonia (State) Park, here the ore was "...converted into blooms markets to eastern cities. – average price: \$65 to \$ 75 per ton."
- Stretching along the turnpike (now Rt. 30), a lineal sequence of over 17-25 workers' houses were erected due west of the Caledonia Furnace Ironworks complex area. These workers' houses were erected along the south side of current Rt. 30 and went through the northern portion of the proposed museum site. A number of these houses' locales can be discerned by extant cellar holes in the proposed project's area.
- Due north of the current Rt. 30 a millrace was constructed immediately due north, across from the proposed museum site. This supplied a water powered mill complex (of unknown confirmed date and construction excepting the readapted millrace and falls for a trail system).

Thaddeus Stevens was a major national political figure during the events relative to the American Civil War, the abolition of American slavery and Reconstruction. From 1858 to 1868 Stevens, one of the Congressmen from Pennsylvania, was the major political power in the Congress. A highly gifted speaker, Stevens' strong will steered the subsequent policies to the South's Reconstruction. Known as the "Old Commoner," Stevens was regionally deeply hated in the South, the Confederate States. As the course of the Civil War led to the Gettysburg Campaign in the summer of 1863, this locale and its iron making settlement would be drawn into those events.

The following quote from "Southern Revenge" by the Greater Gettysburg Chamber of Commerce, published 1989, illustrates what happened by June 30, 1863.

"To the east on this day, (Confederate General) Early began his march to York but not before putting the torch to Thaddeus Stevens' iron works at Caledonia. Early, along with the rest of the invading officers, had strict order to treat the area humanely. Early, the headstrong and arrogant general, however continued to stretch the rules, and burning the iron works was one example. After sending most of his supply train to Chambersburg, Early quickly reached Caledonia (now a state park. Evidence of Stevens' furnace still exists, and thousands of swimmers and visitors who come to the state park see it every summer.)

HISTORICAL NARRATIVE:

Early left the task of razing the enterprise of the famous Radical Republican Stevens to Colonel William H. French and his 17th Virginia Cavalry from Jenkins' Brigade. Early rationalized the burning by saying this was in retaliation for "deeds of barbarity" by Federal troops in the South and because Stevens had such a vindictive attitude toward the South. The works were just beginning to turn profit for Stevens, and there was about \$65,000 invested in the business. What went up in flames that day was a large charcoal-burning furnace, a forge, a rolling mill, a coal house, shops, stables, a sawmill, and a storehouse, as well as a cluster of cottages housing workmen. But Stevens took the loss fairly well, contending that someone must suffer from the ravages of war." (p. 79-80)

Thomas Frederick Woodley in his work "Thaddeus Stevens," published 1934, gives further detail to this raid onto Caledonia Furnace,

"When War began, Stevens was the owner of large iron ore mines and smelting plants at Caledonia, in South Central Pennsylvania. The Confederates were not unaware of this, and surely would miss no occasion to pay their respects to him through a visit to the establishment if circumstances permitted.

Their long awaited opportunity came in July of 1863, when the Southern armies invaded the Keystone State and, of course, destroyed everything they could find that was available for war purposes." The destruction of Stevens' property and equipment provided luscious morsel and if the thoroughness with which they did it is an index of their pleasure, they enjoyed themselves to the full.

When the messenger took the news to Stevens, he said he told Stevens the Confederates had destroyed the whole plant at Caledonia and burned everything he had. Stevens, who apparently had expected some such act after he knew the Confederates were near his property, jokingly inquired, "did they burn the debts, too?"

At the time it was commonly reported that his loss was between \$150,000 and \$200,000 but writing to his junior law partner at Lancaster shortly after the raid, he said the figures had "been exaggerated." The facts were, he wrote, that the Confederates on Tuesday had taken "seven or eight thousand dollars worth of horses, carriages, and mules with their gear." When they returned, "on the following Friday or Saturday, they burned down a furnace, two forges and a rolling mill, nearly new." The building had cost \$65,000 and Stevens estimated the total loss to be about \$90,000.

