

THE HARVARD FOREST MODELS

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OF
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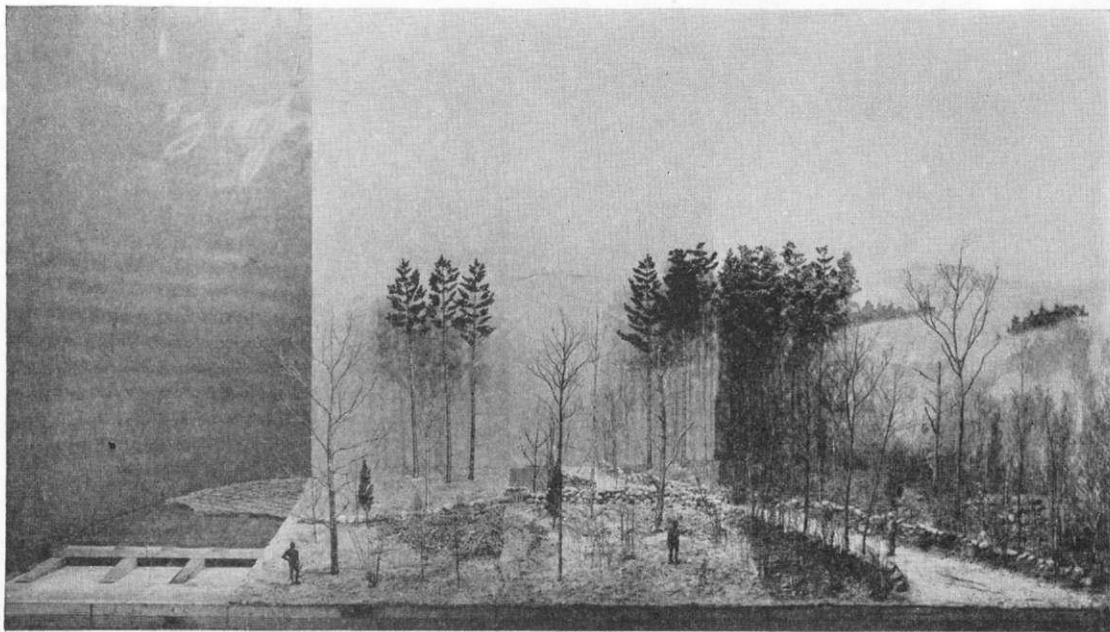
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INTRODUCTION

THESE models were made to illustrate, first, the forest history of central New England, and second, the methods of treatment of existing stands as developed at the Harvard Forest at Petersham, Massachusetts.

The models were made in the studios of Guernsey and Pitman, Cambridge, Massachusetts. The first eight models were made under the direct supervision of the late Professor K. T. Fisher, first director of the Harvard Forest, 1907-1934. The construction of the subsequent models has been directed by Mr. Albert C. Cline, Assistant Director.

As soon as the suggested Fisher Museum of Forestry is completed at Petersham, these and future models illustrating further technical forestry practice will be permanently installed therein.



DEMONSTRATION MODEL

THIS model shows the various stages of construction.

At the extreme left (Section 1) is shown the base with firmly built-up foundation covered with wire screen. In front is the wire armature on which the wax figure is built.

Section 2 shows the first casting of plastic surfacing compound in place and the partially modeled terrain. The trees are built up of fine copper wire following careful drawings done to scale and showing the characteristics which identify the various species. The needles of the conifers and the leaves of the deciduous trees are of sheet copper, each unit of which is attached to a wire. These separate units are assembled and twisted to form boughs. In the same manner the wires alone are twisted to make the bare branches of the hardwood trees. The wax figure, in this section, is shown roughly modeled, unclothed, thus assuring correct musculature and action.

In Section 3 the modeling of the terrain has been completed and the preliminary painting applied to a portion of the surface. The trees have been soldered and a priming coat of paint put on. The figure has been clothed, completing the modeling, then varnished and made ready for final painting.

Section 4 shows the finished model.



