

# THE BLACK ROCK FOREST

BULLETIN NO. 1

HENRY H. TRYON, *Director*

# THE BLACK ROCK FOREST

BY

HENRY H. TRYON

WITH AN INTRODUCTION BY R. T. FISHER



CORNWALL-ON-THE-HUDSON, NEW YORK

1930

PRINTED AT THE CORNWALL PRESS, INC.  
CORNWALL, NEW YORK, U. S. A.

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## FOREWORD

No intensive investigative work in forest management, silviculture or allied fields has been made in the upper portion of the Hudson Highland area. The Black Rock Forest is one of the few remaining comparatively large private holdings in a section where small ownerships are to-day the rule. It is thoroughly representative of the surrounding forest region not as regards forest cover alone, but also with respect to climate, physiographic features, social and economic conditions, and operating chance. The solidity and permanence of the ownership, coupled with the relatively large area available for research work make it a highly practical demonstration forest. The wide variations in topography and association of species will make it possible to undertake and carry through a broad range of practical examples of applied forestry.

## INTRODUCTION

THE Black Rock Forest, from which this bulletin is the first publication, is probably the first institution of its kind to be established in the United States—a private property organized as a forest laboratory for research in problems of forest management and for the demonstration of successful methods in practice. In carrying out this purpose, for which a great deal of the preliminary work is already done, the Forest has every prospect of rendering a valuable public service. The tract is of ample size, and by reason of its location and good protective organization it is relatively safe from fire. Adequate financing and expert supervision assure it of efficient management. Moreover, the Black Rock Forest represents a region where the problem of the future use of land is of peculiar economic and social importance, and where but little systematic work has been done to solve it.

In the hills of northern New Jersey and the Highlands of the Hudson, almost at the back doors of the greatest center of population in the country, there is in the aggregate a very large area of rough, wooded land, much of it still practically a wilderness. For generations it has been repeatedly cut over for wood and many times ravaged by fire. As a result many of the better species of trees have become scarce, inferior kinds have increased growth and reproductive capacity is enfeebled, and the soil is impoverished. For most of this type of land—rocky, steep, and thin-soiled—the only foreseeable use is for recreation or forest products. For either purpose economy requires that the forest should be rejuvenated

in growth and value and the soil restored as far as possible to its maximum fertility. To this end it is necessary that the right methods be worked out to eliminate the worthless and to increase the growth and reproduction of the better species, to restore the fertility of the soil, and in time to define the types of vegetation that will make the best use of these rough and stony sites.

It is the program of the Black Rock Forest to supply this needed knowledge, not only by publishing periodically the results of experimental work, but by displaying to visitors the various areas or plots in the woods where different kinds of treatment have been applied and how they have succeeded. Looking to the future relation between the metropolitan area and its nearest available region of wild land, this will be a service of the greatest value.

R. T. FISHER,

*Director of the Harvard Forest*



## THE BLACK ROCK FOREST

### LOCATION

THE Black Rock Forest lies in the upper limits of the Highlands of the Hudson, about 1½ miles West of the Hudson River (Plate I). It is partly in the town of Cornwall and partly in the town of Highlands. Good woods roads, passable by automobile, enter the tract from the villages of Cornwall and Highland Falls. A network of excellent foot trails covers the entire Forest, making it easily accessible.

### PHYSIOGRAPHY

Excepting the coves, benches, and swampy areas, the Forest is in the main rough, stony land and rock outcrop. The uneven topography, coupled with the rather uniformly granular quality of the soil results in good surface drainage. The good, black soils are generally limited to the valley bottoms and coves. With these last two exceptions, virtually the entire area may be accurately classified as sub-marginal land. The drainage is all to the Hudson River. Gloucester silt loam and Dutchess stony loam are frequent.

The topography is rugged and mountainous, with irregular, steep-sided valleys running about northeast and southwest. Elevations range from a minimum of 450 feet (at the north end of the Forest) to 1461 feet on the summit of Spy Rock. The slopes vary from gradual to precipitous. Exploitation will be difficult in some areas.

The system of roads and trails and compartments is

shown on Plate II. Both the Old West Point Road and the Continental Road were much-used public highways in the days of horse-drawn traffic. They are still public roads, but the former is passable by car only as far as the upper Reservoir while the south half of the latter can still be so used. The various trails shown were once woods roads used formerly in getting out cordwood. To-day they are kept clear of brush and are passable only with teams or on foot.

The Forest includes seven ponds. One of these, the Aleck Meadow Reservoir, occupies what was once a small dairy farm, and now serves as the public water supply for the villages of Cornwall and Cornwall-on-Hudson. Of the other six ponds, Sutherland's is a natural lake, Jim's, Arthur's, Tamarack and Sphagnum having been built since 1915. During the last two years the beaver have made another pond.

#### HISTORY

Settlement began here circa 1694. The Old Continental Road, which practically bisects the Forest from north to south was used by portions of the Continental Army during the campaigns in the Hudson Valley area. To-day there are no permanent structures on the forest, although several old cellar-holes and house foundations are still discernible.