A few days after his first letter he again wrote, saying that on their first visit the Confederates "seized my bacon (about four thousand pounds) and other goods of the store, took about \$1,000 worth of corn and a large quantity of other grain." When they set fire to the works on Friday and Saturday, they burnt the store room and the office with all the books, and even hauled "off my bar iron; being, as they said, convenient for wagons and shoeing horses."

They destroyed all fences and about eighty tons of hay, and "broke in the windows of the dwelling houses where the workmen lived." Wiping out the livelihood of his employees grieved him most, and he wrote, "I know not what the poor families shall do. I must provide for their present relief." And altogether, he concluded, "the rebels could not have done the job much cleaner."

In the first letter Stevens significantly says in reference to these great losses, "...all this gives me no concerns, although it was just about the savings of my life, not the earnings... We must all expect to suffer by this wicked War. I have not felt a moment's trouble for my share of it. If, finally, the Government shall

HISTORICAL NARRATIVE:

be reestablished over our whole territory, and not a vestige of slavery left, I shall deem it a cheap purchase.” (p. 481-483)

By July 4, 1863, the Union forces at Gettysburg had defeated the Confederate Army of invasion. The following quote from “Southern Revenge,” pub. 1989, portrays the scene of horror that passed along now Route 30 through Black’s Gap at Caledonia Furnace after the battle.

The Retreat from Gettysburg

“Gettysburg was the largest battle ever fought in the Western Hemisphere. Despite the tremendous din created by more than 150,000 muskets and 200 cannons hardly anyone in Chambersburg realized a battle was going on. Although a few residents on the eastern outskirts of town reported hearing what they thought was artillery fire, for the most part the mountains shielded the community from the noise of the battle. This is interesting. Apparently during the Battle of Antietam in 1862 the battle sounds were more distinct.

On the evening of July 4, following an Independence Day ceremony at the County Courthouse a number of citizens heard a low rumbling noise to the east. This was Lee’s wagon train of wounded. Escorted by the cavalry brigade of General John D. Imboden, the wagon train of misery was said to be 17 miles long. As it wound its way cross country through Franklin County from Greenwood to New Franklin, Marion, Greencastle and south to Williamsport, Maryland. In an article written after the war, Imboden remembered the horrors of this journey.

“About 4 p.m., the head of the column was put in motion and began ascent of the mountain. After dark I set out to gain the advance. The train was seventeen miles long when drawn out on the road. It was moving rapidly, and from every wagon issued wails of agony. For four hours I galloped along, passing to the front, and heard more – it was too dark to see – of the horrors of war than I had witnessed for the Battle of Bull Run up to that day. In the wagons were men wounded and mutilated in every conceivable way. Some had their legs shattered by a shell or Minie ball; some were shot through their bodies; others had arms torn to shreds; some had received a ball in the face, or a jagged piece of shell had lacerated their heads. Scarcely one in a hundred had received adequate surgical aid. Many had been without food for thirty-six hours. The irragged, bloody and dirty clothes, all clotted and hardened with blood were rasping the tender, inflamed lips of their gaping wounds. Very few of the wagons had even a straw in them, and all were without springs. The road was rough and rocky. The jolting was enough to have killed sound, strong men. From nearly every wagon, as the horses trotted on, such cries and shrieks as these greeted the ear:

“Oh God! Why can’t I die?”

“My God! Will no one have mercy and kill me and end my misery?”

Oh! Stop one minute and take me out and leave me to die on the roadside.”

“I am dying! My poor wife, my dead children! What will become of you?”

Some were praying, others were uttering the most fearful oaths and execrations that despair could wring from them in their agony. Occasionally a wagon would be passed from which only low, deep moans and sobs could be heard. No help could be rendered to any of the sufferers. On, on; we *must* move on. The storm continued and the darkness was fearful. There was no time even to fill a canteen with water for a dying man; for, except the drivers and the guards disposed in compact bodies every half mile, all were wounded and helpless in that vast train of misery.

HISTORICAL NARRATIVE:

The night was awful, and yet it was our safety, for no enemy would dare attack us when he could not distinguish friend from foe. We knew that when day broke upon us we would be harassed by bands of cavalry hanging on our flanks. Therefore our aim was to go as far as possible under the cover of the night, and so we kept on. It was my sad lot to pass the whole distance from the rear to the head of the column, and no language can convey an idea of the horrors of that most terrible of nights of our long and bloody war." (p. 82-85)

On November 23rd, 1867 Thaddeus Stevens ran the following advertisement for the sale of his Caledonia Iron Works. This advertisement gives a succinct image of the scale and overall condition of the property and lands in and surrounding Black's Gap.