No. 1. HISTORICAL SERIES

PRIMEVAL FOREST OF CENTRAL
NEW ENGLAND

1700

BECAUSE of location within a zone of overlapping of the Northern Forest and Central Hardwood Forest, virgin timber stands of the region supported a great variety of species, both coniferous and broad-leaved. White pine, the principal commercial species, attained heights of 140 to 150 feet and diameters of 3 to 4 feet at mature ages of 300 to 400 years. Associated with the pine, and always of lesser height, were trees of such shade-tolerant species as hemlock and red spruce, beech, yellow birch, and hard maple together with smaller representations of red and white oak, paper birch, ash, elm and cherry. Only in large openings caused by blowdown, fires (started by Indians or by lightning), or other catastrophic agencies did the light-demanding "weed" species so common in present day forests succeed in gaining a foothold.

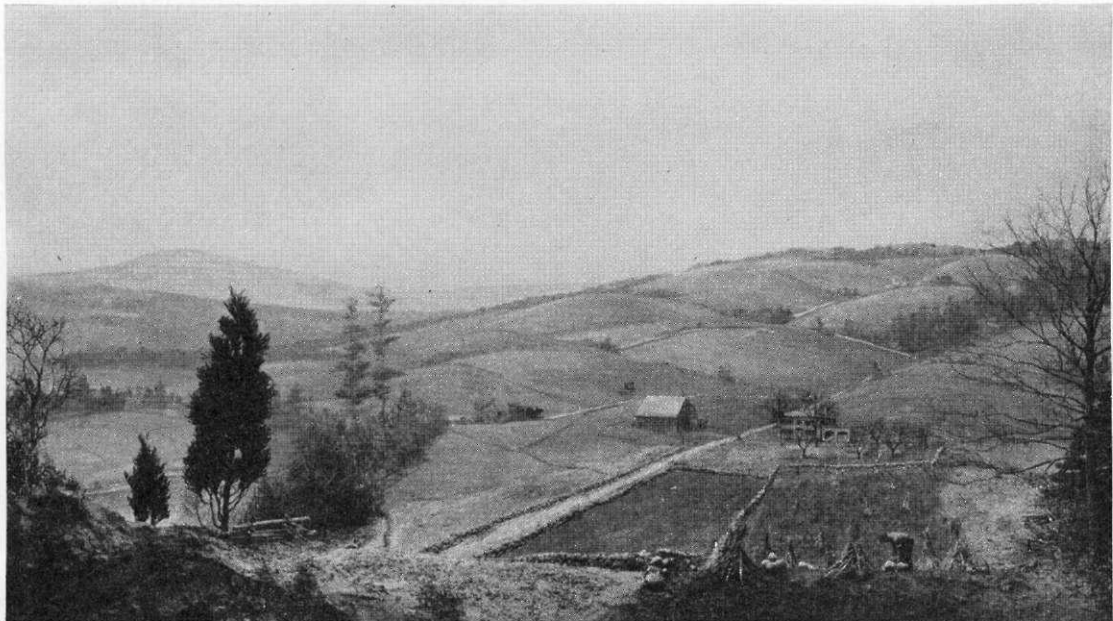


No. 2. HISTORICAL SERIES

AN EARLY SETTLER CLEARS
A HOMESTEAD

1733

THE primeval forest has been cut down. From the home site and areas to be cultivated all stumps have been removed, and many of the loose stones used to build walls. Elsewhere, as in the foreground, stump land is being used for pasture. In the haste of clearing the ground to plant crops great quantities of wood were piled and burned. On the right is a piece of the original forest from which the settler will obtain his future supply of fuel wood and many other products for domestic use—the forerunner of the modern farm wood lot.