It was a community where agriculture and dairying went hand in hand with the exploitation of various minor forest products. Previous to the Revolution many charcoal pits were operated hereabouts. In fact, this particular industry was well maintained until after the middle of the nineteenth century, when the development of the destructive distillation of hardwoods liberated cheap, high-grade charcoal in such amounts as to render the open-pit process unprofitable. River freight traffic, fur-

PLATE II  
THE BLACK ROCK FOREST  
AND ABUTTING LANDS

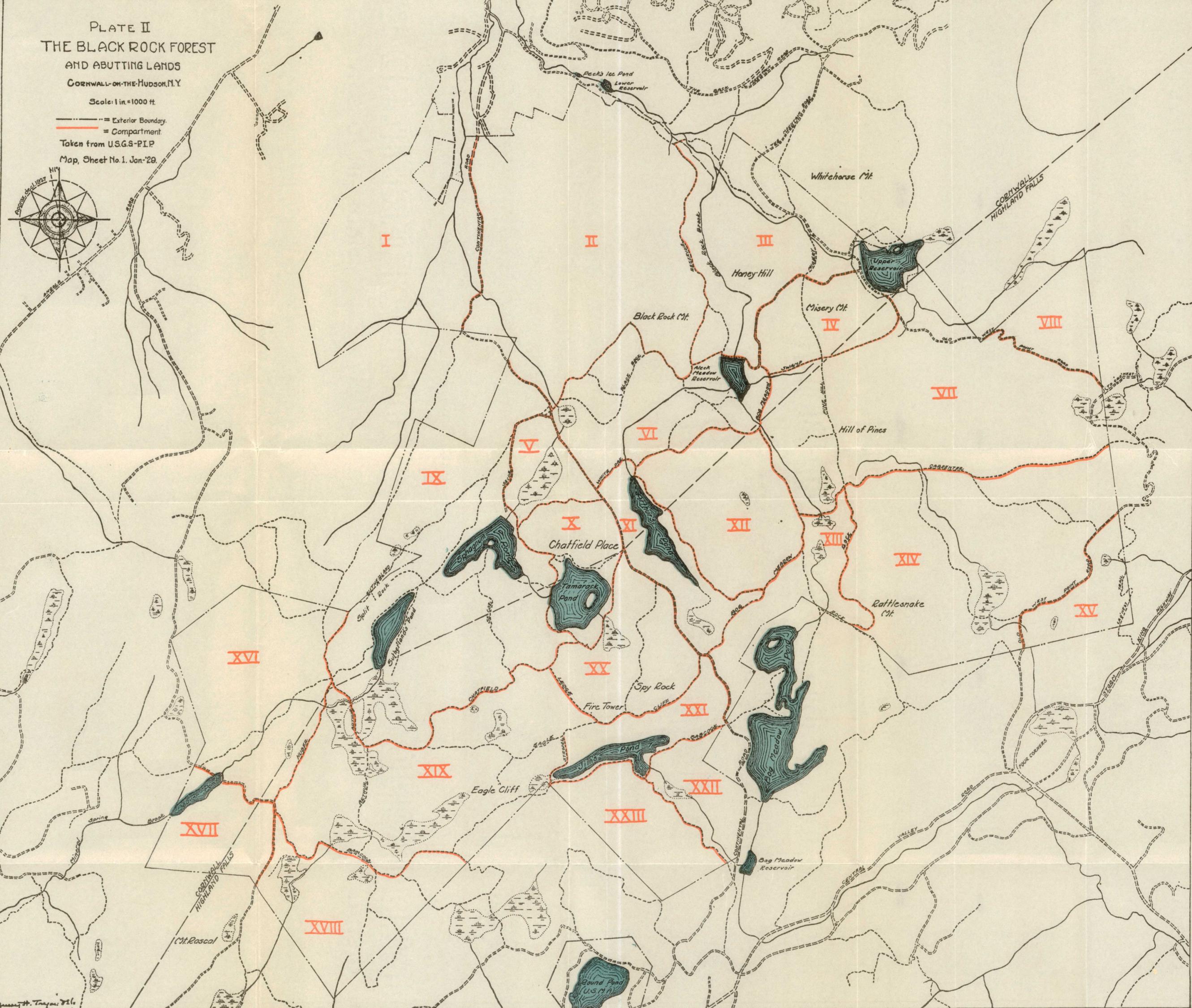
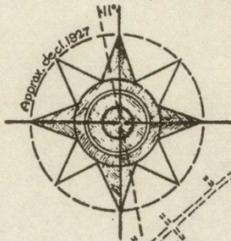
CORNWALL-ON-THE-HUDSON, N.Y.

Scale: 1 in. = 1000 ft.

--- = Exterior Boundary.  
--- = Compartment.

Taken from U.S.G.S-PIP

Map, Sheet No. 1, Jan-'29.



nishing an outlet for farm products, wood, hoop poles, bricks and livestock from the surrounding hinterland flourished rather extensively until the completion of the Erie railroad in 1837.

Railroad ties have been cut sporadically and in steadily decreasing numbers. In consequence, the old trade of "tie-hacking" is slowly dying out. Cordwood, both for domestic use and for the brickyards along the Hudson was formerly cut in large quantities, but to-day the few remaining brick plants are turning to coal and fuel oil. The increasing household use of coal, gas, or electricity for cooking and heating combined with the marked tendency to build smaller and more compact dwellings, without fireplaces and equipped with a central heating plant using either coal or fuel oil have served vastly to reduce the consumption of wood as fuel.

Chestnut posts, poles, and ties were also cut in considerable quantities, but the thorough-going invasion by the Chestnut bark blight has effectively terminated this traffic except for an occasional load of posts. There has been an occasional portable mill set, cutting a few thousand feet of rough hardwood plank, timbers, or wagon stock, but to-day these operations are rare.

Agriculturally, this section shifted about 1864 from dairying to the production of small fruits, while a number of acres have been abandoned and permitted to revert to forest cover of various sorts. Fifty years ago the amount of cleared land was far greater than now.

As it now stands, the Black Rock Forest is an excellent example of the mixed hardwood stands of the Hudson Highland portion of the Sprout Hardwood Region. Plate III shows the present growth and density of the entire forest.