CALEDONIA IRON WORKS Valley Spirit – November 23, 1867

This is a property situated on the headwaters of the Coconocheague Creek, between Chambersburg and Gettysburg lying on both sides of the great Turnpike road which leads from Baltimore to Pittsburg, nine miles from Chambersburg and fourteen miles from Gettysburg.

It is designed and emaculated to manufacture Charcoal Iron. The buildings now there are a SAW MILL, FURNACE AND FORGE RUN OUT FIRES, SMITH SHOP, and other proper buildings. The DWELLING is not a very valuable one, being built of logs, but is large and comfortable for use. The TENANT HOUSES for hands number fifty or sixty, quite enough to accommodate the works. The land has been generally estimated at 17,000 ACRES, but the Surveyor who lately made a connected draft and calculation of the whole, fixes the number of acres at 21,881. As it is designed to furnish Charcoal, it has been kept in wood, and as fast as cut off, has been permitted to grow up in young timber. That growth ranges from thirty years to the present time, and furnishes corresponding timber for rails or Charcoal. The valley and slope before it rises to the Mountain – which is a very slight one consists of good arable land, in sufficient quantity to make three or four farms, if desirable. Less than one hundred acres have been cleared, and that has been found to be very productive.

The hill land, like all such used for Iron Works, is not well timbered, but a great portion of it now supports very fine young Chestnut timber quite large enough for rails. A friend of mine who was lately over it, told me, that he estimated the number of acres of such timber now fit for the axe, at 6,000 acres lying right along side the Turnpike. Being Chestnut, it grows up very rapidly, when cut away, and there is no doubt but ten or twelve thousand acres would always supply the works with charcoal.

Before the Rebels entered the valley, there was a very fine Rolling mill and Chafery forge, with the proper heating Ovens, whose foundations are still there, which command one of the best water powers in the State, of twenty eight feet fall, the whole creek being readily turned on a level from its bed without any other dam than a log. There is sufficient pine timber on the tract to supply the works with timber. Whenever any of the timber is cut, it always comes back up in Chestnut.

HISTORICAL NARRATIVE:

ORE BANKS

There are two Ore Banks opened up on the property, both very abundant, and each distant from three to four miles from the Works – which are reached from one by a level, from the other by a descent all the way. The one is hermatite ore, the other cold-short-mountain. Neither of them have been well opened, but sufficient has been explored in the course of fifteen years (and is still working) to show that the quantity is inexhaustible, and the bank easily opened with proper management. Fifteen years ago shafts were sunk at the lowest part, mining ore all the way to a depth of 130 feet, and there left a solid body of ore from which they were driven for the first time by water.

It is believed that no better iron was ever made in the world than was produced from the Pond Bank. While the Rolling Mill was in operation, the horse shoe bar, Wagon tire, and Horse Shoe nailrod, were pronounced by competent Black Smiths to be equal to anything produced by Norway or Sweden for malleability, toughness, and welding qualities. For Boiler plates it is said that no iron in the United States excels it. Richard Morris & Bro, Balley & Bro, and others so pronounce. Of course as Foundry metal it cannot be surpassed. We do not speak of the Mountain Bank which has never been sufficiently tried to authorize an honest opinion, although of course it is cold-short, and useful for foundry purpose alone, or for consumption with stone coal, which is not doubted, would make it equal to most ore used in Anthracite furnaces – it is said there are indications of numerous deposits of ore on different portions of the property.

It is believed that a Rail Road commencing at Mt. Alto and running past Boiling Spring Iron Works would take up a larger amount of Iron Ore than can be found elsewhere in the same distance – enough for all the uses of that region and for exploration for an indefinite number of years. The Charter which was obtained for manufacturing purpose and under which it was proposed to purchase the property contains ample privilege to build a Rail Road from the Maryland line to the Susquehannah business and high rates of the Cumberland Valley road have driven freighters to look elsewhere. A connected draft of the property can be seen at the Furnace. And the management will be always ready to show the property to any inquirers. If not sold at private sale, subscriptions of stock will soon be taken up, both for it and for the Railroad.