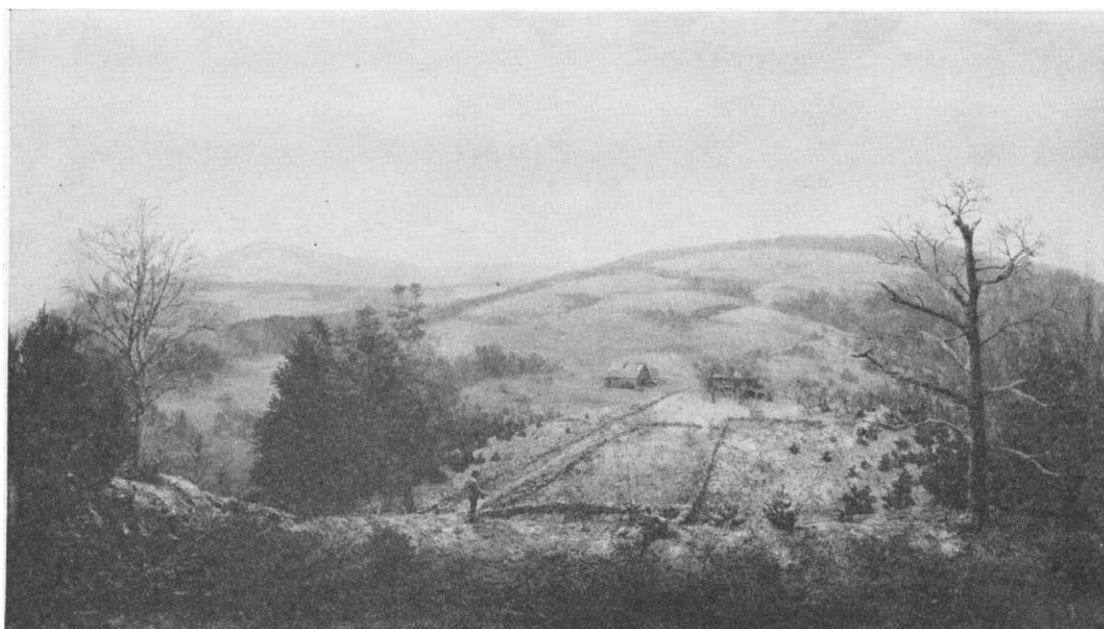


No. 3. HISTORICAL SERIES

HEIGHT OF CULTIVATION FOR FARM CROPS

1830

THE descendants of the first settlers have cleared nearly 70 per cent of the land for tillage and pasturage. The original cabin has been replaced with a commodious farm house. Roads lead to the village and to the homes of neighbors. All of the stump land has been cleared, and stone walls or rail fences encompass every field and pasture. Most of the remaining stands of old growth timber have been culled of the best trees to meet the greatly enlarged needs of agriculture and industry. During this period the population of the Town of Petersham was two and a half times that of the present day.



No. 4. HISTORICAL SERIES

FARM ABANDONMENT

1850

WITH the opening to settlement of the rich lands of the West, the building of the railroads, and the rapid growth of industrial centers, thousands of farmers abandoned the rocky soils of the New England hills to seek a more comfortable living elsewhere. There followed soon the Civil War with the culmination of a decline in population which exceeded 50 per cent. The old farm buildings are neglected, brush and weed hardwoods overgrow the walls, and white pine has begun to seed in the idle fields and pastures. Fortunately, sod and grassland furnish an excellent seed bed for pine.



No. o. HISTORICAL, SERIES

THE ABANDONED FARM PRODUCES A
CROP OF WHITE PINE

1910

COMPLETELY seeded 60 years ago by nearby pine seed trees, the abandoned fields have yielded a valuable "second growth" stand which is being clear cut to make lumber for such products as boxes, pails, match sticks and woodenware. The logs are hauled to a portable, steam sawmill set up near the pond, and the lumber is piled not far distant. The income from this wholly volunteer crop proved a boon to many non-resident owners who had thought of their New England heritage as rich in memories but poor in visible assets.



No. 6. HISTORICAL SERIES

THE "OLD FIELD" PINE IS FOLLOWED BY HARDWOOD

1915

FIVE years after logging, the cutover pine lot now supports, between the windrows of slash, a young stand of hardwoods composed of sprouts and seedlings of many species. The sprouts originate from the very small stumps of the undergrowth in the previous stand, which was cut out of the way during the course of logging, and also from occasional large stumps of hardwoods which grew with the pine. The seedlings come from seed which is stored in the duff, or which blows in from nearby stands after logging. The sprouts from the large stumps and the trees of fast-growing weed species, like gray birch and poplar, tend to choke out the well-formed trees of valuable species desirable for a saw-timber crop.