### THE EFFECTS OF THIS PREVIOUS UTILIZATION

THE traces are plain of the abusive methods of exploitation which were practiced on the Forest up to about thirty years ago. Repeated clear cuttings, making no provision whatever for natural regeneration have perceptibly raised the percentage of the less valuable species and have greatly increased the number of stool sprouts. It appears that the formation and maintenance of these fast-growing and quickly-forming coppice stands may have been of marked effect in keeping down seedling growth either through shade-killing or stunting of the natural reproduction. And the generally universal practice hereabouts of clear cutting these coppice stands over a rotation of only thirty to forty years has probably helped to keep down the percentage of seedlings by removing the overwood before it attained sufficient size and vigor to function as a really effective source of seed.

Repeated fires, up to about twenty years ago, have also done their share of damage. Decayed butts and cat-faces are now common, and it is obvious that these regular scorplings have also had much to do with keeping down the natural seedling growth. The soil conditions display unmistakable evidence of the effects of these fires. Except in the coves and other moist areas which were probably less frequently burned over than were the drier sections, the general soil conditions appear to be noticeably below what they might have been, given adequate fire prevention. Both humus and leaf-litter deposits are scanty, rarely showing a depth in excess of three to four inches. It is believed that these impoverished soils can be rebuilt, but only after a lengthy period of protection from fires. With this there must be supplied such management of the various stands as will increase the fall



--- Compartment Boundary  
 - - - Stand or Type Boundary

Age Classes	Stand per Acre
a = 20-30 years	1 = 0-5 cords
b = 30-40 "	2 = 6-10 "
c = 40-50 "	3 = 11-15 "
d = 50-60 "	4 = 16-20 "
e = 60-70 "	5 = 21-25 "
f = 70-80 "	6 = 26-30 "

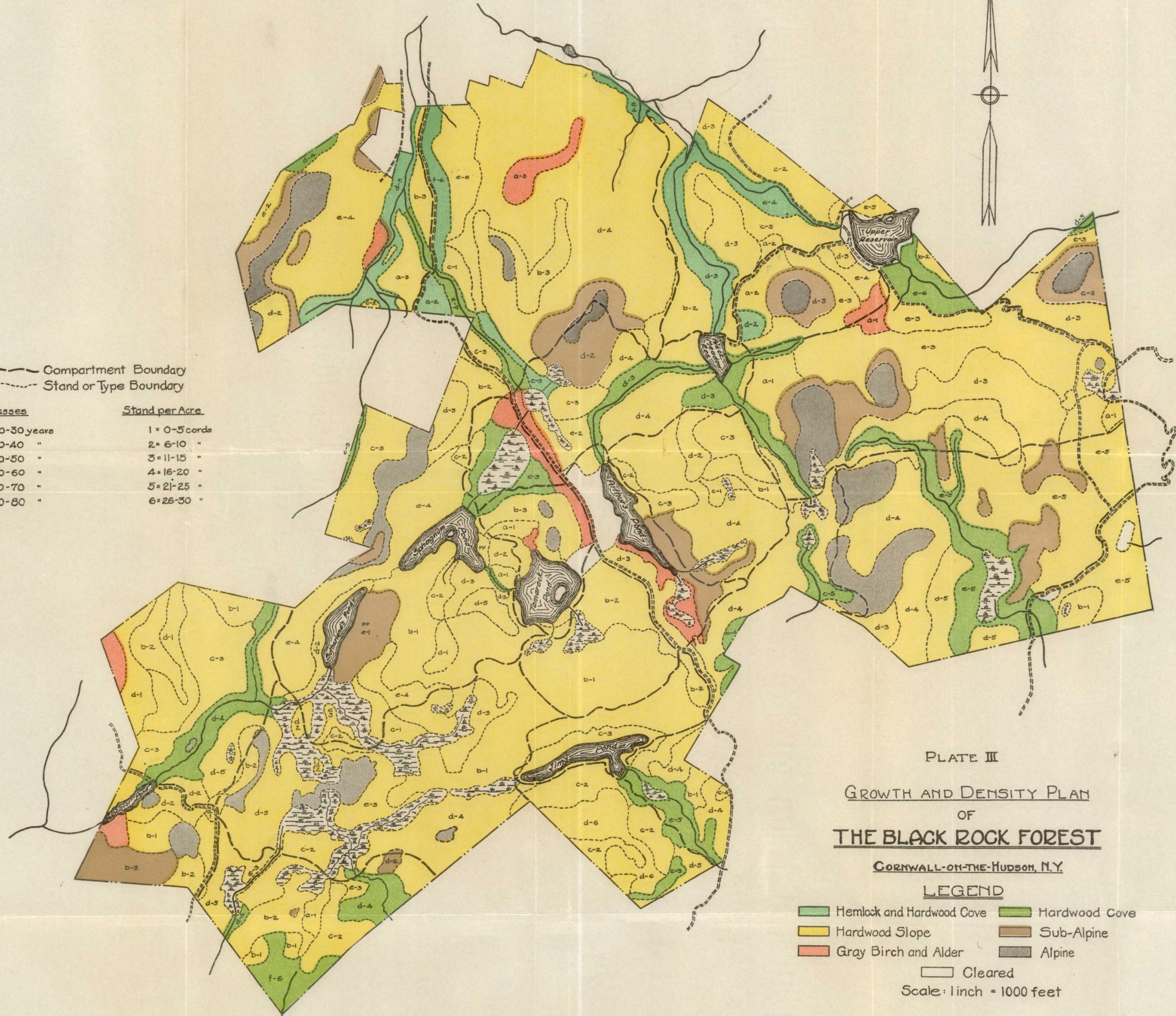


PLATE III  
 GROWTH AND DENSITY PLAN  
 OF  
 THE BLACK ROCK FOREST  
 CORNWALL-ON-THE-HUDSON, N.Y.

**LEGEND**

Hemlock and Hardwood Cove	Hardwood Cove
Hardwood Slope	Sub-Alpine
Gray Birch and Alder	Alpine
Cleared	

Scale: 1 inch = 1000 feet

and decomposition of leaf-litter, and encourage a steady infiltration of conifers from such seed trees as are now available.