The only above grade structure left from the Caledonia Furnace buildings is the Caledonia Blacksmith Shop. As a historic resource with direct connections to Thaddeus Stevens at Caledonia and its relations with Caledonia Furnace the Caledonia Blacksmith Shop appears to the Criteria for A and B.

Photo View Sheet

**Proposed Construction of the
Pennsylvania Forest Fire Museum.**
Michaux State Forest,
Franklin County, Pennsylvania

Photo # 1

**View looking due southeast at now dense
growth of Demonstration Plot of
Caledonia Plantation, along Rt. 30.**

Photography by Thomas E. Jones
Historic Preservation Planner
11/02

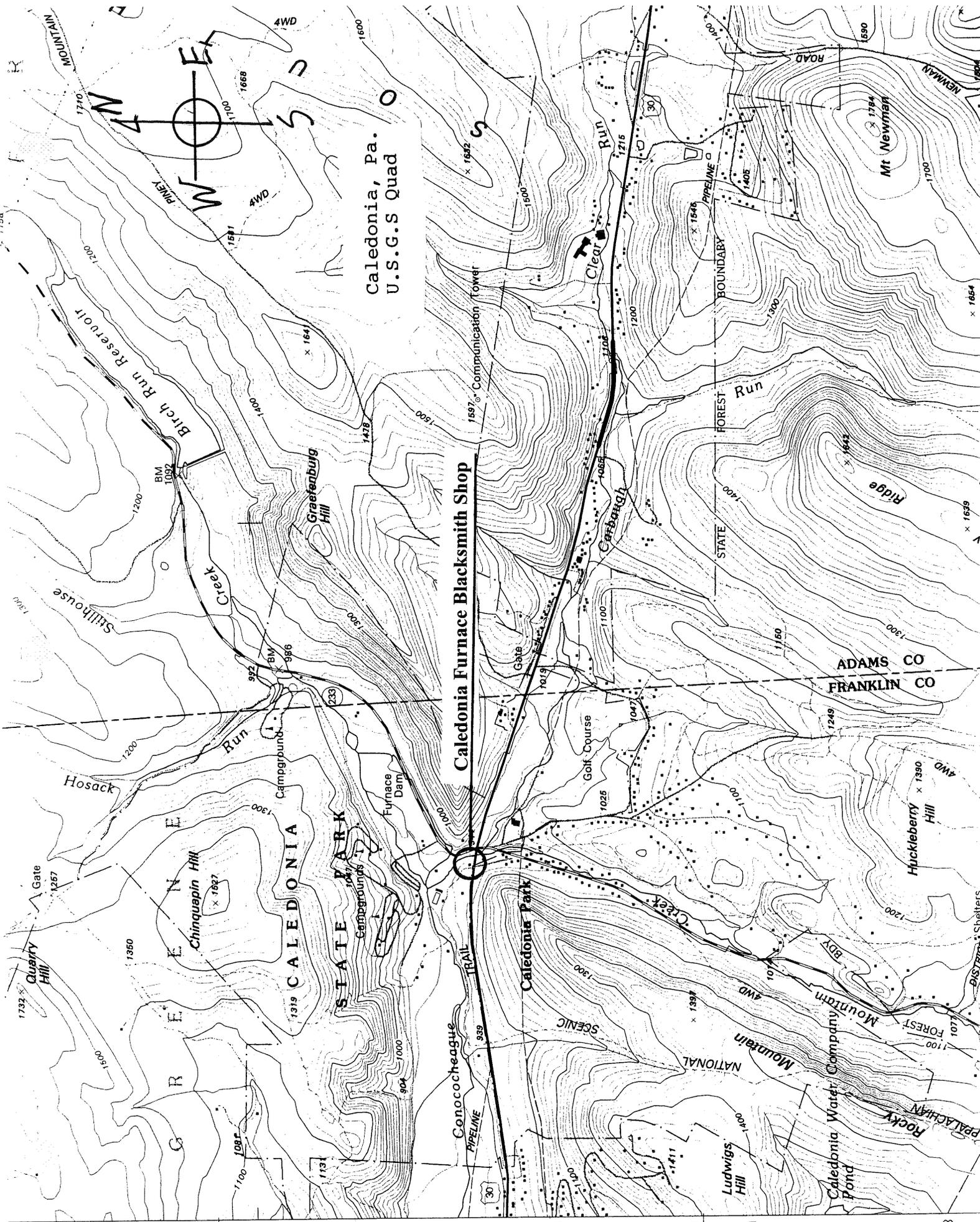
Photo View Sheet