No. 7. HISTORICAL SERIES

THE HARDWOOD STAND HAS REACHED
CORDWOOD SIZE

1930

TWENTY years after logging, the pine slash has disappeared, and the rapidly growing young hardwoods have closed in to form a complete cover over the soil. Coarse stump sprouts and other fast-growing but inferior individuals are in the lead and threaten to suppress many of the best-formed trees of the most desirable sawtimber species, such as white ash, hard maple, red oak, yellow birch, and basswood. At this age the stand is in urgent need of silvicultural treatment for the purpose of controlling the weed trees and encouraging the most promising crop trees; without such treatment the final crop will be largely cordwood. Proper handling will serve to produce an excellent sawtimber crop.



No. 1. SILVICULTURE SERIES

E A R L Y T R E A T M E N T O F A V O L U N T E E R H A R D W O O D S T A N D

ON THE fertile upland soils "old field" white pine is almost invariably followed by well-stocked stands of mixed hardwoods.

Left

Just prior to logging, the advance growth hardwood underneath a 60-year pine stand is cut close to the ground with brush scythes. The small stumps give rise to well-formed sprouts the first growing season after logging. The pine slash is burned either during or soon after logging.

Center

The first weeding, 6 years after logging. Trees of inferior species or form are cut down to favor and to free straight, single-stemmed trees of the most desirable species. Cutting is done with a machete.

Right

The second weeding, 10 years after logging. The quality of the future crop is further improved by the removal of inferior trees which have succeeded in gaining a dominant position.



No. 2. SILVICULTURE SERIES

WAYS OF INTRODUCING GROUPS OF WHITE PINE IN VOLUNTEER HARDWOOD STANDS

ON THE medium quality soils it is often advantageous to introduce groups of conifers among the hardwoods, particularly on the dry knolls, where hardwood stocking is poor and the growth of the better hardwood species very slow.

Left

White pine established by planting 2 years after logging. Delay in planting is on account of the Pales weevil. Hardwoods will be favored on the lower and richer parts of the cutting area, pine on the drier and more exposed parts.

Center

Pine established by the "Shelterwood Method," in which seedling reproduction is induced to come in under the parent stand by a series of partial cuttings. The first weeding, 4 years after the final cutting of the previous stand, is in progress.

Right

Pine established by cutting the previous stand in a seed year, 7 years ago. In this case the lumberman did not burn the slash and left worthless hardwoods, which now are being girdled. Weeding is in progress to free pine and desirable hardwoods from overtopping trees of inferior species or form.