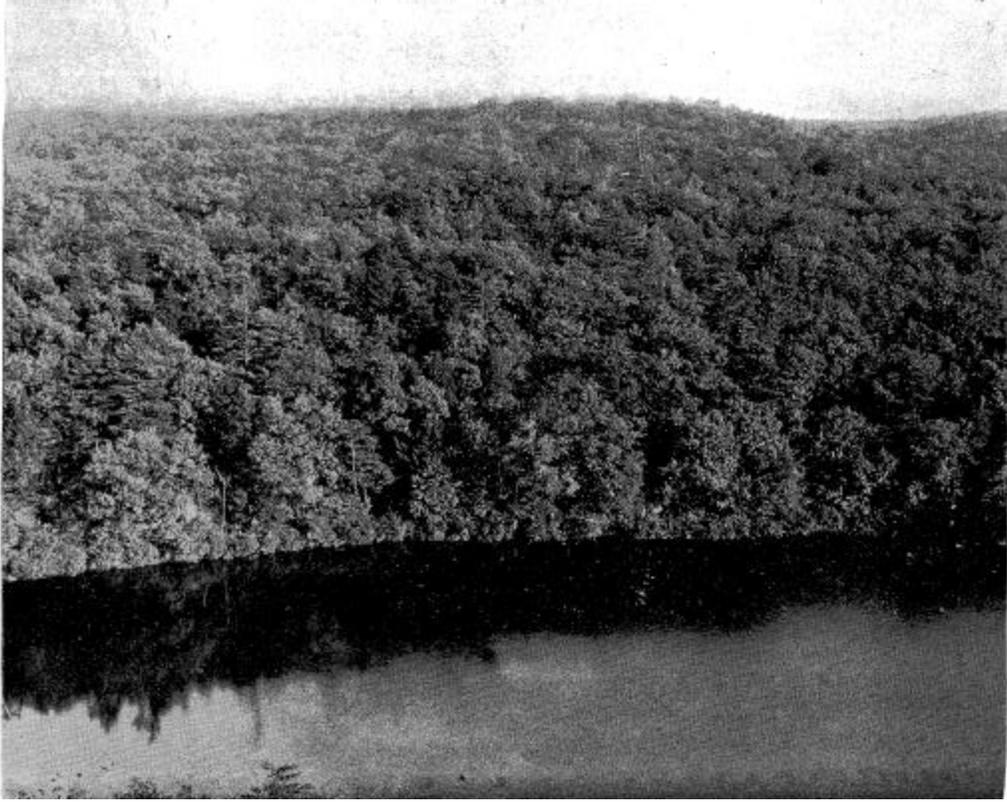
Our detailed examination of the Forest brings out that conifers, especially Hemlock, were formerly rather more abundant. To-day we have left perhaps a few dozen White and Pitch Pine, while the Hemlock is confined chiefly to the more moist sites which did not burn so readily. It is again evident that had these numerous fires been prevented, we would to-day have a far larger acreage of mixed stands of Hemlock and hardwood. The future management of the Forest includes a definite purpose of soil-building, and the establishment of desirable types of mixed stands.

#### AREAS

The several land classifications of the Forest total as follows:—

Forested .....	2864.64	acres
Old Fields .....	27.60	
Pure Swamp * .....	54.17	
Roads and trails .....	87.30	
Water:		
Sutherland's Pond .....	9.2	acres
Sphagnum Pond .....	14.3	
Tamarack Pond .....	19.7	
Arthur's Pond .....	13.4	
Jim's Pond .....	12.1	
Beaver Pond .....	4.1	
	72.8	
Water Surface .....	72.8	
Islands .....	2.3	75.10
	75.10	
Total .....	3108.81	acres

\* This division covers the wet areas where no tree growth at present exists. It is entirely separate and distinct from the Hardwood Swamp type.



**PLATE IV. THE SOUTH SHORE OF SUTHERLAND'S POND. SHOWING WHITE PINE, HEMLOCK, AND HARDWOODS IN MIXTURE.**

## TYPES

SINCE we have no recognized, detailed type classification for this portion of the Sprout Hardwood Region, we shall for the present employ our own nomenclature. This has been worked out to accord with the several species mixtures now found in the Forest.

Until conditions warrant a change, we plan to use seven types: (1) Hardwood Swamp, (2) Hardwood Cove, (3) Hemlock and Hardwood Cove, (4) Hardwood Slope, (5) Sub-Alpine Hardwoods, (6) Alpine Scrub, and (7) Gray Birch and Alder. These divisions are based on data obtained from an intensive cruise of the area. They are weighted chiefly according to the association of species, giving due consideration to tree form and development. We ascribe the fluctuations in the distribution and development of the species primarily to variations in the water supply and in soil quality, since, save in the coves and on the benches and lower slopes the soil is quite uniformly granular and porous, while the maximum variation in elevation barely exceeds 1,000 feet. A complete list of species represented in Black Rock Forest is given in Table I.

We class all of our types as relatively permanent except the patches of volunteer Gray Birch and Alder which have invaded some of the abandoned farm clearings. All of these permanent types are marked by a high percentage of coppice. Stands of even-aged high forest, or of distinctly two-storied forest are not common. Blight-killed Chestnut is frequent on the Hardwood Flats, and especially so on the Hardwood Slopes.