**Proposed Construction of the
Pennsylvania Forest Fire Museum.**
Michaux State Forest,
Franklin County, Pennsylvania

Photo # 2

**View looking due northeast onto the
southwest corner elevation of the
Caledonia Blacksmith Shop.**

All photographs by Thomas E. Jones
Historic Preservation Planner
11/02



Caledonia, Pa.
U.S.G.S Quad

Caledonia Furnace Blacksmith Shop

ADAMS CO
FRANKLIN CO

4422 5' 00" 4421 4420 62 500 METERS 4419 4418

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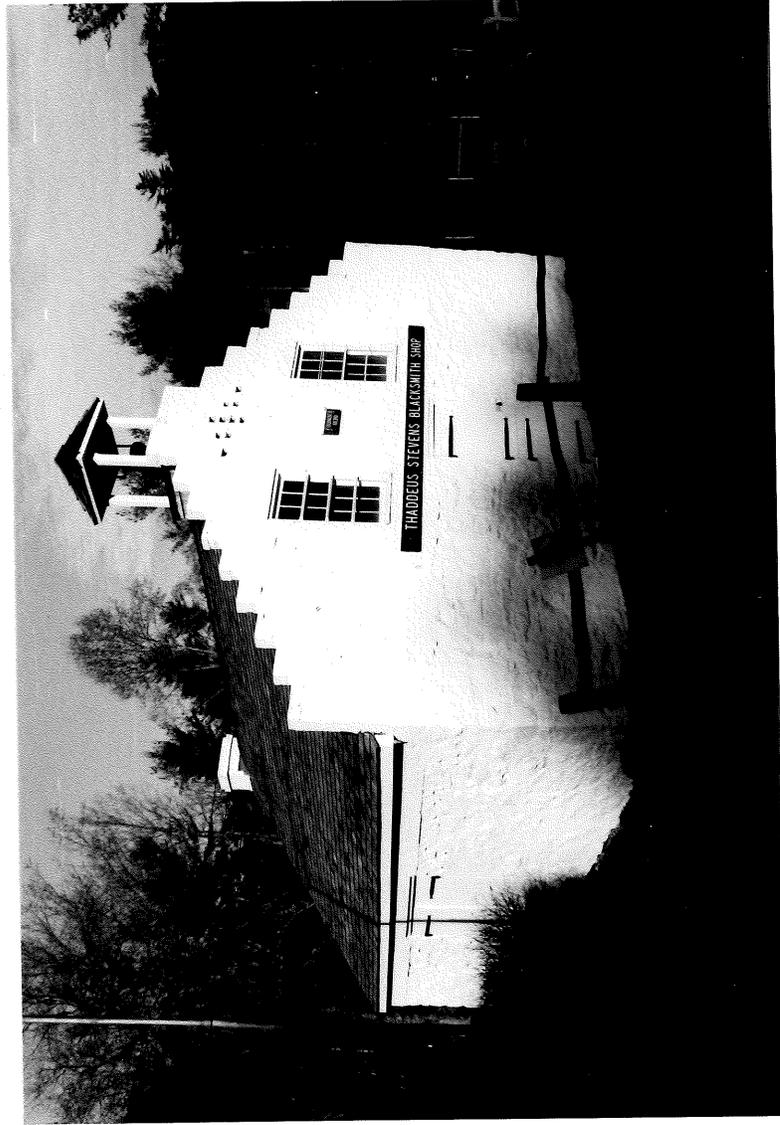


Photo # 2

View looking due northeast onto the southwest corner elevation of the Caledonia Blacksmith Shop.

All photographs by Thomas E. Jones
Historic Preservation Planner