No. 3. SILVICULTURE SERIES

FIRST THINNING IN MIXED WHITE PINE AND HARDWOODS

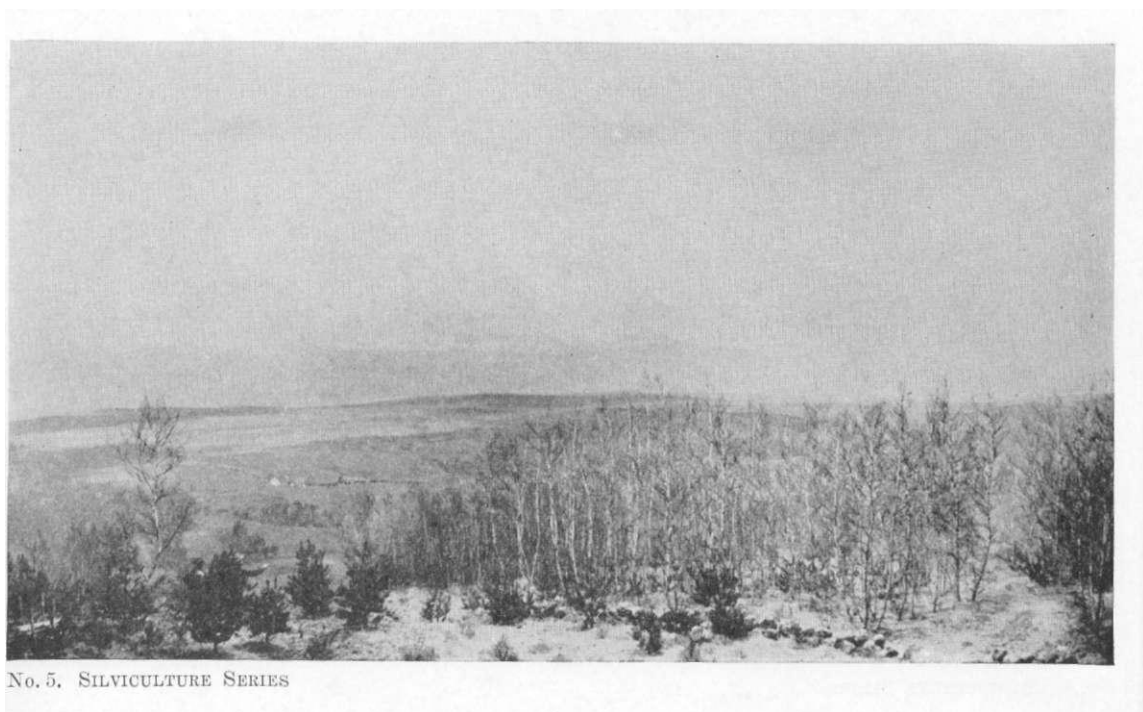
THE object of thinning is to increase growth rate by reducing the number of trees. In this 25-year-old stand the hardwood section is being thinned according to the French Method of "thinning from above." The crop trees are given more room for the expansion of their crowns by cutting neighboring trees whose crowns form part of the main canopy, especially inferior trees with over-developed crowns and very slender ones (whips) which cause damage by abrasion. All overtopped trees (trainers) are left to improve the quality of the crop trees by assisting in the natural pruning of the lower branches. The pine group has been thinned according to the German Method of "thinning from below," in which suppressed and partially overtopped trees are removed.



No. 4. SILVICULTURE SERIES

THIRD THINNING IN MIXED WHITE PINE AND HARDWOODS

THIS is the same stand as shown in Model No. 3 at the time of the first thinning. It was thinned a second time when about 35 years of age. It is now 50 years old, and for its continued vigorous and profitable growth as a high quality sawtimber crop more trees must be removed. In the third thinning, now in progress, the trees favored for leaving, the crop trees, are the choicest individuals of a well balanced variety of commercial species, including white pine, white ash, red oak, hard maple, paper and yellow birch. They have by now reached diameters of from 12 to 15 inches and heights of from 60 to 70 feet. Sufficient space is left between the crowns to provide for their unhampered expansion during the next 10 to 15-year period. Crown expansion is closely related to diameter growth in the bole. The thinning will yield more than enough return from saw logs and cordwood to pay for its cost.



RELEASE OF WHITE PINE FROM SUPPRESSION BY GRAY BIRCH

BECAUSE of the present scarcity of pine seed trees and the abundance of gray birch, fields abandoned within recent years often are seeded to an even-aged mixture of the two. The birch, though short-lived as compared with pine, grows much more rapidly at the start and, in the absence of release cutting, suppresses and kills the more valuable associated white pine. Release cuttings should be made before the stand is 20 years old.

Left

After release. The gray birch has been cut into cordwood for fuel.

Right

Before release.



No. 6. SILVICULTURE SERIES

CONVERSION OF CORDWOOD TO FUTURE SAWTIMBER

Left

An area planted several years ago. Overtopping hardwood sprout clumps and other weed trees are being cut back with a machete to free a plantation of white pine and European larch.

Center

Planting a stand of mixed conifers immediately following the removal of the cordwood and burning the slash.

Right

Uncut portion of a stand of inferior hardwoods, good only for cordwood, composed of such species as gray birch, poplar, red maple, and pin cherry—a stand not worth saving for future growth.