TABLE NUMBER I  
LIST OF SPECIES IN THE BLACK ROCK FOREST

<i>Common name</i>	<i>Scientific name</i>
Black ash (Swamp ash)*	<i>Fraxinus nigra</i>
White ash	<i>Fraxinus americana</i>
Large-toothed aspen (Balm tree)	<i>Populus grandidentata</i>
Quaking aspen (Popple)	<i>Populus tremuloides</i>
Beech	<i>Fagus grandifolia</i>
Blue beech (Ironwood)	<i>Carpinus caroliniana</i>
Black birch (Sweet birch)	<i>Betula lenta</i>
Gray birch (White birch)	<i>Betula populifolia</i>
Paper birch	<i>Betula papyrifera</i>
Yellow birch (Silver birch)	<i>Betula lutea</i>
Red birch	<i>Betula nigra</i>
Butternut (White walnut)	<i>Juglans cinerea</i>
Red cedar	<i>Juniperus virginiana</i>
Black cherry	<i>Prunus serotina</i>
Choke cherry	<i>Prunus virginiana</i>
Pin cherry (Red cherry)	<i>Prunus pennsylvanica</i>
Chestnut	<i>Castanea dentata</i>
Dogwood	<i>Cornus florida</i>
White elm	<i>Ulmus americana</i>
Hemlock	<i>Tsuga canadensis</i>
Bitternut hickory	<i>Carya cordiformis</i>
Pignut hickory	<i>Carya glabra</i>
Shagbark hickory (Shellbark hickory)	<i>Carya ovata</i>
Hop-hornbeam (Ironwood)	<i>Ostrya virginiana</i>
Red maple (White maple)	<i>Acer rubrum</i>
Sugar maple	<i>Acer saccharum</i>
Black oak	<i>Quercus velutina</i>
Chestnut oak (Rock oak)	<i>Quercus montana</i>
Pin oak	<i>Quercus palustris</i>
Red oak	<i>Quercus borealis</i> var. <i>maxima</i>
Scarlet oak	<i>Quercus coccinea</i>
Scrub oak	<i>Quercus ilicifolia</i>
Swamp white oak	<i>Quercus bicolor</i>
White oak	<i>Quercus alba</i>
Black gum (Pepperidge, tupelo)	<i>Nyssa sylvatica</i>
Pitch pine	<i>Pinus rigida</i>
Red pine (Norway pine)	<i>Pinus resinosa</i>
White pine	<i>Pinus strobus</i>
Sassafras	<i>Sassafras officinale</i>
Shad Bush (Juneberry)	<i>Amelanchier</i> sp.
Black spruce	<i>Picea nigra</i>
Sycamore (Buttonball)	<i>Platanus occidentalis</i>
Black Walnut	<i>Juglans nigra</i>
Yellow poplar (Whitewood, Tulip)	<i>Liriodendron tulipifera</i>

\* Names in parentheses are local common names.

## 1—HARDWOOD SWAMP

Red Maple is the dominant species, forming on the average about 60% of the stand. In mixture with it are found Yellow and Black Birch, White and Brown Ash, White Oak, an occasional Red or Chestnut Oak, Yellow Poplar, Basswood, Hard Maple, Butternut and American Elm.

The soil is usually of high quality, frequently showing from ten to twenty inches of rich, black loam. The moisture content is high. Surface rock is apt to be common, but ledges and outcrops are infrequent.

Owing to frequent previous cuttings due to easy hauling in winter, such types are now almost entirely coppice with only an occasional standard. What reproduction appears is chiefly Red Maple with some White Ash, Yellow Birch, and Hard Maple. Litter and humus are usually present to respective average depths of 4-6 inches and 2-3 inches. Table II gives the composition.

TABLE NUMBER II  
ASSOCIATION OF SPECIES IN THE HARDWOOD SWAMP TYPE

<i>Species</i>	<i>Number per Acre</i>	<i>%</i>
Red Maple .....	247	56.9
Red Oak .....	64	14.7
White Ash .....	32	7.4
Chestnut Oak .....	32	7.4
White Elm .....	27	6.2
White Oak .....	16	3.7
Yellow Birch .....	16	3.7
	434	100.00

Average volume: 16 cords per acre.

## 2—HARDWOOD COVE

This type usually skirts the edges of swamps and the banks of the ponds and streams. The composition is



**PLATE V. THE HARDWOOD COVE TYPE BORDERING ON A BROOK AND CONTAINING CHIEFLY YELLOW BIRCH, RED OAK, SUGAR MAPLE AND BASSWOOD**



**PLATE VI. THE HARDWOOD COVE TYPE.**

**COMPARTMENT NO. VI. MARCH, 1930**



**PLATE VII. A SAPLING STAND OF COVE HARDWOODS ON A MOIST BENCH. INCLUDED ARE: RED OAK, YELLOW BIRCH, RED AND SUGAR MAPLES, YELLOW POPLAR, BASSWOOD, BEECH AND WHITE ASH.**

**COMPARTMENT NO. XIV. APRIL, 1930.**

given in Table No. III. Chestnut Oak and Red Oak easily predominate. This type, and the Hemlock-Hardwood Cove carry both the best timber as well as the highest promise of all the sites found on the Forest. While the trees show plainly the effects of former abuse and of fire damage, the average increment is fair and the bole forms are not bad despite the hardships which have been undergone. We are confident that these cove areas will respond readily and profitably to proper management.

The highest ultimate yields will probably be obtained on these areas. The existing percentages of White Oak, White Ash, Yellow Poplar and Basswood are not great, but the soils are of uniformly good quality, the water supply averages high, and we consider entirely possible gradually to decimate the less desirable species in favor of the more valuable ones. The percentage of stool sprouts is rather high. Reproduction includes Red Maple, Hard Maple, Chestnut Oak, White Oak, White Ash, some Yellow Poplar and lesser species.

Logging on these areas will be simple. Surface rock

TABLE NUMBER III  
ASSOCIATION OF SPECIES IN THE HARDWOOD COVE TYPE

<i>Species</i>	<i>Number per Acre</i>	<i>%</i>
Chestnut Oak .....	126	40.58
Red Oak .....	106	34.20
Red Maple .....	39	12.66
White Ash .....	16	5.22
White Oak .....	8	2.61
Yellow Poplar .....	6	1.93
Yellow Birch .....	3	1.03
Basswood .....	2	0.59
Hickory * .....	2	0.59
Beech .....	2	0.59
	310	100.00

Average volume: 26 cords per acre.