0. 7. SILVICULTURE SERIES

PRUNING WHITE PINE

ARTIFICIAL pruning of the lower branches offers the only means of obtaining clear lumber in white pine stands grown to the usual cutting age of 50 to 70 years.

Left

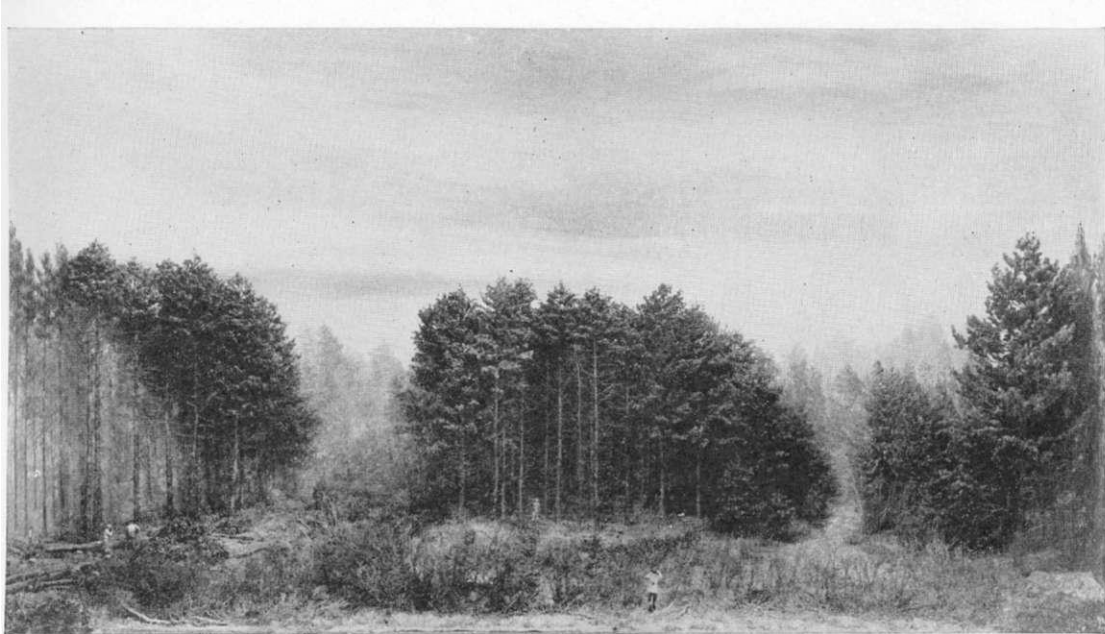
First pruning treatment in a well-stocked stand of natural origin, 18 years old. About 200 per acre of the straightest dominant trees are selected for pruning. Even this comparatively small number is more than enough to form the final stand.

Center

Final pruning in a well-stocked stand of natural origin, 23 years old. The butt logs of the selected crop trees have now been completely cleared of branches, and clear wood will be produced during the remainder of the rotation.

Right

Improving a severely weeviled pine plantation by pruning enough of the straightest trees to form a final crop, and girdling the over-topping weeviled "scrubs" with a chain saw. Generally, the best-formed trees are found in the co-dominant and intermediate crown classes, the forked and crooked trees in the dominant crown class.



No. 8. SILVICULTURE SERIES

GROUP SELECTION METHOD OF NATURAL REPRODUCTION

WHITE pine on very light, sandy soils is generally uneven-aged, and it has been found that heavy cutting encourages the development of dense mats of blueberry which hinder reproduction. For these reasons a partial cutting system is best employed.

Left

Mature pine group being clear cut. This area will be seeded by the remaining middle-aged groups.

Center Background

Middle-aged pine group which will be cut 10 to 15 years hence.

Center Foreground

Area from which a mature pine group was cut 10 years ago. Pine reproduction is most abundant on the two moss beds.

Right

A bed of reindeer lichen in a natural opening in the stand. Reproduction has been very slow in establishment, except under the clump of gray birches which has acted as a "nurse tree" to the pine.