\*NOTE:—Includes *C. glabra*, *ovata*, and *cordiformis*.

is generally abundant, but the slopes are slight and accessibility is usually easy.

The supply of litter and humus is but 2-3 inches and 1-1½ inches respectively. This condition can in time be greatly improved as the general thrift of the stand is raised. Better crown development will yield an increasing leaf fall, while fire protection will enable this to function without loss or interruption.

### 3—HEMLOCK AND HARDWOOD COVE

These areas are practically identical with the Hardwood Coves just described, except that they contain a much higher percentage of Hemlock. This ranges from only a few trees to the acre to as high as seventy-five or more. The other factors are in general about the same as those given under the preceding type. The composition is found in Table No. IV.

TABLE NUMBER IV

ASSOCIATION OF SPECIES IN THE HEMLOCK-HARDWOOD COVE TYPE

<i>Species</i>	<i>Number per Acre</i>	<i>%</i>
Hemlock .....	70	33.2
Red Oak .....	50	23.7
Chestnut Oak .....	40	18.9
Hard Maple .....	17	8.06
Red Maple .....	11	5.24
Yellow Birch .....	10	4.74
Basswood .....	7	3.32
White Ash .....	6	2.84
	211	100.00

Average volume: 14 cords per acre.

### 4—HARDWOOD SLOPE

Such slopes are by far the most common type in the Forest. Table No. V shows the composition. Therein appear a few of the genera more commonly associated



PLATE VIII. OLD GROWTH HEMLOCK AND HARDWOOD COVE.  
*Compartment No. II. September, 1929.*

with the lower and more moist areas. This is doubtless due to the inevitable slight infiltration along the lower slopes by species throwing light, wind-disseminated seed.

Red Oak, often of good form and a high degree of thrift is most frequent, with Chestnut Oak of nearly equally good condition coming second. At present we feel that these two species, together with White Oak, are the chief trees to favor on these slopes.

The soil is granular and porous, with good drainage and a moisture content appreciably lower than is found on the benches and in the coves. Surface rock is frequent, occasionally forming small areas of true talus. Ledge outcrops are also common. The slopes range from gentle to precipitous, and in some cases operation will be difficult. The average chance can be accurately classed as fair.

TABLE NUMBER V

## ASSOCIATION OF SPECIES IN THE HARDWOOD SLOPE TYPE

<i>Species</i>	<i>Number per Acre</i>	<i>%</i>
Red Oak .....	114	48.9
Chestnut Oak .....	69	28.9
White Oak .....	20	8.6
Red Maple .....	10	4.3
Hard Maple .....	8	3.6
White Ash .....	3	1.0
Hemlock .....	3	1.0
Yellow Poplar .....	2	0.9
Yellow Birch .....	1	0.45
Black Birch .....	1	0.45
Hickory * .....	1	0.4
Basswood .....	1	0.4
Tupelo	} .....	0.2
Pitch Pine		
Asten		
	233.5	100.00

Average volume: 18 cords per acre.



**PLATE IX. A LOWER HARDWOOD SLOPE CONTAINING A HIGH PERCENTAGE OF DEAD CHESTNUT. THE FIRST TREATMENT OF SUCH AREAS WILL PROBABLY BE A CLEANING.**

**COMPARTMENT No. VI. MARCH, 1930.**



**PLATE X. A GOOD EXAMPLE OF THE HARDWOOD SLOPE TYPE AT ABOUT THE 1000-FOOT LEVEL.**

**COMPARTMENT No. VII. SEPTEMBER, 1929.**



**PLATE XI. THE HARDWOOD SLOPE TYPE AT ABOUT THE 1050-FOOT LEVEL.**

**COMPARTMENT NO. VIII. SEPTEMBER, 1929.**

## 5—SUB-ALPINE HARDWOODS

These upper types, usually found at or above the 1,100 foot contour, have as their outstanding characteristics short, stunted boles, a marked predominance of Chestnut Oak, generally thin, friable, porous soils, and a comparatively slow growth rate. The number of stems per acre is relatively low, and the stands present the familiar gnarled and twisted appearance with the perceptibly flattened crowns usually associated with stands growing at the upper altitudes. Small, grassy, park-like open areas are occasionally present. Table No. VI gives the composition.

TABLE NUMBER VI  
ASSOCIATION OF SPECIES IN THE SUB-ALPINE HARDWOOD TYPE

<i>Species</i>	<i>Number per Acre</i>	<i>%</i>
Chestnut Oak .....	137	62.37
Red Oak .....	59	26.83
White Oak .....	12	5.67
Hard Maple .....	9	4.22
Red Maple .....	2	0.91
	219	100.00

Average volume: 5.4 cords per acre.

## 6—ALPINE SCRUB

On the hill-tops, where the ledges lie very close to the surface, where surface rock is abundant with frequent outcroppings, where the soils are extremely shallow and porous and possess a proportionately low moisture content, are found dense stands of Scrub Oak with rather more open stockings of scrubby, dwarfed and wind-blown Red, Chestnut, and White Oak, with an occasional Red Cedar and Pitch Pine. Open, grassy patches are common. These alpine areas are classed as true protection forests and should be handled as such. The sites are of



PLATE XII. SUB-ALPINE HARDWOODS AT ABOUT THE 1250-FOOT LEVEL.  
*Compartment No. VI. January, 1930.*

such indifferent quality that, for the present, we do not regard them as capable of producing anything but watershed cover. For composition see Table VII.

TABLE NUMBER VII  
ASSOCIATION OF SPECIES IN THE ALPINE SCRUB TYPE

<i>Species</i>	<i>Number per Acre</i>	<i>%</i>
Scrub Oak .....	968	81.7
Red Oak .....	105	8.9
Cherry sp. ....	56	4.7
Chestnut Oak .....	32	2.7
White Oak .....	10	0.95
Pitch Pine .....	8	0.7
Red Cedar .....	4	0.35
	1183	100.00

There is no commercial yield on these types.

#### 7—GRAY BIRCH AND ALDER

These secondary types are the volunteer weed growth which has invaded the abandoned clearings. While Gray Birch has infiltrated a bit into some of the previous clear cuttings it has rarely gained much of a foothold, owing probably to the rapidity with which shade was formed by the competing sprout growth.

Where such volunteer growth occurs it is usually in pure stands. The soils are fair to good, as might be expected on what was once farm land; both rock and ledge are scanty and the moisture content is ample for good tree growth.

These weeds are difficult to remove except through some expensive process of complete type conversion. At present such stands offer no return save as mediocre fuel.



PLATE XIII. THE ALPINE SCRUB TYPE AS FOUND ON TOP OF RATTLESNAKE MOUNTAIN. INCLUDED ARE:—SURFACE ROCK AND LEDGE OUTCROP; LICHENS; PRUNUS; KALMIA; VACCINIUM; PINUS RIGIDA; QUERCUS ALBA, MONTANA, BOREALIS AND ILICIFOLIA.

*Compartment No. XIV. September, 1928.*

TABLE NUMBER VIII

<i>Type</i>	<i>Total Forested Acreage</i>
Hardwood Swamp .....	110.3
Hardwood Cove .....	265.7
Hemlock and Hardwood Cove .....	66.7
Hardwood Slope .....	2042.84
Sub-Alpine Hardwoods .....	166.6
Alpine Scrub .....	152.1
Gray Birch and Alder .....	60.4
	2864.64

## VOLUME

OUR present estimate of the volume is on a cordwood basis. A few boat fenders and an occasional railroad tie were found, but these are so infrequent that we prefer, for the time being, to carry everything in cords. Table No. IX shows a specimen form of our detailed compartment summary, giving a description of each unit stand area within the compartment.

TABLE NUMBER IX  
COMPARTMENT NUMBER XVI

<i>Sub-com- partment</i>	<i>Type *</i>	<i>Area (Acres)</i>	<i>Age Class</i>	<i>Stand per Acre (Cords)</i>	<i>Present Volume (Cords)</i>
1	A	1.0	....	..	...
2	HS	10.7	60-70	16	171
3	"	8.7	30-40	4	35
4	"	50.0	40-50	14	700
5	"	22.0	50-60	3	66
6	"	15.0	30-40	8	120
7	"	15.0	50-60	3	45
8	"	16.0	" "	21	336
9	"	2.7	30	7	19
10	"	0.25	"	7	2
11	"	1.0	"	5	5
12	"	6.9	50-60	9	72
13	HC	30.3	" "	17	515
14	GB&A	5.7	....	..	...
Totals .....		185.25			2086

\* NOTE:—These abbreviations are the initial letters of the seven types previously described.

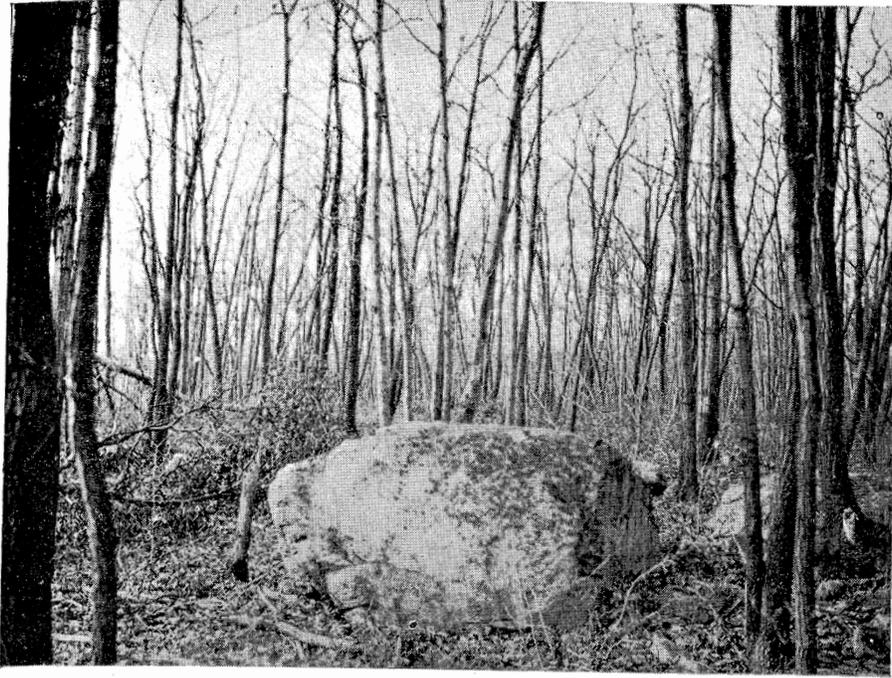


PLATE XIV. SUCH BEDS OF GLACIAL BOULDERS ARE NOT UNCOMMON.  
*Compartment No. XXII. January, 1930.*

### UTILIZATION

At present the tract contains very little saw-timber. Where such few stands do occur (usually on the benches and in the coves) the growth rate is usually so high, and the opportunity so good for various interesting practical applications of the several cutting systems that we deem it wiser to forego the immediate financial returns possible from these portions and, instead, make them serve a term as research material. There should be no real loss thru this delay, as these stands are in no case actually at full commercial maturity. Rather will the waiting period under proper management serve perceptibly to increase the value of the first final cuttings from these areas.

Cordwood, charcoal, dunnage, boat fenders and a few



PLATE XV. COVE HARDWOOD TYPE OF GOOD QUALITY. THE MIXTURE CONTAINS: RED, CHESTNUT, AND WHITE OAK; RED AND SUGAR MAPLE; WHITE AND BROWN ASH; YELLOW POPLAR AND BASSWOOD. THE SOIL IS GOOD AND INCREMENT BORINGS SHOW A GROWTH ABOVE THE AVERAGE. THIS IS EVIDENTLY ONE OF THE MORE MOIST AREAS WHICH HAS RARELY BEEN BURNED OVER.

*Compartment No. XIV. April, 1928.*



PLATE XVI. A CLOSE-UP OF A PORTION OF THE AREA SHOWN IN PLATE XV, TAKEN AFTER A CLEANING COMBINED WITH A LIGHT THINNING UNDER THE GERMAN SYSTEM.

*Compartment No. XIV. April, 1929.*

railroad ties will be the chief products for some years. When our managed areas are in line for their second cuttings, the yield of fuelwood should show a decline with an appreciable increase in the cut of fenders and ties. As the general condition of the stands is improved, other products will of course become available. Sawlogs, veneer logs and piling are certain to materialize under continued management.

Blight-killed Chestnut, which is present in varying amounts on nearly all of the drier sites, has practically no market value at all save as kindling wood or as an occasional load of posts or vineyard stakes.

There is a fair and steady local demand for hardwood charcoal. Our potential production of this will be worked out. New York City offers the best market for fuelwood and dunnage, while the two railroads serving the town of Cornwall make the sale of ties a certainty.

### FOREST PROTECTION

FIRE is our chief danger. But, owing to our policy of partially restricted public use combined with our being located somewhat away from the travelled roads, we are not often troubled. Our exterior lines and a number of our trails are kept cleared out to a width of twenty-five feet to serve as fire-lines or, in an extreme case, as a possible starting-point for a backfire. The Forest is patrolled daily from March 1 to the middle of November. Our trails are posted with signs warning travellers not to build fires without a permit, and to exercise proper care in smoking.

One fire tower is maintained. This, coupled with the range of vision afforded from the bare summit of Black Rock Mountain makes it possible to scan virtually our entire acreage. The forester and all the rangers carry commissions as State Forest Fire Wardens; each of these

men lives near the Forest and has a telephone and either a car or a truck together with a supply of shovels, rakes, hoes, and knapsack pumps. It is possible to mobilize a fire-fighting crew on very short notice.

### MANAGEMENT POLICY

This can be briefly set forth. Since our data are as yet insufficient to afford a reliable basis for even an approximation of a working plan, our operations have been tinged with caution. All our cuttings are regarded as experimental; and it is not unlikely that we may have erred on the side of conservatism in our marking, as it is at present impossible to make final choice either of the species to be favored or as to the most suitable cutting systems. Our object is a sustained maximum annual yield. We prefer to approach this goal gradually but surely; and we deem it better to make perhaps an occasional extra cutting in lieu of committing the serious error of too drastic exploitation.

### PUBLIC USE

The Forest is open to public use by anyone who will treat it properly. Hunting is permitted, but fishing is prohibited save in Sutherland's Pond and in the streams. Hikers and picnickers are allowed provided they will not leave litter about. Camping and the building of fires may be done by permit only; and we are endeavoring to educate what few campers we have into using nothing but dead and fallen timber for camping purposes. The fire permits are issued by the forester; they are non-transferable; they must be signed by the recipient and displayed on request to all wardens and rangers; and they are of course liable to either temporary or permanent cancellation at any time.



**PLATE XVII. AN EXAMPLE OF THE HARDWOOD SLOPE TYPE AT ABOUT THE 1200-FOOT LEVEL JUST BEFORE BEING CLEANED AND THINNED LIGHTLY UNDER THE FRENCH METHOD. THIS AREA SUFFERED A VERY SEVERE BURN IN 1911. A GOOD AMOUNT OF RED MAPLE AND WHITE OAK REPRODUCTION IS NOW PRESENT. DECAY BUTTS ARE COMMON IN THE OVERWOOD.**

**COMPARTMENT NO. XXII MARCH, 1930**



**PLATE XVIII. THE AREA SHOWN IN PLATE NO. XVII AFTER TREATMENT. NOTE THE AMOUNT OF SEEDLING REPRODUCTION.**

**COMPARTMENT No. XXII. MARCH 1930.**

No permanent structures of any sort are allowed save for our own toolhouses and camps.

### THE PLAN

THE chief aim of this laboratory is the determination of which silvicultural systems should be applied to the several types here represented to bring the land to the highest possible point of sustained, profitable forest crop production and to so maintain it.

The principal method of attack will be through the establishment of numerous experimental cuttings combined with adequate office records and photographs. Soil profiles and analyses will be periodically recorded and data on growth and yield will be gathered simultaneously with the cuttings. Some reforestation and underplanting will also be carried on. Our object is not, for the present at least, the construction of a working plan for the Forest. That will automatically crystallize at a later date.

Our immediate need is to set up, as rapidly as we can, a varied assortment of different experimental cuttings. Owing to the lengthy period of over-exploitation which has preceded the present ownership, nearly all of these must be weedings and cleanings combined with varying amounts of the basic work of the cutting system selected for the particular area in question.

Each project will of course be properly recorded, and monographs will appear from time to time either as progress reports or embodying our final conclusions.



PLATE XIX. THE ISLAND IN TAMARACK POND. THIS, A TRUE SPECIMEN OF THE NORTHERN SWAMP FOREST, IS AN INTERESTING EXAMPLE OF ONE STAGE IN THE XEROPHYTIC SUCCESSION. BLACK SPRUCE AND ERICACEOUS PLANTS ARE FREQUENT.

*Compartment No. XI. July, 1929.*

